ITIF
The Information Technology & Innovation Foundation

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Before the
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In the Matter of

Protecting and Promoting the Open Internet	))))	GN Docket No. 14-28

Comments of ITIF

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I. Introduction and Summary

The Information Technology and Innovation Foundation ("ITIF")[1] has long been interested in appropriate methods to promote the Open Internet and welcomes this opportunity to comment in the above captioned proceeding.[2] As early as 2006, in a paper co-authored with Phil Weiser, ITIF recommended a "third-way" solution to the network neutrality debate, allowing for case-by-case analysis of acceptable traffic prioritization.[3] At its core our "third way" framework was grounded in the notion that the Internet has never been "neutral" and that discrimination can be pro-innovation and pro-consumer or anti-innovation and anti-consumer. Broad dictates like "all prioritization should be banned" or "all prioritization should be allowed" are not helpful to achieving the kind of Internet that will be central to driving to innovation and consumer welfare in the decades ahead.

Eight years later, ITIF appreciates Chairman Wheeler's proposal to use the authority granted under section 706[4] to both allow innovation and consumer-welfare enhancing prioritization while at the same time policing commercially unreasonable conduct.

Indeed section 706 gives the Commission ample jurisdiction to prohibit those rare instances of discrimination that would undermine the "virtuous circle" of innovation we see in

[1] 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.

[2] *Protecting and Promoting the Open Internet*, GN Docket No. 14-28 (May, 2014) Notice of Proposed Rulemaking.

[3] Robert D. Atkinson and Philip J. Weiser, "A 'Third Way' on Network Neutrality" May, 2006, http://www.itif.org/files/netneutrality.pdf.

[4] In discussing "Section 706" we refer, of course, to both 706(a) and 706(b) of the Communications Act, 47 U.S.C. § 1302(a)-(b).

Internet services driving demand for connectivity and underlying infrastructure. However, the Commission should take care that Open Internet rules are not so over-broad as to prevent beneficial new arrangements that further support such a cycle. In many contexts, prioritization of traffic enables innovation and new business start-ups and should be supported, not prohibited.

Questions of particular network management practices are often quite complex – determining the appropriate balance of security, innovation, network integrity, consumer protection, etc., is not a straightforward process. A case-by-case approach that allows for some subtlety and nuance in regulating appropriate network management is to be preferred to an over-broad, proscriptive rule that would likely limit the Internet's potential to become the multi-purpose platform it promises to be.

Regardless of exactly where the Commission draws the line between "good discrimination" and "bad discrimination," classification of broadband as a Title II telecommunication service is unnecessary and inappropriate. This is especially true now that the authority to regulate broadband as an information service has been confirmed in January's *Verizon* decision.[5] The threat to Internet "openness" posed by commercially reasonable business arrangements is minimal in comparison to the confusion and likely unintended consequences of Title II classification.[6]

It is both unfortunate and troubling that the Commission's section 706 proposal has been characterized as opening up paid "fast lanes" and "slow lanes" – these fears are simply not realistic. Every major U.S. ISP has committed to an open Internet and to not degrading Internet

[5] Verizon v. FCC, 740 F.3d 623 (D.C. Cir. 2014) ("*Verizon*").

[6] Indeed, the only real case of abuse of network power with regard to "network neutrality" was the Madison River case, which was easily resolved through consent decree in 2005. Madison River Communications, LLC and affiliated companies, File No. EB-05-IH-0110, *Consent Decree*, https://apps.fcc.gov/edocs_public/attachmatch/DA-05-543A2.pdf. Granted, Madison River was under investigation for violation of section 201(b), but VoIP port blocking would certainly be considered "commercially unreasonable" under rules based on section 706.

traffic. It is very unlikely that any commercially reasonable business arrangements would threaten that openness. Moreover, recent improvements to broadband infrastructure, widespread deployment of Content Delivery Networks, and implementation of improved Active Queue Management (AQM) algorithms mean that fears of ISPs making a business case out of scarce bandwidth are largely a thing of the past. It is unlikely that the so-called "fast lanes" will become the norm or required for the vast majority of applications.

Rather than widespread "tolls" that threaten start-ups, paid prioritization or Quality of Service (QoS) agreements will likely occur at the margins, largely focused on enabling a limited set of high-bandwidth, latency-sensitive applications, many of which may very well be developed by new startups that, without the ability to access networks that can recognize specialized application needs, would never get off the ground. In short, there is little reason to fear "fast-lanes" becoming standard on the Internet – "best-efforts" networking will continue to serve the vast majority of applications quite well, as it does today. But enabling the Internet to evolve into a system of "smart pipes" will only add to the potential of the Internet to continue to drive innovation and productivity.

As such, while the Commission is right to encourage broad participation and feedback in this process, policy should not be driven by misunderstanding, Internet "ideology" or intentional mischaracterization designed to stoke populist fears. The future of the Internet is too important to be left to such forces.

II. The Commission Should Rely on Section 706 for Legal Authority of its Rules Promoting and Preserving the Open Internet

The appropriate jurisdictional hook for the regulations has been the focus of discussion in the several weeks since the Commission's Open Internet proposal made the news. ITIF argues that section 706 is the appropriate framework for these rules for several reasons. Section 706

gives the Commission ample authority to pursue strong but flexible rules that can best promote an open Internet without the need for the outmoded rules of Title II. Section 706 can provide all the tools the Commission needs to protect the open Internet.

A. Section 706 gives ample authority for Open Internet regulations

The *Verizon* decision made clear that the Commission has the "authority to promote broadband deployment by regulating how broadband providers treat edge providers. . ." – it is important to pause and recognize that this was, up until the *Verizon* decision, not a settled point of law.[7] There is now a clear path forward to developing appropriately flexible and light-touch regulation of the Internet, and the Commission is right to explore this approach. Previous discussions probing a Title II classification of broadband services made sense when it was unclear whether the Commission had any regulatory power over the predominant communications platform of the day,[8] but now that its jurisdiction under section 706 is confirmed, reclassification is not justified.

As recognized by the D.C. Circuit Court and reiterated in the NPRM, there is a "virtuous cycle" between the different actors in the Internet ecosystem whereby new services drive demand for increased network investment.[9] Anywhere that this cycle is compromised, where actions by a broadband provider threaten to reduce demand for edge services, the Commission has the authority to step in.

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[7] *Verizon*, 740 F.3d 649.

[8] *See, e.g.*, Julius Genachowski, "The Third Way: A Narrowly Tailored Broadband Framework," *FCC* (May 2010), https://apps.fcc.gov/edocs_public/attachmatch/DOC-297944A1.pdf (stating that the *Comcast* decision "create[d] serious uncertainty about the Commission's ability, under this approach, to perform the basic oversight functions, and pursue the basic broadband-related policies, that have been long and widely thought essential and appropriate" under Title I).

[9] *Verizon*, 740 F.3d 644-45; NPRM at para 26.

Section 706 therefore gives the Commission the ability to craft an appropriate non-discrimination standard allowing for only those commercial arrangements that are welfare enhancing. There is opportunity for arrangements, both commercial and non-commercial, that are not strictly "neutral" yet do not threaten the openness of the Internet as a platform for innovation, free expression, and exploration of new services – a flexible framework under section 706 allows those arrangements to grow with the appropriate oversight.

Although *Verizon* limits the Commission from exercising its ancillary authority for broad, *ex ante* prohibitions on discrimination that amount to common carrier regulations, a case-by-case approach under 706 nevertheless provides very strong protections in the public interest. The Commission should seize the opportunity to carefully define "commercially reasonable" conduct to quickly bring clarity to an area long plagued by uncertainty.

B. Classifying broadband as a Title II Telecommunications Service would be inappropriate

All of the harms net neutrality regulations are designed to prevent have thus far been almost exclusively hypothetical. To date there has been only one example of obviously anti-competitive action by a broadband provider, which was quickly resolved despite the lack of a rigid regulatory structure in place.[10] Virtually every broadband provider has made public commitments to the open Internet and has little interest in stifling its innovation or in blocking or degrading traffic. It is the bounty of the open Internet that brings customers to broadband providers. The incredibly valuable innovation on the edge of the network is what drives demand for ISPs broadband product to begin with – disruption of that edge innovation would be against those companies' interest.

[10] Madison River Communications, LLC and affiliated companies, File No. EB-05-IH-0110, *Consent Decree*, https://apps.fcc.gov/edocs_public/attachmatch/DA-05-543A2.pdf.

Indeed, in the last several years, while the net neutrality debate has continued along the same terms, much has changed. Indeed, we have come a long way since then SBC CEO Ed Whitacre proclaimed that "for a Google or Yahoo! or Vonage or anybody to expect to use these pipes [for] free is nuts!"[11] Everyone recognizes and agrees upon the importance of an open Internet as a technological platform for speech, innovation, and commerce, including all major broadband providers and large incumbent edge providers.[12] Any threats to that platform will be rooted out and exposed by the public and the media even if not directly regulated by the Commission.

Given that the theoretical harms have not yet become manifest despite years without more than guiding principles, combined with the fact that the Commission now has unambiguous authority to police this area, reverting to an extensive utility-style regime designed for the old monopoly telephone system is wildly imprudent. Imposing restrictive common carrier regulations would undoubtedly slow innovation, potentially requiring any company who falls under the Act's expansive definitions to seek out permission before deploying any new service.

For some advocates, net neutrality is a vehicle not so much to protect the open Internet, but to push for broader Title II utility-style regulations like mandatory unbundling and price regulations. These advocates see the ideal broadband network as a publicly-owned monopoly, and Title II as the first step to get to a world of heavily regulated "dumb pipes." For them, the Internet is not a dynamic technology system, but rather a utility-like technology that has already

[11] *See* Ken Fisher, "SBC: ain't no way VoIP uses mah pipes!" Oct, 2005, http://arstechnica.com/uncategorized/2005/10/5498-2/.

[12] *See, e.g.*, David L. Cohen, "FCC Begins Process to Establish Strong, Legally Enforceable Open Internet Rules" *Comcast Voices*, http://corporate.comcast.com/comcast-voices/fcc-begins-process-to-establish-strong-legally-enforceable-open-internet-rules; Randal Milch, "Verizon Reiterates Its Commitment to the Open Internet," *Verizon Policy Blog*, http://publicpolicy.verizon.com/blog/entry/verizon-reiterates-its-commitment-to-the-open-internet; AT&T Blog Team, "AT&T Statement on Net Neutrality," *AT&T Public Policy Views & News*, http://publicpolicy.att.com/att-open-internet-policy-statement.

matured, and therefore the only task is to prevent, not spur, change and innovation. Leaving aside some advocates' broader ideological goals, many of the requirements of Title II are simply not suited for regulating broadband and have rightly been avoided for years.

Furthermore, it is not clear that there is much to gain from a Title II regime. As Chairman Wheeler has rightly noted,[13] Title II only allows the Commission to ban "unjust and unreasonable discrimination."[14] It is unclear to what extent a standard of "commercially reasonable" would end up being materially different from one of "unjust and unreasonable." Indeed, a number of types of "discrimination" are already allowed under Title II.[15] The key difference between these two regimes is *not* that one opens up "fast lanes" and the other does not, as has been widely reported, but largely a difference between an *ex ante* ban on "unreasonable discrimination" (Title II) on the one hand, and, on the other, a case-by-case analysis that identifies and prevents conduct that is unreasonable (section 706).

What's worse, classifying broadband as a Title II "telecommunications service" potentially brings many Internet edge services into regulatory reach. Although companies may only face full common carrier regulations to the extent they are providing "telecommunications services,"[16] the definition of telecommunications service is quite broad.[17] The Commission

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[13] Chairman Tom Wheeler, "Finding the Best Path Forward to Protect the Open Internet," Official FCC Blog http://www.fcc.gov/blog/finding-best-path-forward-protect-open-internet.

[14] 47 U.S.C. § 202.

[15] *See, e.g., Orloff v. FCC*, 352 F.3d 415 (D.C. Cir. 2003) (upholding carriers' ability to offer differential discounts to retail customers); *Southwestern Bell Tel. Co. v. FCC*, 19 F.3d 1475, 1481 (D.C. Cir. 1994) (upholding carriers' ability to enter into individualized contracts); *Ameritech Operating Cos. Revisions to Tariff FCC No. 2*, Order, DA 94-1121 (CCB 1994) (upholding reasonableness of rate differentials based on cost considerations).

[16] 47 U.S.C. § 153(51).

[17] 47 U.S.C. § 153(53) (stating that "[t]he term 'telecommunications service' means the offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used."

would rightly want to avoid subjecting any edge providers, such as VoIP services, to common carrier regulations, but determining the boundary of Title II through forbearance would be a difficult and complex process the Commission should seek to avoid.

C. Regulatory forbearance under Title II would introduce unnecessary confusion and delay

Many who have advocated for a classifying broadband as a Title II telecommunications service argue the Commission can simply forbear from applying the many ill-suited, utility-style regulations. Certainly the Commission has the authority to forbear from applying Title II regulations under certain conditions laid out in section 10 of the Communications Act.[18] However, forbearance is not a simple or straightforward process, and the Commission and the courts would likely get bogged down in several line drawing exercises, delaying the opportunity for enforceable open Internet rules for years and guaranteeing prolonged uncertainty.

The Commission has previously asserted its authority to undertake regulatory forbearance on its own motion and may not require a petition from every potential new telecommunication service and carrier.[19] However, when forbearing from any affirmative Title II obligations,[20]

[18] 47 U.S.C. § 106(a).

[19] Petition to Establish Procedural Requirements to Govern Proceedings for Forbearance Under Section 10 of the Communications Act of 1934, as Amended, WC Docket No. 07-267, FCC 09-56, *Report and Order*, at para. 5. Note that where the Commission has initiated forbearance on its own motion, at least to this commenter's knowledge, it has been forbearing from Title I (*Computer II*) regulations. It is not as clear that the Commission has the authority to initiate forbearance on its own motion when forbearing from explicit Title II statutes, as would be the case if broadband was reclassified. *See, e.g.*, Time Warner Telecom, Inc. v. FCC, 507 F. 3d 205 (2007), fn. 13.

[20] As opposed to Title I regulations not unambiguously required by statute, *cf.* Time Warner Telecom 507 F. 3d 205 (2007), fn. 13 *citing United States Telecom Ass'n v. FCC* 359 F.3d 554, 561, 579 (D.C. Cir. 2004) ("USTA I") for the proposition that "§ 10 forbearance analysis did not apply to FCC's *discretionary* decision . . . ." (emphasis

section 10 requires an analysis of whether "(1) enforcement of the provision or regulation is not necessary to ensure that the telecommunications carrier's charges, practices, classifications, or regulations are just, reasonable, and not unjustly or unreasonably discriminatory; (2) enforcement of the provision or regulation is not necessary to protect consumers; and (3) forbearance . . . is consistent with the public interest."[21]

While the Commission has relatively wide discretion in how it conducts this analysis,[22] the Commission will have opened the door to very complicated and detailed market-by-market examinations.[23] Indeed, when petitioning for forbearance the Commission's rules require large amounts of detailed information from parties. This required information, in addition to showing "in detail" how each of the above criteria are met, includes each carrier and service for which forbearance is sought, and the particular geographic location in which forbearance is sought.[24]

This would inevitably be a lengthy and complex process, even under the best of circumstances. Unfortunately, these decisions of whether and to what extent a particular service would be considered a "telecommunications service" for the purposes of Title II would not be an abstract exercise – large amounts of money, either through forgone revenue, regulatory

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added); *See* USTA I, 359 F.3d 579 (stating that "§ 160, prescribing when the Commission may forbear from applying statutory requirements, obviously comes into play only for requirements that exist . . . .").

[21] 47 U.S.C. § 106(a).

[22] *See Earthlink, Inc. v. FCC*, 462 F.3d 1, 8 (2006) (stating that "[o]n its face, the statute imposes no particular mode of market analysis or level of geographic rigor.") Some may point to cases like *Earthlink* to support the argument that forbearance is easy – the Commission should appreciate the irony of pointing to appellate level litigation as evidence that something is easy or straightforward. There will inevitably be areas of uncertainty companies will have every right and reason to explore in court.

[23] *See* Petition to Establish Procedural Requirements to Govern Proceedings for Forbearance Under Section 10 of the Communications Act of 1934, *Report and Order*, WC Docket 07-267 (June 2009). ("Forbearance Procedure Report and Order"); *see also, e.g., Qwest Corporation v. FCC*, No. 10-9543 (10th Cir.).

[24] Forbearance Procedure Report and Order at para 16-17.

compliance costs, USF contributions, or others, would hang in the balance, inviting extensive rent-seeking in front of the Commission as well as protracted court battles.

When concentrated interests are involved, as would be the case in a restructuring of both broadband and edge provider regulation, the Commission will not be able to make unwanted regulations disappear as neatly as it would like. This means that forbearance, even with good intentions, would not be clean or easy – many parties would get involved in attempting to craft these new rules in their own interest, effectively delaying any hope for effective tools to protect and promote the open Internet for years.

D. Antitrust alone is likely not sufficient

Although there is little or no evidence that the Internet is under any present threat, and the fact that we have gotten this far without much in the way of specific regulation indicates rules may not be needed, it makes sense to move forward and give the Commission the tools to police possible bad behavior instead of relying purely on existing antitrust laws.

While the case-by-case analysis of business practices in antitrust courts is a good guiding example, the expertise of the FCC and its ability to accelerate resolution of complaints even between parties of disparate means and power should be preferred. Clear, up-front factors as to what sorts of business arrangements would be considered "commercially reasonable" can provide more certainty for those with a new business or innovation to move forward. The FCC has a better expertise to set these factors than a generalist anti-trust court.[25] Furthermore, antitrust law is designed to protect competition, and, as the Commission has recognized, there are non-economic concerns at stake with the open Internet.

[25] *See, e.g.*, Law Offices of Curtis V. Trinko, L.L.P. v. Bell Atl., 124 S.Ct. 872, 878 (2004) (discussing the reasons to defer to an expert agency).

Indeed, the section 706 approach that sets forth clear factors of what sorts of practices will be "commercially reasonable" and allows, on a case-by-case basis, those practices that do no harm to consumers, innovation, or competition is an appropriate balance between the extremes of no rules and an expansive, up-front ban on discrimination, even pro-consumer and pro-innovation discrimination, under Title II. A section 706 approach adopts the best of both alternatives and should be preferred.

III. A Flexible Non-Discrimination Standard Will Best Promote Innovation in an Open Internet

A. Fears over "fast lanes" are overblown

Some pro-net neutrality commenters argue that any commercial deals at all between an edge service and a broadband provider will thrust the Internet into a world where prioritized "fast lanes" are the norm and any start-ups unable to pay ISP "tolls" will fail. These concerns are wildly overblown. Given the limited circumstances where traffic prioritization will present a substantial advantage for an edge provider there is little reason to fear "fast lanes" eating the rest of the best-efforts Internet. It appears the "fast lane" fears are often motivated by broader political distrust of large corporations instead of an analysis of the technological and economic facts.

Backhaul transit has always been priced based on throughput – indeed the core of the network is far from "neutral." Netflix, with its tremendous throughput, must pay significantly more for transit (in addition to any CDNs) than, say, a think tank like ITIF. Furthermore, that amount of business gives large streaming companies the power to negotiate down the cost of transit. This fact should be far from disconcerting, as it reflects basic economic realities of the cost of bandwidth and economies of scale.

Transit pricing based on throughput is just one of many ways in which our networks today are not "neutral." The architecture of the Internet favors delivery of static content (e.g., web pages, email, etc.) over dynamic, real-time communications (e.g., VoIP or telepresence). Overly strong net neutrality regulations risk limiting the growth of real-time applications in order to lock-in an architecture that favors plain-text web pages. As Tim Wu, who coined the term "net neutrality," has put it:

> [T]o the extent an open access rule inhibits vertical relationships, it can help maintain the Internet's greatest deviation from network neutrality. That deviation is favoritism of data applications, as a class, over latency-sensitive applications involving voice or video.[26]

Broadband networks are the future of all communications, and the network should be allowed to be intelligent enough to compensate for architectural biases. The key of course has been, and will continue to be, crafting rules that enable pro-consumer and pro-innovation discrimination, rather than banning all discrimination motivated by some anti-corporate, populist ideology.

Those commercially reasonable deals that will gain the most value from prioritization will be for exactly these sorts of dynamic, latency sensitive applications the Internet's current architecture discriminates against. High-definition video conferencing or future data-intensive, real-time cloud services would benefit from a flexible "commercially reasonable" standard.

Any improvements or incentives that come with any paid prioritization deals will go towards upgrading the same equipment that all other traffic uses. This is a simple point, but one that is mischaracterized by the term "slow lane." We are not talking about separate sets of infrastructure, but a simple prioritization of a narrow class of traffic that cannot be accommodated through over-provisioning. The "best efforts" Internet will continue to do bulk of the heavy lifting for all the major applications used today and market-based paid prioritization will only allow the "best efforts" Internet to get even better.

[26] Tim Wu, "Network Neutrality, Broadband Discrimination," 2 *Journal of Telecom. And High Tech Law* 141 (2003).

B. Improvements in infrastructure have reduced concerns over unreasonable discrimination

There have been several developments even since the formulation of the Commission's 2010 Open Internet Rules that should reduce concerns over problematic discrimination. First, network speeds have increased substantially as technology has improved and intermodal competition has spurred providers to upgrade networks. U.S. networks see consistently above average growth in broadband speeds – recent reports put average connection speed up 31% over last year.[27] Moreover, some new entrants, most notably Google, have built entirely new networks, offering a third pipe to the home.

Not only does this increase in wired competition reduce concerns over vertical foreclosure, but such high-capacity networks greatly reduce the need for any sort of discrimination based on bandwidth. These faster networks offer more bandwidth than most of today's applications require. According to Reed Hastings, CEO of Netflix, next-generation 4K resolution video streaming will only require 15 Mbps,[28] largely thanks to advances in compression algorithms.[29] Granted, by these estimates, streaming 4K will require a *constant* bitrate of at least 15 Mbps, meaning broadband users will need to subscribe to a higher tier, but the point remains: most networks provide bandwidth in excess of even next-generation demands.

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[27] Akamai's State of the Internet, Q1 2014 Report, Vol. 7 No. 1, pg. 21, http://www.akamai.com/dl/akamai/akamai-soti-q114.pdf?WT.mc_id=soti_Q114.

[28] *See, e.g.*, Ryan Waniata, "The 4K Revolution will be Televised, and Netflix Says You'll Only Need 15 Mbps to Watch," *Digital Trends* (Sept. 2013), http://www.digitaltrends.com/home-theater/netflix-ceo-says-4k-streaming-will-only-require-15mbps-bandwidth/#!bekKin.

[29] *See, e.g.*, Gary J. Sullivan *et. al.* "Overview of the High Efficiency Video Coding (HEVC) Standard, 22 *IEEE Transactions on Circuits and Systems for Video Technology* 1649, http://www.ee.cuhk.edu.hk/~mhwang/website_files/eleg5431/HEVC_Overview.pdf.

With the future introduction of next generation DSL technologies,[30] DOCSIS 3.1,[31] and fiber being pushed further into the last mile, network will likely continue to get faster as applications become more demanding or increased load comes from unexpected future innovations. In a world where bandwidth outstrips demand, the economic case for discrimination based on throughput is significantly reduced.

Furthermore, the rapid growth of content delivery networks (CDNs) has dramatically improved the ability of new companies to scale the provision of streaming video over broadband networks. CDNs store content closer to consumers, in practice removing the "lane" from a remote server to the end user's network – much more effective than a "fast lane." While the possibility of prioritization over a last-mile network remains, CDNs have substantially reduced costs and improved performance of data-intensive Internet applications.

Moreover, ongoing implementation of improved Active Queue Management (AQM) algorithms will likely see considerable improvement in user experience of broadband. These AQM algorithms are designed to fix the so-called "bufferbloat" problem.[32] Bufferbloat refers to the excessive buffering of packets in equipment throughout the network. Buffers in most network equipment have grown quite large as a result of cheap, abundant memory and the desire to avoid

[30] *See, e.g.,* Alcatel-Lucent sets new world record broadband speed of 10 Gbps for transmission of data over traditional copper telephone lines, *Alcatel-Lucent Press Releases* (July 2014), http://www.alcatel-lucent.com/press/2014/alcatel-lucent-sets-new-world-record-broadband-speed-10-gbps-transmission-data-over-traditional. Note, however, these advances in DSL technology (G.fast and the recent XG-FAST) rely on utilizing additional spectrum which sees significant attenuation over distance in copper. They will still require significant cap-ex in the form of deeper fiber.

[31] *See* New Generation of DOCSIS Technology, *CableLabs*, http://www.cablelabs.com/news/new-generation-of-docsis-technology/.

[32] *See* Jim Gettys, "Bufferbloat: Dark Buffers in the Internet," IEEE Internet Computing 15 (3) at 96.

dropping packets.[33] When a link is saturated, the buffers fill, dramatically increasing latency and frustrating consumers. Although there is a host of reasons BitTorrent traffic did not play nice with other applications on last-mile networks,[34] some engineers believe bufferbloat to be a main culprit behind the problems BitTorrent was causing networks which eventually led to the *Comcast* case.[35] Network engineers should have the flexibility to implement AQM or other specialized solutions to address congestion impairing their networks without having to first check with a regulator.[36] While not precluding other forms of traffic management or overshadowing advantages of an intelligent network core, AQM should prove useful in

[33] The problem is actually compounded because packets are not dropped. When packets sit waiting in buffer queues, he TCP protocol doesn't know to back off its flow rate.

[34] The BitTorrent protocol has added some interesting congestion control mechanisms since its days of worst offense. For discussion, *see* Dario Rossi, *et al.*, "Ledbat: the new BitTorrent congestion control protocol," Telecom ParisTech (Aug. 2010), http://perso.telecom-paristech.fr/~drossi/paper/rossi10icccn.pdf.

[35] *Comcast Corp. v. FCC* 600 F.3d 642 (D.C. Cir.) (2010). *See* Jim Gettys, "Bufferbloat and network neutrality – back to the past...," *jg's Ramblings,* http://gettys.wordpress.com/2010/12/07/bufferbloat-and-network-neutrality-back-to-the-past/. Jim's point that "We should not set public policy going forward without understanding what may actually have happened, rather than a possibly flawed understanding of technical problems" is a good one.

[36] While Comcast's current transparent, application agnostic network management practices are likely preferable over application specific congestion management, in some cases application specific management may be necessary. *See* "Comcast Corporation Description of Planned Network Management Practices to Be Deployed Following the Termination of Current Practices," *Comcast Corp.*, http://downloads.comcast.net/docs/Attachment_B_Future_Practices.pdf. Note the Broadband Internet Technical Advisory Group (BITAG) has explored under what circumstances application specific congestion management is appropriate and has recommended best practices. BITAG, "Real time Network Management of Internet Congestion" (Oct. 2013), http://www.bitag.org/report-congestion-management.php. ITIF strongly recommends the Commission rely on the advice and recommendations of groups like BITAG when examining "commercially reasonable" practices.

decreasing latency throughout the network, further reducing the economic case for "fast lanes" taking over.

C. Networks should be aware of applications' needs

There is an incredible diversity of applications that leverage the Internet, and this diversity only promises to increase. Accordingly, different applications have incredibly diverse demands on the network. The success or failure of an application can turn on its sensitivity to latency, jitter, throughput, packet loss, among other variables. Applications can also have a wildly varying scope of operations – they can be a video intended to be streamed by millions simultaneously, or a chat between two friends. Applications may have other various requirements, such as an unusually fast start-up or resumption of a high send rate after a long idle period.[37] Overly strong neutrality requiring dumb pipes to carry only best efforts traffic would undoubtedly limit the potential performance of real-time applications.

In order for broadband to continue to enable the increasing number of diverse applications that push the boundaries of networks today, providers need to be able to expand intelligence in the core. Network should have the flexibility to respect the diverse needs of applications. In some circumstances, special treatment will justify payment from those application providers that desire more than best-efforts treatment. Regulations should not stifle the exploration of these new innovative services for fear the entire Internet will collapse into a series of tolls. Any such commercial arrangements should be strictly voluntary with all applications having the option of free best efforts last mile delivery. But future real-time, cloud-based applications that require extremely low latency should not be shut out by regulation.

[37] *See* S. Floyd & M. Allman, "Comments on the Usefulness of Simple Best-Efforts Traffic," RFC 5290 at 4, IETF (July 2008), (discussing the limitations of best-efforts traffic).

While there is little evidence to fear that specialized traffic management will be the norm or required for the vast majority of new websites or services to succeed, there is tremendous potential for real gain by allowing commercially reasonable discrimination. Furthermore, increasing the intelligence to the core of the network and allowing equipment to recognize applications' needs is important for increasing resiliency and security as crucial, even safety-of-life, functions become digitized and reliant on broadband networks. A strict "dumb pipes" rule some advocates push for does not appreciate the limits of our ability to predict the demands placed on these complex systems.

The potential for valuable innovation to be enabled by future networking technologies like software defined networking (SDN) and network function virtualization (NFV) is very real, but not yet well understood.[38] Any Commission action should be careful to allow these technologies to be explored. A standard of commercial reasonableness under 706 should provide the appropriate oversight.

In many ways a "dumb pipe" network determines winners by inherently discriminating against particular classes of applications, especially high-bandwidth, real-time interactive applications. We should want a smart network that lets all application types win or lose on the basis of customers decisions, not to the extent they comport to a one size fits all network imposed by over-zealous neutrality advocates.

D. A "Commercially Reasonable" Standard should give edge companies certainty to innovate and allow broadband providers flexibility in managing their networks

Discrimination will be beneficial in many cases, but the Commission is right to watch for potentially anti-competitive behavior that undermines the Internet's value as a platform for

[38] For an introduction to these technologies, *see, e.g.*, 6WIND, "SDN/NFV Primer," http://www.6wind.com/software-defined-networking/sdn-nfv-primer/.

communication and commerce. ITIF believes that the majority of paid prioritization deals that are likely to be sought by edge providers will be commercially reasonable. Yet the Commission is right to subject certain kinds of arrangements to higher scrutiny. In particular, no prioritization arrangement should be exclusive.

The Commission should also prohibit a thorough-going two-sided market from developing whereby all edge providers would have to pay specifically for carriage through the last mile – the vast majority of edge providers should not have a need for prioritization or specialized deals. It would be commercially unreasonable to not offer free best efforts traffic carried within the last mile. If large numbers of static content edge providers start signing up for prioritization, something is probably amiss and the Commission should investigate. Also, any prioritization deals should not result in manifest degradation to other services. Although ITIF does not believe "throttling" or targeted degradation to be a concern, such practices would obviously not be commercially reasonable.

It is important that the Commission lay out clear guidelines for what will be considered commercially reasonable in order to give edge providers the assurance that these rules do not threaten them in any way. That said, any rules should be flexible enough to address changing practices in a rapidly developing environment. The Commission should rely on outside bodies of experts such as the Broadband Internet Technical Advisory Group to develop appropriate best practices to guide them in evaluating arrangements.

ITIF also strongly believes that it is not appropriate to impose the same or similar burdens on both wired and wireless broadband networks. It is important to recognize that wireless broadband is still in a nascent stage, with technology and services rapidly evolving. Furthermore, the fundamental constraint on capacity imposed by limited availability to spectrum means that wireless networks operate differently from their wired counterparts. Correspondingly, wireless networks require specialized management so that they can meet customers' expectations. Any arguments for a wireless non-discrimination rule must go beyond "wireless is

increasingly important" and address the fundamental differences in capacity. Here the consideration should be whether discrimination is needed for a wireless Internet service to operate effectively.

IV. The Transparency and No-Blocking Rules Should Allow For Innovation

A. The 2010 transparency rules are effective

Transparency is very effective in this space. Requiring broadband providers to explicitly disclose their network management practices allows consumers, advocacy groups, regulators, and edge providers to know what is being done and how it affects them. Net neutrality is clearly something the public at large feels strongly about, and, although not without its perils of technical and economic misunderstandings, broader civic participation in these issues gives companies a strong incentive to play fair. The transparency requirement still in place from the 2010 rules is sufficient and requires no further action from the Commission.

B. Enforcing a "minimum level of service" is unnecessary

Network operators already engage in blocking of certain types of traffic in order to protect consumers. Networks block spam and malware, for example, without objection. So the issue cannot be one that the Internet should be fundamentally open. It is not. Blocking malware and spam violates strong versions of openness, and we are thankful for it. There are no real risks of networks expanding these practices to block legitimate applications. If this were to happen for some strange reason, it would be a clear violation of the commercially reasonable standard and could be stopped. It is not clear that an affirmative no-blocking rule is necessary or if such a rule would be allowed under section 706.

Furthermore, the Commission does not need to define and enforce a "minimum level of service." This would be a difficult exercise and may well stifle beneficial practices. For example, latency-insensitive "scavenger class" of traffic (like large file transfers) can fill gaps, functioning "below" best-efforts. Such traffic politely backs off and holds the door open for more latency sensitive applications.[39] Putting traffic in a class "lower" than best efforts should not be a done without a convincing showing that it is commercially reasonable and in consumers interest, but it should also not be prevented by regulation. The commercially reasonable standard can do the work of a no-blocking rule. Again, the principle that all traffic be treated alike is one that is likely to lead to lower levels of consumer welfare, not higher.

V. Conclusion

The *Verizon* court opened the door for the Commission to develop strong, enforceable rules to protect and promote an open and innovative Internet. The Commission should move forward under section 706 to give itself the flexible tools that appreciate the subtle complexities and technological and economic realities of broadband networking. However, the Commission should recognize that there needs to be innovation in both the edge and the core and any rules should be designed to enable ISPs to develop "smart," not "dumb" pipes. Moreover, the Commission should not be driven into a Title II morass by wild over-reaction and misunderstanding that would likely stifle innovation and delay the development of enforceable rules for years to come.

[39] Indeed, the BitTorrent protocol allows it to function below best efforts to avoid congesting networks. *See fn* 34.

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