Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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

COMMENTS OF
THE TELECOMMUNICATIONS INDUSTRY ASSOCIATION

Danielle Coffey
Vice President, Government Affairs

Mark Uncapher
Director, Regulatory & Government Affairs

Brian Scarpelli
Director, Government Affairs

TELECOMMUNICATIONS INDUSTRY ASSOCIATION
1320 Court House Road
Suite 200
Arlington, VA 22201
(703) 907-7700

July 15, 2014

TABLE OF CONTENTS

INTRODUCTION AND SUMMARY

In its effort to establish a regulatory approach to broadband Internet access services that is technically feasible and legally stable, the Commission must pay primary attention to the cycle of ongoing private investment and consumer demand upon which the Internet's development rests. By chilling investment – and thereby impeding competition and innovation – an ill-crafted set of Open Internet policies could exacerbate, rather than solve, the looming congestion problem that both industry and policymakers know we must confront.

Most American consumers today enjoy access to high-quality broadband with world-leading innovation and service choices. But without increased broadband capacity and further refinements in network-specific traffic management technologies, consumer experiences could increasingly fall short of expectations. Without more capacity and improved traffic management, the demand that drives innovation could falter – and thereby slow or even stop the emergence of many new services. Both current consumer demands and future broadband advances are directly dependent on a sustained flow of private investment to existing providers and potential new rivals. Government's impact on meeting those needs is only indirect. Nonetheless, the regulatory choices the Commission makes here will shape investor responses to any altered balance between risks and rewards in the broadband marketplace. For Americans without ready access to broadband, the FCC's choices here may have the most profound effect – by making high-risk investments in rural and urban core areas even more challenging than they already are.

The Telecommunications Industry Association ("TIA")[1] has actively participated in earlier phases of its Open Internet proceedings by submitting a wealth of empirical evidence. Drawing on the expertise of our member companies, which include the telecommunications industry's leading suppliers of network equipment and software, we have provided detailed information about the distinctly different operation of the wireline and wireless networks that provide Internet access, including the management techniques needed to ensure their smooth operation. As we have explained, as a technical matter the broadband networks that directly

[1] TIA is the leading trade association for the information and communications technology (ICT) industry, with 600 member companies that manufacture or supply the products and services used in global communications across all technology platforms. TIA represents its members on the full range of public policy issues affecting the ICT industry and forges consensus on industry standards. For over 80 years, TIA has enhanced the business environment for broadband, mobile wireless, information technology, networks, cable, satellite, and unified communications. TIA is accredited by the American National Standards Institute (ANSI).

serve consumers fall into three broad categories – wireline telco, cable, and wireless – and rely on different architectures to deliver services. Regardless of the platform, however, the "open Internet" is and has always been a managed Internet. There always has been intelligence at the core of the network, as well as at the edge, and rising consumer demand is driving the need to locate intelligence at various points within the core that make engineering sense. Mobile broadband is especially challenging in this regard. Because wireless networks rely on limited and dynamically changing radio resources, they require operator-controlled traffic management throughout their infrastructure. Should any new Open Internet rules fail to provide sufficient flexibility to reflect those technical realities, they will not serve consumers and could, over the long term, force uneconomic contortions of network design and impede innovation.

These real-world consequences underscore the importance of the Commission maintaining a regulatory framework based on Title I flexibility rather than Title II rigidity. Common carriage rules were devised for technologies – first railroads, then voice telephony – that were relatively static for many decades after they were introduced. The growing intricacy of common carriage regulation over more than 100 years, while affecting business practices, did not have a profound effect on the underlying technical operation of the regulated rail or telephone lines. Broadband technology, in contrast, has morphed dramatically in the two decades since consumers first began adopting it. There is no reason to believe that trajectory will change, and the Commission should not want it to do so; the Internet's future openness depends upon the development of ever-improving traffic management techniques and infrastructure upgrades and extensions. But pressing as many as 17 different provisions of Title II onto broadband Internet access services would make it difficult, if not impossible, for providers to operate their networks in ways that have proven so successful since the public Internet emerged. Common carriage regulation also would throw the business case for continuing and increased investment into disarray. The Commission should not take false comfort in the thought that forbearance would spare the Internet from the negative effects of Title II. The potential for quick reversal of rules and policies would be a legitimate concern whenever Commission leadership changes; and that uncertainty would deter investment in the first place.

As the *Notice* indicates, the Commission's better choice – if any new regulation is actually required – is to consider a more flexible, Title I-based framework that emphasizes the FCC's longstanding Internet policy principles as the lodestar. There is broad consensus on the

value of those principles, embodied in the Commission's *Internet Policy Statement*. They have worked to encourage broadband deployment and provide consumers with the benefits of the "open and interconnected nature of the Internet." Broadband ISPs have every business incentive today to continue providing consumers with access to the Internet content and services of their choice; to do otherwise would risk punishment in the marketplace. The Commission should look to the guidance provided in the D.C. Circuit's *Verizon* decision and avoid adopting overly prescriptive rules that would impose a one-size-fits-all approach. The *Notice* is correct in recognizing that flexible rules, administered through case-by-case analysis, are the only workable means for accommodating the different technical issues involved in operating today's varied types of broadband networks.

In crafting any flexible approach, the Commission must adopt an expansive definition of "reasonable network management" that reflects the nature and needs of contemporary broadband networks. The FCC also should recognize mobile's technical distinctiveness as it did in 2010. Mobile broadband networks continue to require more operator oversight and traffic management, largely because of the inherent technical constraints (and related security and safety issues) that flow from relying on spectrum. In addition, the agency should acknowledge that consumers today are being served by many services that are "prioritized" in some fashion. Several types of popular consumer services, such as voice over Internet protocol ("VoIP") service and online gaming, depend on prioritization to overcome difficulties with latency and jitter that can be made worse by traffic congestion. The same holds true, with particularly serious consequences, for the growing use of high-definition video for telehealth and public safety. Finally, there is no need for the FCC to change course away from simply monitoring the development of specialized services. These offerings, which may share the same last-mile connections as broadband Internet access service, can help spur investment in broadband facilities.

In sum, if the FCC determines that new regulations are needed, it should adopt a flexible, Title I approach in keeping with the pathway set by earlier policymakers, both Democratic and Republican. A case-by-case approach to reviewing complaints concerning individual broadband ISPs would best support ongoing investment in the broadband space – and thereby fuel the competition and innovation that serves consumers.

I. THE COMMISSION'S PRIMARY FOCUS MUST BE ON SPURRING BROADBAND INVESTMENT TO ENHANCE CONSUMERS' EXPERIENCE

A. The United States Already Enjoys World-Leading Broadband Service – And Demand Is Escalating

The breadth and depth of U.S. broadband networks and the services they support are widely acknowledged,[2] and that robust environment operated both before and after Commission adoption of the 2010 Open Internet rules.[3] The FCC's focus now – and for many years to come – must be on ensuring that any new regulations imposed on broadband Internet service providers ("broadband ISPs")[4] continue to foster, or at least not discourage, the private investment required to satisfy growing consumer demand for broadband services across wireline and wireless platforms.[5] As companies in robustly competitive markets must do, ISPs have responded to

[2] *See, e.g.*, Roslyn Layton, *Don't Buy the Hype About Lagging U.S. Broadband*, Real Clear Markets (Feb. 19, 2014), http://www.realclearmarkets.com/articles/2014/02/19/dont_buy_the_hype_about_lagging_us_broadband_100911.html (quoting EU Commissioner for the Digital Agenda Neelie Kroes as saying, "We can't afford to remain trapped in 28 national markets; if this continues, we will fail to feed the digital economy the raw materials it needs: connectivity and scale. The writing is on the wall, and many EU leaders are abandoning their approach and looking to the American broadband model of infrastructure-based competition and private investment.").

[3] There was significant investment in, and demand for, broadband prior to the FCC's December 2010 adoption of Open Internet rules. USTelecom Comments, GN Docket No. 09-51, at i (June 8, 2009) ("By some estimates, cumulative capital expenditures by broadband providers from 2000-2008 were over half a trillion dollars, and private investment in broadband infrastructure has grown consistently from 2003 through 2008."). That investment largely did not subside in 2011 or afterward should be construed as some confirmation of the value of a flexible, Title I-based regulatory approach – although the long-term time horizons for network infrastructure planning and investment make firm conclusions difficult to draw at this relatively early juncture. *See Protecting and Promoting the Open Internet*, Notice of Proposed Rulemaking, 29 FCC Rcd 5561 ¶ 30 (rel. May 15, 2014) ("*Notice*").

[4] Although the *Notice* raises a few questions about peering and other types of Internet traffic exchange beyond last-mile connections to consumers, Chairman Tom Wheeler later announced that the Commission staff has begun to separately gather and analyze data about Internet traffic exchanges services and business practices. *Notice* at ¶ 59; Press Release, Statement by FCC Chairman Tom Wheeler on Broadband Consumers and Internet Congestion (June 13, 2014), *available at* https://apps.fcc.gov/edocs_public/attachmatch/DOC-327634A1.pdf. Given that separate effort, TIA's comments here are limited to the Commission's existing limitation of the Open Internet construct, *i.e.*, potential regulation of broadband ISPs. *Notice* at ¶ 59.

[5] The *Notice* opened a new docket, but as both a practical and legal matter, the Commission's efforts here are linked to several earlier Open Internet dockets. TIA participated in all of them and hereby incorporates by reference the following earlier submissions, including the supporting evidence associated with them: TIA Comments, GN Docket No. 09-191, WC Docket No. 07-52 (Jan. 14, 2010) (including (1) the Declaration of Marcus Weldon, Corporate Chief Technology Officer, of Alcatel-Lucent and member of Bell Laboratories, on Managed Services ("Weldon Declaration"); (2) the Declaration of Kenneth D. Ko, Senior Staff Scientist, and Kevin W. Schneider, Chief Technology Officer, of ADTRAN, Inc., on Wireline Platforms ("Ko/Schneider Declaration"); and (3) a statement by Matt Tooley, Vice President, Consulting Solutions and Don Bowman, Chief Technology Officer, of Sandvine, on

consumers' escalating demands for bandwidth by investing billions in additional capacity.[6] In a vibrantly competitive industry, market forces compel these investments, and the Commission should recognize this consumer welfare-enhancing dynamic.

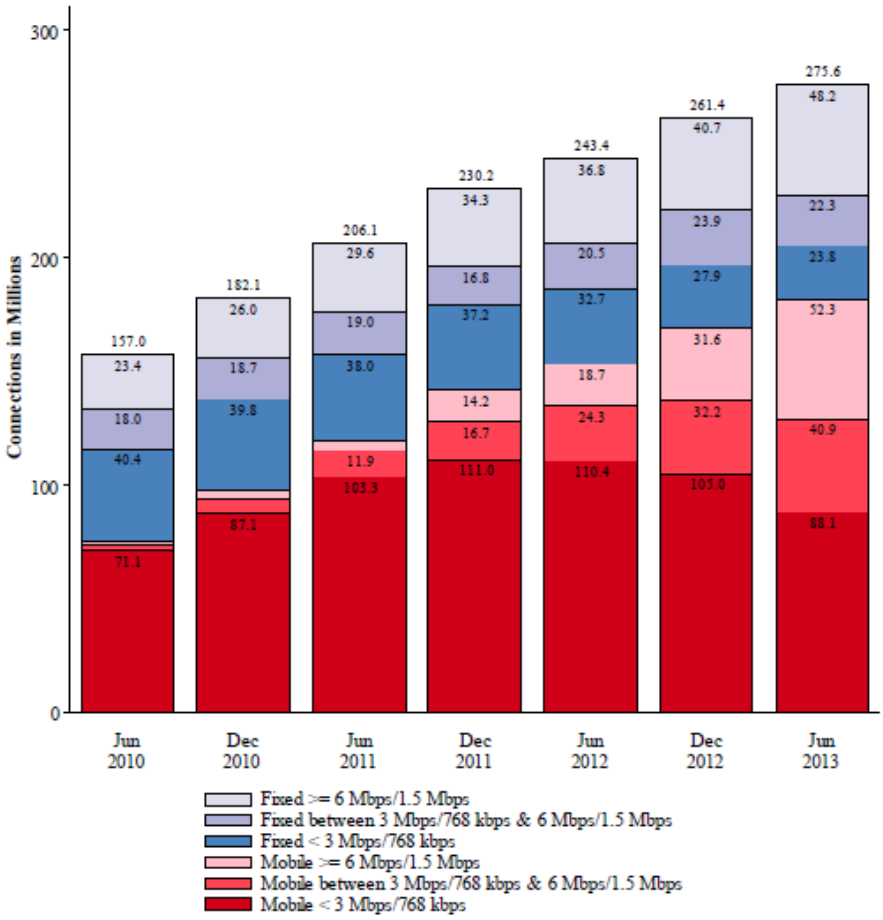
Broadband connections and speed have been growing over the past four years, as the Commission's own latest report on Internet access service reveals:[7]

Cable's DOCSIS platform ("Tooley/Bowman Declaration")) ("TIA January 2010 Comments"); TIA Reply Comments, GN Docket No. 09-191, WC Docket No. 07-52 (Apr. 26, 2010) ("TIA April 2010 Reply Comments") (including the Declaration of Matt Grob, Senior Vice President of QUALCOMM, Inc. on Wireless Broadband ("Grob Declaration"); TIA Comments, GN Docket No. 10-127 (July 15, 2010) (including CSMG, *FCC Reclassification NOI: Economic Impact Assessment* ("CSMG Study")); TIA Comments, GN Docket No. 09-191, WC Docket No. 07-52 (Oct. 12, 2010) ("TIA October 2010 Comments").

[6] *See infra* Section I.B.

[7] Industry Analysis and Technology Division, Wireline Competition Bureau, FCC, *Internet Access Services: Status as of June 30, 2013*, at 2, 4 (June 2014), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-327829A1.pdf ("Internet Access Report").

Figure 1
Fixed Connections and Mobile Connections by Speed 2010-2013*



* Some previously published data have been revised. Figures may not sum to totals elsewhere in this report due to rounding. Connections include both residential and business connections. In June 2013, total connections were reported as 31% residential fixed connections, 3% business fixed connections, 52% mobile connections to non-business subscribers, and 14% mobile connections to business subscribers.

Recent Commission data and that of other sources agree: Broadband traffic has been exploding and will continue to do so.[8] According to one report, "Global IP traffic has increased

[8] *See* Internet Access Report at 25, Table 7 (depicting a remarkable surge in the total number of fixed and mobile wireless connections with at least 3 Mbps downstream in the past five years). *See also* Statement of Commissioner Mignon L. Clyburn, Protecting and Promoting the Open Internet, GN Docket No. 14-28 (May 15, 2014) (noting "the increased use of WiFi, deployment of LTE, faster speeds and connections to homes, schools, libraries, and the increased use of broadband on mobile devices"); Remarks of Commissioner Ajit Pai at PCIA's 2014 Wireless Infrastructure Show (May 20, 2014) ("Deploying more infrastructure is important because we're on the leading edge of a data tsunami. By 2018, U.S. mobile data traffic will increase nearly 8-fold…").

more than fivefold in the past 5 years, and will increase threefold over the next 5 years."[9] North American IP traffic is expected to spike from 16,607 petabytes of data in 2013 to 40,545 petabytes of data in 2018, a compound annual growth rate of 20 percent.[10] Reported wireless data traffic nearly quadrupled in two years, from 388 billion MBs in 2010 to 1,468 billion MBs in 2012.[11]

New and increasingly popular broadband services also are changing network usage and having a notable impact on traffic flows. America's increasing appetite for video and online gaming, in particular, is transforming the way traffic moves across the Internet. Content delivery networks ("CDNs") and other methods of keeping traffic local (collectively "metro-only" traffic), are taking on an increasingly larger role in supporting broadband traffic management.[12] Over the next five years, CDNs will grow at a compound annual growth rate ("CAGR") of 33 percent in North America and rise from support of 36 percent of all global Internet traffic to a projected 55 percent by the end of the period.[13] In addition, the amount of IP video that traditional commercial television services are sending to directly to their subscribers, that is, delivering traffic from within their systems without sending the video to the greater Internet, is also increasing.[14] The numbers starkly illuminate the effect of these shifts for U.S. broadband network providers: While metro-only traffic is projected to grow at a CAGR of 24 percent over

[9] Cisco, Cisco Visual Networking Index: Forecast and Methodology, 2013–2018 1 (2014), *available at* http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/VNI_Hyperconnectivity_WP.html ("Cisco VNI").

[10] *Id.* at 6.

[11] CTIA – The Wireless Association, CTIA Semi-Annual Wireless Industry Survey Top-Line Results 9 (2013), *available at* http://files.ctia.org/pdf/CTIA_Survey_YE_2012_Graphics-FINAL.pdf ("CTIA Survey").

[12] Cisco VNI at 8-9.

[13] *Id.* at 2.

[14] *Id.* at 13.

the next five years, moving traffic among networks (long-haul traffic) is expected to remain essentially flat (-0.1 percent) in North America.[15]

The rising popularity of VoIP merits attention as well. Cable networks are now the principal VoIP providers, with the number of residential of residential VoIP subscribers through cable rising 10.1 percent in 2013 to 25 million.[16] The non-cable VoIP market more than doubled between 2009 and 2012.[17] The overall residential VoIP market will increase from 35.9 million subscribers in 2013 to 46.8 million in 2017.[18]

The data demonstrates that robust broadband services already are available in the U.S., thanks in part to the FCC's existing regulatory approach. These figures also provide the Commission additional incentive to continue taking steps to ensure that the inevitable transition of legacy transmission platforms and technologies to Internet Protocol ("IP") networks occurs in an organized and orderly fashion.

B. Regulatory Conditions Must Continue To Encourage Infrastructure Investment And Further Fuel Competition

The implications of the rising trend lines for broadband consumer growth and demand, coupled with concerns about network congestion, should be obvious: If investment does not continue flowing into broadband infrastructure deployment and upgrades, the Internet that users enjoy today may falter – and the vision for future broadband services may never emerge. But the Commission cannot rely on private investment to keep rolling into broadband infrastructure

[15] *Id.* at 8.

[16] Telecommunications Industry Association, TIA's 2014-2017 ICT Market Review & Forecast 3-32 (2014) ("TIA MRF").

[17] *Id.* at 3-33.

[18] *Id.* at 3-33. In the meantime, circuit switched spending – primarily by wireline telcos – is expected to decrease from $111.6 billion in 2013 to $95.4 billion in 2017, a 3.8 percent decline compounded annually. *Id.* at 3-6. Overall landline voice spending is projected to fall at a 1.1 percent rate compounded annually, from $132.1 billion in 2013 to $126.3 billion. *Id.* at 3-6.

automatically, as if broadband were somehow immune to normal business cycles and overly burdensome federal regulation. Such an unwarranted regulatory paradigm would have a demonstrable chilling effect on investment,[19] and stifle the competitive forces that have increased broadband speeds, kept entry-level broadband price options low, and delivered multi-platform broadband options to consumers across the country.

The FCC's earlier decision to eschew Title II regulation should be credited as having had a positive role in current broadband investment trends. The established light-touch regulatory framework has afforded investors the confidence to devote significant financial resources to our nation's Internet infrastructure. On the mobile side, in 2012 alone carriers invested $34 billion upgrading wireless networks – an increase of $10 billion from the previous year.[20] TIA data indicates that wireless infrastructure spending in 2013 rose 9.2 percent.[21] Wireless equipment was the fastest-growing category as LTE network rollouts fueled capital spending.[22]

The cable industry has spent over $213 billion on capital expenditures since 1996.[23] Researchers report that "[m]ajor cable TV operators in the U.S. are aggressively deploying high-speed Wideband network based on the DCOSIS 3.0 technology," with a 14 percent spike in device shipment expected this year.[24]

---

[19] *See infra* Section II (discussing the TIA-commissioned Economic Impact Statement of July 2010, which demonstrated that reclassification of broadband Internet connectivity, even when lightened by forbearance, would push mildly profitable cable build-outs in a rural town or telco fiber upgrades in an urban wirecenter to money-losing levels, while rendering investments by either platform in other rural areas even less justifiable than before).

[20] CTIA Survey at 5.

[21] TIA MRF at 5-3.

[22] *Id.* at 5-3. Wireless penetration passed the 100 percent mark in 2012 and reached 105.2 percent in 2013 – with the above-100 figure representing people who own more than one wireless device. TIA expects wireless penetration to increase by 6.6 percentage points over the next four years to 111.8 percent by 2017.

[23] National Cable & Telecommunications Association, Tracking Cable's Investment in Infrastructure, https://www.ncta.com/industry-data/item/3199#.U3JOSGox5xg (last visited July 9, 2014).

[24] Zachs Equity Research, *DOCSIS 3.0 Market Thriving*, Analyst Blog (Dec. 17, 2013), http://www.zacks.com/stock/news/117193/DOCSIS-30-Market-Thriving.

The wireline industry has invested approximately $660 billion since 1996.[25] In the period spanning 2002-12, wireline providers averaged $28.3 billion in capital expenditures annually.[26] The result of these significant levels of investment: The U.S. "has more competitive facilities-based broadband markets than most of the rest of the world. Approximately eighty percent of United States households can choose among two or more wired competitors."[27]

All of this investment has directly benefited consumers. Average broadband speeds have doubled in the last four years.[28] And, according to TIA's own calculations, the average cost per megabit for consumers has dropped at a rate of approximately 50 percent every two years for the past two decades.[29]

Through 2017, TIA projects that infrastructure spending should remain reasonably stable, assuming no substantial changes in regulatory treatment. Overall infrastructure equipment spending should grow from $38.6 billion in 2013 to an estimated $42.9 billion in 2017.[30] Cumulative spending on infrastructure equipment during 2014-17 should total $163.8 billion, 12.9 percent more than the $145.1 billion spent during 2010-13.[31]

---

[25] USTelecom, Broadband Investment, http://www.ustelecom.org/broadband-industry/broadband-industry-stats/investment (last visited July 10, 2014).

[26] USTelecom, Historical Wireline Provider Capex, http://www.ustelecom.org/broadband-industry-stats/investment/historical-wireline-provider-capex (last visited July 10, 2014).

[27] USTelecom Comments, GN Docket No. 12-228, at 9 (Sept. 20, 2012).

[28] Press Release, Akamai, Akamai State of the Internet Report Spotlights Latest Global Speed and Attack Trends from Fixed and Mobile Internet Connections (January 24, 2011), *available at* http://www.akamai.com/html/about/press/releases/2011/press_012411.html (the overall average connection speed for the U.S. as a whole in the third quarter of 2010 was 5.0 Mbps and overall average peak connection speed was 20 Mbps); Akamai, State of the Internet Report, 23 (Q4 2013), *available at* http://www.akamai.com/dl/akamai/akamai-soti-q413.pdf?WT.mc_id=soti_Q413 (the average connection speed in the United States were 10.0 Mbps and average peak connection speeds were 43.7 Mbps).

[29] TIA compared America Online's 1995 offering of *28.8* kbit/s @ $19 to today's FiOS Quantum, with 150 mbps download speeds and 65 mbps upload speed for $99.99 per month.

[30] TIA MRF at 3-9.

[31] *Id.* at 3-39.

As a general matter, TIA anticipates that total infrastructure spending during the next four years should average $41 billion annually, a 13 percent improvement from the $36.3 billion annual average during the past four years – assuming the current regulatory environment continues.[32] Infrastructure spending will be fueled by primarily by the ongoing need to accommodate surging data traffic.[33]

C. The FCC Must Not Lose Sight Of The Engineering Realities Of The Distinctly Different Types Of Broadband Platforms

In our filings in earlier phases of this proceeding, TIA empirically demonstrated that the open Internet is, and always has been, a managed Internet.[34] It relies on a highly intelligent network core – regardless of the specific technology involved – and management occurs across the network on an ongoing basis. We briefly recap below the Internet's technical history and the current operation of the different networks that provide broadband services. More detailed overviews are available in the series of expert declarations and statements submitted with TIA comments in the related 2010 Open Internet dockets.[35]

The Internet has evolved and gained intelligence in a way that the initial developers could never have imagined, particularly with respect to traffic management.[36] Since shortly after the Internet "went live," engineers have revised and modified the Internet to accommodate growing and changing traffic. Many of these approaches directed functionality to the core of the network

[32] *Id.* at 3-5.

[33] *Id.* at 3-5.

[34] *See infra* n. 36.

[35] Weldon Declaration; Ko/Schneider Declaration; Tooley/Bowman; Grob Declaration.

[36] But even the earliest versions of the Internet did not treat all packets identically. Douglas A. Hass, *The Never-Was-Neutral Net and Why Informed End Users Can End the Net Neutrality Debates*, 22 Berkeley Tech. L. J. 1563, 1574-75 (2007) ("*The Never-Was-Neutral Net*") (explaining the original Defense Advanced Research Projects Agency ("DARPA") TCP/IP standards and subsequent Internet Engineering Task Force standards allowed for some traffic filtering and prioritization). Given the radical changes in the volume, content and use of broadband networks, it is not surprising that network engineers and developers have continue to look beyond the end-to-end "dumb pipe" presumption by placing more capabilities within the network itself.

in order to increase efficiency – with the result that engineers have moved further and further away from a rigid end-to-end approach.

The growth and change in broadband traffic[37] have placed a growing premium on network management. Increased use of shared network capacity (in the edge on cable and wireless networks, and in the "middle mile" and other network segments for all platforms), combined with sharply rising bandwidth demands, have placed great strains on network resources.[38] Because there is no feasible way to solve these problems solely by the addition of capacity,[39] network engineers have created management tools that rely on the network's intelligence to ensure that users' needs are met and that the benefits of a robust Internet continue to be enjoyed by all. These tools often require network intelligence to identify packets as requiring certain levels of prioritization, or to otherwise classify packets, and to afford different packets the differential treatment necessary to serve consumers' needs.

Below is a very high-level overview of the major attributes of the different types of broadband networks and some of the techniques used to manage traffic on them – and thereby preserve the Internet's open and useful nature.[40]

Wireline telco

> Even from the Internet's earliest days in the analog telephony environment, network design has focused on achieving the needs of the network's users through pragmatic engineering.[41] The original Internet was an amalgamation of ideas and

[37] *See supra* Section I.A.

[38] *See, e.g.*, Tooley/Bowman Declaration at 25; Ko/Schneider Declaration at 4-7.

[39] *See, e.g.*, Tooley/Bowman Declaration at 22.

[40] Each provider uses specific management tools depending on its own network and associated operational considerations. For example, there may be significant differences among the scheduling algorithms used for allocating bandwidth resources among contending users on cable, wireless, and fiber platforms, based on the unique characteristics of the various platforms, and any one of the algorithms may be wholly unsuited to other platforms.

[41] This is clear from the historical design of IP packets – the electronic "envelopes" that carry information over the Internet. This design includes (and has always included) a service parameter that allows communicating computers to indicate to network routers that certain messages deserve precedence over other messages. *See* ADTRAN Comments, GN Docket No. 14-28, at 15 (Mar. 21, 2014); *The Never-Was-Neutral Net* at 1574-75.

functionalities – drawn from predecessors including ARPANET and CYCLADES – that made the most sense for the time.[42] The development of the Internet since then, starting with the TCP/IP protocol itself, has reflected a consistent move away from the "dumb pipe" network, with the placement of greater intelligence in the network's core.

The increase in volume and complexity of wireline traffic had led wireline engineers to employ a wide variety of traffic management techniques, including – since the late 1990s – the ability to identify and prioritize particular types of traffic.[43] Today, prioritization techniques have become quite advanced, and may be configured in many different ways to ensure that jitter- and latency-sensitive traffic is delivered on a timely basis without any perceptible effect on best efforts Internet traffic.[44] Network engineers have employed various strategies such as packet blocking, dropping, and re-routing in order to prevent or alleviate harm from hackers and other security risks.[45] The basic tools used to manage network traffic fall into four broad categories: (1) tools for classifying traffic; (2) methods to ensure that the amount of traffic entering and exiting the network is consistent with contracted levels; (3) tools that prioritize and schedule traffic within the network, based on classifications identified using the first category of tools; and (4) traffic filtering and other techniques related to network security and blocking of illegal,

---

[42] *See* TIA January 2010 Comments at 4-7. One of the first network systems was ARPANET, a packet-switched network developed in the late 1960s and designed for the Defense Advanced Research Projects Agency ("DARPA"). It functioned largely as a "black box" that handled all networking functions with minimal instruction from the end-user's hardware or applications. This "intelligence in the core" approach had advantages, such as simplifying the creation of applications, but it also imposed costs. Engineers who wanted to innovate with new approaches to networking found it very difficult to modify the operation of ARPANET itself, because all of the intelligence resided in the network.

In contrast, CYCLADES was one of the first internetworking systems designed for network engineering experiments. A French system developed in the early 1970s, it kept only the simplest networking functions in the network core – thereby increasing efficiency by simplifying the network and pushing certain functions such as error-checking out to the edge, where they need to be performed only once; allowing data to travel over multiple, redundant paths, improving the robustness of the system; and making it easier to interface with any number of other networks, creating one of the first network of networks – or "internet." The experimental convenience of implementing the network intelligence at the edge of the network was a pragmatic solution to encourage experimentation, not an engineering judgment that innovation always must be focused on the edge. But while the CYCLADES approach facilitated the development of new protocols at the network's "edge," network engineers expect to deploy any newly developed networking functions wherever it makes the most sense, including in the core of the network.

The designers of the Internet relied on both the ARPANET and CYCLADES experiences when they developed the TCP/IP protocols that today form the software backbone of the Internet. The history described above often has been lost in debates over network management practices. In the telling of those who advocate "net neutrality" regulation, the "end-to-end" approach is cast not as the pragmatic engineering tool it was – designed for certain purposes but also subject to important limitations – but rather as an essential, inflexible and intrinsic feature of the network, largely (or fully) responsible for the Internet's openness and transparency. This is incorrect.

[43] One particular type of smart routing known as Multiprotocol Label Switching ("MPLS") has been the subject of the Internet Engineering Task Force standards working group since 1997. The MPLS Resource Center, The MPLS FAQ, *available at* http://www.mplsrc.com/faq1.shtml#MPLS%20History.

[44] *See generally* Ko/Schneider Declaration at 12-16 (describing different prioritization techniques, including use of strict priority, "round robin" approaches, and weighed algorithms). This is not a new development. *See supra* n. 36.

[45] *See* Ko/Schneider Declaration at 16.

harmful or objectionable content.[46] Traffic volume, of course, has only increased since the Commission adopted the 2010 Open Internet rules.

Cable

Another form of wireline broadband network, cable – because of its history as a multichannel video service provider optimized for a private network delivery of services – has always had intelligence throughout its network.[47] It also has special attributes worth noting, including but not limited to the following:

- Bandwidth growth has limits, and to take advantage of additional bandwidth offered by the latest version of DOCSIS, subscribers must upgrade their modems.
- At the access edge of the network, anywhere between 25 and 2000 homes may share the network connection; typically, about 500 homes share a single "node." This can raise user-to-user fairness issues, as certain users may disproportionately consume network resources. Also, as the number of homes increases, the amount of bandwidth consumed by the data needed to manage these modems increases quickly, resulting in an efficiency loss and a practical maximum number of modems per node.
- Because the coaxial portion of cable networks is analogous to a giant antenna, it is prone to "noise" on the line, particularly in the upstream direction on the network. Certain lawful devices when connected to the network can exacerbate this noise. Noise increases packet loss, which in TCP/IP forces bandwidth-consuming retransmission of packets, which in turn increases the need for specific network management techniques.

Mobile

The *Notice* – and the Commission's 2010 Open Internet rules – correctly notes that wireless broadband networks have unique characteristics and therefore face distinct management challenges.[48] Wireless operators must contend with an environment of mobility, set spectrum resources, interference, and other unique factors that change rapidly and quickly.[49] It also is important to recognize that the spectrum is shared among the operator's customers, and that limited throughput capacity can lead to a greater potential for network congestion than is found with a wireline broadband network.[50] The

[46] *Id.* at 12.

[47] Tooley/Bowman Statement at 4.

[48] *Notice* at ¶ 62 (discussing FCC's mobile-specific 2010 rules).

[49] *See* Jeffrey H. Reed & Nishith D. Tripathi, The Application of Network Neutrality Regulations to Wireless Systems: A Mission Infeasible, 25-27 (2010) (attached to AT&T Comments, GN Docket 09-191, WC Docket 07-52 (Jan. 14, 2010)).

[50] As one technical expert explained in an earlier phase of the rulemaking, "one strand of fiber-optic cable has greater capacity than the entire RF spectrum." Rysavy Research, *Net Neutrality Regulatory Proposals: Operational and Engineering Implications for Wireless Networks and the Consumers They Serve*, at 10 (attached to Mobile Future Comments, GN Docket No. 09-191, WC Docket No. 07-52 (Jan. 14, 2010)).

> same wideband radio channel must be shared among many user sessions that may each involve many different types of data streams and protocols. Consequently, "[i]nterference limits capacity in a wireless system on a dynamic basis, varying by location and from one millisecond to the next, and this problem has no counterpart in wireline systems."[51] For these reasons, wireless networks traditionally have been centrally managed, with intelligence in both the core and the handset under network control. Mobile network management requires use of a variety of algorithms, including admission-control, load-balancing, handover or handoff, scheduling, power-control, and limitations on applications causing network management issues.[52]

* * *

Broadband services in the United States have flourished under the historic light-touch regulatory framework. This approach recognized the dynamic nature of the Internet – enabled in part by network management techniques customized for each particular platform – and helped unchain remarkable levels of capital investment in broadband infrastructure. The Commission should maintain that time-tested approach to fostering competition among advanced broadband networks. The various technologies involved in supplying world-class broadband services to Americans could be hamstrung, as an engineering matter and a business matter, by one-size-fits-all mandates that are not adaptable to the fast-changing Internet environment.

II. RECLASSIFYING BROADBAND ISP OFFERINGS AS TITLE II SERVICES IS UNWARRANTED AND WOULD CHILL INNOVATION

After years of a successful, bipartisan, and appropriately modest approach to Internet regulation, the Commission once again seeks comment on extending a legacy regulatory framework from the time of Theodore Vail onto the 21st century's communication technology. The Commission has considered Title II classification for broadband ISP services several times

[51] *See* Reed & Tripathi at 22.

[52] *See, e.g.*, Grob Declaration at 7-8; Verizon Comments, GN Docket No. 09-191, WC Docket No. 07-52, at 64 (Jan. 14, 2010); Nokia Siemens Networks Comments, GN Docket No. 09-191, WC Docket No. 07-52, at 7 (Jan. 14, 2010). *See also* Groh Declaration at 10 ("When it comes to network management tools, there is no set menu of tools that carriers look to implement. The congestion management techniques that carriers use are constantly changing and evolving. In addition, each carrier takes a different approach to network management, which depends upon the network configuration and deployed service (which vary on a customer-by-customer basis), as well as end-user demands, equipment, and location.").

over the last dozen years – and each time, whether under Democratic or Republican leadership, has rejected it.[53] It is not hard to understand why, particularly in light of the complex technical issues involved in managing and upgrading the several different types of broadband networks involved. Recreating a common carrier regime for broadband ISP service now, years after the Commission set a different regulatory course, would thwart the operation of the "virtuous cycle" of investment, competition, and innovation that the agency has celebrated and throw the industry into disarray.

As previous phases of the rulemaking attest, the FCC already has confronted the tensions between potentially applying Title II (even on a theoretically limited basis) while also attempting to adhere to "restrained oversight of broadband Internet service."[54] Imposition of the investment-inhibiting common carrier mandates cannot be reconciled with the goal of an Internet ecosystem capable of producing rapid innovation and revolutionary new products. Subjecting broadband services to core common carriage mandates, such as Section 201's "just and reasonable" rate mandates or Section 202's strict nondiscrimination requirements would hardly be a simple matter; 47 C.F.R. is filled with detailed mandates (e.g., Part 64) implementing Section 201 or other statutory provisions from which the Commission would either have to forbear – or not. Imposition of those most basic of all common carrier statutory obligations undoubtedly would lead to protracted debates over the application of specific rules and the lawfulness of existing broadband ISP service rates, terms, and business practices.

---

[53] *See, e.g.*, *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities*, GN Docket No. 00-185, CS Docket No. 02-52, Declaratory Ruling and Notice of Proposed Rulemaking, 17 FCC Rcd 4798 ¶¶ 43, 54-55 (2002); *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities et al.*, CC Docket No. 02-33 *et al.*, Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 14853 ¶¶ 44-46 (2005); *Preserving the Open Internet et al.*, GN Docket No. 09-191, WC Docket No. 07-52, Notice of Proposed Rulemaking, 24 FCC Rcd 13064 ¶¶ 115-23 (2010) ("*Open Internet Order*").

[54] *Framework for Broadband Internet Service*, GN Docket No. 10-127, Notice of Inquiry, 25 FCC Rcd 7866 ¶ 7 (2010) ("2010 NOI").

And which Title II provisions might end up being applied? In 2010, by TIA's estimate, the Commission identified at least 17 specific Title II provisions for discussion within the context of the "Third Way" NOI, notwithstanding the agency's stated desire for restraint. These went beyond Sections 201 and 202 to encompass Section 203 (Schedules of Charges); Section 206 (Liability of Carriers for Damages), Section 207 (Recovery of Damages), Section 208 (Complaints to the Commission); Section 209 (Orders for Payment of Money); Section 214 (Extension of Lines); Section 218 (Inquiries into Management); Section 222 (Privacy of Consumer Information); Section 224 (Regulation of Pole Attachments); Section 225 (Telecommunications Services of Hearing-Impaired and Speech-Impaired Individuals); Section 229 (Communications Assistance for Law Enforcement Compliance ("CALEA"); Section 251(a)(2) (Interconnection: obligation to comply with Section 255 guidelines and standards); Section 253 (Removal of Barriers to Entry); Section 254 (Universal Service); Section 255 (Access by Persons with Disabilities); and Section 257 (Market Entry Barriers Proceeding).[55]

And which service providers would be regulated? Although the Commission previously imposed Open Internet obligations only on broadband ISPs – and has separately begun to analyze the Internet [transit] marketplace – demarcation lines may be more difficult to draw than some envision. Providers of fiber network services directly to consumers would have to shoulder any new obligations. But what about service providers such as Netflix, which owns broadband facilities: Could it be subject to just and reasonable rate mandates or universal service obligations? Would cloud storage providers that own facilities also be swept in? How far would customer proprietary network information mandates extend – far enough to reach

[55] 2010 NOI at ¶¶ 74-92. The Title II provisions raised earlier also included Section 229 (Communications Assistance for Law Enforcement Compliance), which already applies to providers of broadband Internet access. *Id.* at ¶ 89; *see Communications Assistance for Law Enforcement Act and Broadband Access and Services*, First Report and Order and Further Notice of Proposed Rulemaking, 20 FCC Rcd 14989 ¶¶ 24-38 (2005), *aff'd, Am. Council on Educ. v. FCC*, 451 F.3d 226 (D.C. Cir. 2006).

entities such as Uber, Groupon, and Facebook, which rely on broadband ISP facilities to deliver location-based services?

Several Title II provisions would have a direct and potentially devastating impact on broadband innovation and investment. For example, in applying Section 214, the Commission could subject ISPs to an approval process for entry, transfers of control and/or discontinuance of service. In a competitive marketplace, a requirement to secure Commission approval before extending or modifying services would impose costs, raise barriers to entry, and could directly affect business plans and the ability of companies to quickly respond to changed market conditions – and in at least some cases discourage entry in the first place.

Title II's potential negative impact on investment is not just a rhetorical point. TIA previously commissioned and submitted an economic study assessing the effect of "Third Way"-style Title II mandates on two operator investment decisions in two particular business case scenarios: (1) a cable operator considering a new cable build in a rural town or adjacent countryside; and (2) a wireline telco operator considering a fiber-to-the-home overbuild of its existing territory in an urban area.[56] In both cases, the outcome was bleak. In its analysis, Cambridge Strategic Management Group ("CSMG") has found that an increased regulatory burden under Title II "impairs the commercial case for network investment" and raises "the required level of any universal service subsidy that could be awarded."[57] Even under the "limited" Third Way approach, CSMG determined that "[i]n every case, increasing the degree of regulation reduces the NPV [Net Present Value] of an investment." To be specific:

- In the cable scenario, CSMG modeled a build by an existing cable provider into a new geographic area – which would bring triple-play retail services, including broadband, into a new market. CSMG determined that the NPV of such an

[56] *See* CSMG Study.

[57] *Id.* at 5-6.

investment opportunity for a small town deployment would fall over two-fold, from a positive $7.2 million to a subpar (-)$11.5 million.

- For the telco case, CSMG modeled the economics of an incumbent local exchange carrier deploying an FTTH network to an urban area with existing DSL and voice services – which also would bring triple-play retail services, including broadband, into a new market. CSMG determined that the proposed Title II mandates would drive down the NPV of the FTTH deployment from a positive $7.4 million to a negative (-)$5.3 million.

In other words, the revenue loss inflicted by "light" Title II regulation renders broadband build-out untenable in many situations – leading directly to reduced investment activity or increased demand on universal service support.[58]

In short, the specter of Title II regulation would inject substantial uncertainty into the marketplace in two respects. First, it would slow the introduction of new services, hamper broadband ISPs' ability to respond quickly to customers, and potentially thwart the Commission's own goals for increasing broadband deployment and upgrade. Second, broadband providers would have to assess whether any new application might fall within whatever forbearance the FCC might grant – and wonder whether future FCC decision-makers will agree with their predecessors on that point.[59]

III. MAINTAINING LIGHT-TOUCH REGULATION WILL CONTINUE TO FOSTER INTERNET OPENNESS

A. A Regulatory Approach Incorporating Case-By-Case Analysis Of Fact-Specific Complaints Best Serves The Public Interest

Because the FCC's light touch approach to broadband ISP offerings has allowed the Internet economy to evolve and flourish, the Commission should continue to move forward on

[58] *See Id.* at 6, 12-16 (projecting even larger shortfalls for cable broadband extensions into rural areas and telco FTTH upgrades in rural town wirecenters, which accordingly would require more USF support to ever actually be built).

[59] The FCC itself may not be fully in control of all forbearance decisions. For example, even if the Commission did not act to regulate rates, a third party could file a Section 208 complaint alleging unreasonable rates, forcing the agency to rule.

that path. For all the reasons detailed above, if any regulations are needed at all, they must be crafted within a framework that can allow for action targeted to a specific set of factual circumstances and that can be readily revised over time as technology and marketplace developments change. The *Notice* amply acknowledges the need for this flexibility, and the Commission should confirm it by relying on its Title I authority to craft any new rules.

In doing so, the agency also must take care to ensure that new regulations do not inadvertently pick favorites among, or confer advantages on, one type of broadband network over another. TIA firmly believes that the public interest is best served by allowing technologies to succeed or fail based on their own merits, not on the operation of government regulatory regimes. In this proceeding, because broadband platforms have very different technical characteristics, any new Open Internet regulations should account for the distinct engineering constraints confronting mobile broadband ISPs.

1. The FCC Has The Legal Authority Under Title I To Craft Meaningful Regulations To Guide Individual Adjudications

The Commission's authority under Section 706 to fashion sustainable broadband ISP regulations merits serious consideration.[60] Although that authority has limits, the D.C. Circuit determined that that the FCC has authority under that provision of Title I to act to accelerate broadband deployment.[61] The FCC's power is channeled to serve explicit, legislatively prescribed policy objectives. Specifically, Section 706(b) empowers the agency to "accelerate deployment … by removing barriers to infrastructure investment" and "by promoting competition in the telecommunications market."[62]

[60] *Notice* at ¶¶ 143-147.

[61] *Verizon v. FCC*, 740 F.3d 623, 635-42 (D.C. Cir. 2014).

[62] 47 U.S.C. § 1302(b).

By its plain-English terms, then, Section 706 directs the FCC to avoid regulations that would discourage broadband infrastructure investment. Lawmakers made clear that encouraging investment naturally will lead to even greater competition among existing providers, while also holding promise for the prospect of new entrants. In the open Internet context, removing impediments to investment includes finally resolving the regulatory uncertainty that has hung over broadband ISP services for several years now.

TIA shares the Commission's desire for regulations that will work in marketplace and withstand potential court scrutiny.[63] Case-by-case adjudication can provide a feasible balance between the need to accommodate rapidly changing technology advances and consumers' need for assurance that they will to continue enjoy the same fundamental Internet benefits they have come to expect.[64] The agency has experience with regulation through the development of case precedent based on generally articulated standards, which has proved adaptable to changing conditions over time.[65] That approach should work here as well.

2. The Commission Should Craft Reasonably Simple Ground Rules That Can Be Fleshed Out As Needed Through Case-By-Case Consideration of Complaints

The Commission need not plow new ground in establishing "generally articulated standards" for a flexible, adjudication-based approach to broadband ISP regulation. The agency needs simply to look to its *Internet Policy Statement* as the lodestar. The four principles

[63] *See, e.g., Notice* at ¶ 110 (noting that the Commission believes "that establishing an enforceable legal standard for broadband provider practices is necessary to preserve Internet openness, protect consumers, and promote competition").

[64] *Id.* at ¶ 111.

[65] *See, e.g., Revision of the Commission's Program Access Rules et al.*, Report and Order in MB Docket No. 12-68 *et al.*, 27 FCC Rcd 12605 ¶ 45 (2012) (noting the a "case-by-case approach for considering exclusive contracts … will allow the Commission to consider the unique facts and circumstances of each case"); *2000 Biennial Regulatory Review Spectrum Aggregation Limits for Commercial Radio Services*, WT Docket. No. 01-14, Report and Order, 16 FCC Rcd 22668 ¶¶ 47-58 (2001) (adopting a case-by-case review for analyzing spectrum transactions with a spectrum screen, as opposed to a "prophylactic" rule.)

articulated a decade ago – centering on the rights of consumers to access the lawful content of their choice in a dynamically evolving Internet environment – have proven their worth.[66] The FCC has repeatedly acknowledged that light touch regulation best supports the ongoing operation of the Internet cycle of investment, competition, and innovation. Strictly prescriptive rules, in contrast, would hinder both competition and innovation by stifling investment and imposing time-to-market constraints on emerging products and services.

a. Any New Transparency Rules Must Be Tailored For Consumer Understanding And Accommodate The Dynamic Variability In How Networks Operate

The D.C. Circuit upheld the Commission's 2010 Open Internet transparency rules, and they have been in effect for more than three years without attracting a single formal complaint.[67] Given this record, it is not clear that any additional rules are needed. The consumer concerns that the *Notice* references may suggest that further consumer education about how broadband networks work in the real world would be useful; some consumer expectations about speed and frustration over occasional traffic congestion, for example, may be better addressed through broad-based information campaigns as opposed to point-of-sale disclosures. Given the relatively sparse evidentiary foundation the Commission has on this issue to date, the FCC should be

[66] Specifically, the principles call for consumers to have the ability to (1) "access the lawful Internet content of their choice;" (2) "run applications and use services of their choice, subject to the needs of law enforcement;" (3) "connect their choice of legal devices that do not harm the network;" and (4) enjoy "competition among network providers, application and service providers, and content providers" – all subject to "reasonable network management." *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities et al.*, GN Docket No. 00-185 *et al.*, Policy Statement, 20 FCC Rcd 14986 ¶ 4 (2005) ("*Internet Policy Statement*").

The policy preferences reflected in the *Internet Policy Statement* and later *Open Internet Order* built upon an emerging consensus. In 2003, TIA and other trade associations in the "High Tech Broadband Coalition" articulated a set of "Broadband Principles for Consumer Connectivity." High Tech Broadband Coalition Letter to Chairman Powell, CC Docket No. 02-33 *et al.* (Sept. 25, 2003).

[67] *Notice* at ¶ 161.

cautious about adding new disclosure requirements that mandate discussion of technical information that would not be useful to the average consumer.[68]

With respect to transparency for edge providers, it is appropriate generally for ISPs to share service-focused information with edge providers, but such information exchanges are best left to private discussions that the individual parties can tailor to their own needs. These discussions are likely to involve issues that may not be relevant to every edge provider, which would render prescriptive disclosure mandates unhelpful – and, from a practical standpoint, potentially unworkable.

b. Because There Is Broad, Market-Driven Support For The "No Blocking" Concept, A Simple And Flexible Rule Would Be Sufficient

The *Verizon* decision, as the *Notice* indicates, suggested a pathway for ensuring that consumers will encounter no anticompetitive blocking of lawful content or services on the public Internet.[69] Re-adoption of the 2010 rule language – including the tailored treatment afforded to mobile broadband providers – appears likely to be sustainable under Title I as long as the Commission also adopts the *Notice's* proposal for individualized negotiation of terms of service beyond a broad baseline level.[70]

Of course, broadband ISPs already have every business incentive to deliver all lawful content to consumers; it is the very definition of service they are selling. Providers know that consumers have choices and will switch if they are dissatisfied with their broadband service – which a notable percentage of consumers can easily do because they subscribe (or have access

[68] In keeping with TIA's understanding that the Commission staff is separately gathering facts about broadcast transit arrangements and practices, we take no position here on transparency regulations directed at any recipients other than end-user consumers.

[69] *Notice* at ¶¶ 92-93.

[70] *Id.* at ¶ 97.

through work or school) to both wireline and wireless broadband options.[71] This marketplace discipline is the most effective and efficient mechanism for ensuring Internet openness.

c. Prohibiting Only "Commercially Unreasonable Practices" Could Be A Feasible Way To Ensure Internet Openness While Avoiding Traditional Common Carrier Mandates

In considering how best to avoid unnecessarily – and counter-productively – straight-jacketing broadband ISPs with rigid nondiscrimination mandates, the Commission should draw lessons from the contrast between two D.C. Circuit decisions, as the *Notice* explains. The distinction between the FCC's loss in *Verizon* against a Title II challenge and the agency's win in *Cellco* against a similar Title II claim turned on the agency's more careful crafting of its data roaming rules.[72] The latter afforded regulated entities the opportunity for individualized negotiation of roaming agreements with a foundational requirement of commercial reasonableness based on the totality of the circumstances.[73] The Commission gave meaning to the commercial reasonableness standard by providing a list of factors it would consider in resolving disputes on a case-by-case basis, including a "catch-all" factor to account for "other special or extenuating circumstances" that might be presented by any particular set of facts.[74]

Should the Commission determine that it must adopt a replacement for the nondiscrimination rule invalidated in *Verizon*, the *Cellco* approach seems the only real alternative. As discussed at length above, the broadband marketplace is too diverse and too

---

[71] Internet Access Report at 10, Figure 5(b)(noting that 98 percent of U.S. households have at least two providers offering fixed or wireless service delivering at least 6 Mbps downstream and 92 percent have three or more providers offering fixed or wireless service of at least 6 Mbps downstream). Not every consumer needs to immediately switch to a competitive alternative for marketplace discipline to operate. In the Internet space, broadband ISPs can be expected to pay close attention to savvy consumers, including but not limited to early adopters, who aggressively analyze their options.

[72] *Notice* at ¶¶ 114-116.

[73] *Id.* at ¶ 115 (quoting *Verizon*, 740 F.3d at 657 (D.C. Cir. 2014)).

[74] *Id.* at ¶ 115, n. 243 (quoting *Reexamination of Roaming Obligations of Commercial Mobile Radio Service Providers and Other Providers of Mobile Data Services*, WT Docket No. 05-265, Second Report and Order, 26 FCC Rcd 5411 ¶ 86 (2011)).

dynamic for rigid Title II-style regulations to actually work to the benefit of either consumers or broadband providers. Strict mandates would inhibit investment, thereby dampening the competition and innovation that ultimately serves consumers. And arcane enforcement proceedings that would necessarily incorporate common carriage precedents are not likely to lead to rapid and readily understandable conclusions.

On the other hand, case-by-case analyses that build on the *Cellco* model seem to offer some promise. A Title I foundation will give the Commission room to focus only on empirically demonstrated harms within a given dispute and narrowly tailor enforcement to identified harms. This approach also is likely to best accommodate the limits on the FCC's regulatory authority identified in *Verizon*; by its nature the adjudicatory process should keep the agency focused on ensuring that case results serve the ultimate statutory objectives of encouraging investment and supporting competition. As with its data-roaming rules – and other FCC regulatory schemes requiring a balance between flexibility and structure – the agency could provide some general factors that it may consider in determining whether particular practices are commercially reasonable.[75]

With respect to concerns about potentially different levels of acceptable broadband service speeds, TIA emphasizes that an understanding of engineering issues is critical to the discussion. Should the FCC seek to determine parameters for some baseline or "best efforts" Internet service, they must account for the technical characteristics of the network at issue in a

[75] In addition to the data roaming rules, the *Notice* also accurately points to the Commission's development of good-faith negotiation standards for resolving retransmission consent disputes as another promising model. *Notice* at ¶ 133. In that setting, the FCC developed an initial set of factors to provide guidance to industry, and later refined the factors after having the benefit of adjudicating several disputes. *See Implementation of the Satellite Home Viewer Improvement Act of 1999; Retransmission Consent Issues: Good Faith Negotiation and Exclusivity*, CS Docket No. 99-363, First Report and Order, 15 FCC Rcd 5445 (2000); 47 C.F.R. § 76.65(b)(1) (establishing a list of seven objective good faith negotiation standards). The process thus allowed for flexible amendment as marketplace conditions changed, while also ensuring that interested parties had clear, up-to-date notice of the agency's basic expectations for the private negotiation process.

specific adjudication. It would be reasonable to generally expect to see improvements in all platform types over time, but the specific circumstances must be the primary consideration. In any event, there are a variety of broadband technologies with different capabilities, speeds and prices competing vigorously for consumers in the marketplace – and those consumers, rather than the government, should decide what combination of price, speed and capability is "best" for each individual user. If a certain technology does not improve, consumers who want higher speeds will abandon that technology and, eventually, it will cease to be relevant. Broadband providers who do not wish to become irrelevant will either find a way to improve their technology or replace it with another technical option.

d. Reasonable Network Management Is Essential To Any Broadband Ecosystem

TIA's comments here, and in the past, have made abundantly clear that network management has always been necessary – as a technical matter – for the Internet to operate. We appreciate that the *Notice* reveals the Commission's understanding of these technical issues,[76] and we anticipate any serious debate about the issue in the 2014 proceeding will be relatively limited and more sophisticated than in the past.

It is should be beyond dispute that FCC oversight of "reasonable network management" must be flexible enough to accommodate the unique constraints of the particular technical platform and *also* the differences between providers whose networks ostensibly might be considered the same. For example, a small-town cable operator's mixed analog/digital networks likely will have decidedly different traffic management issues that a major cable operator's fully upgraded DOCSIS 3.0 system. "Reasonableness" must depend in part upon the constraints of the particular network at issue. And at the very least, any FCC oversight of network

[76] *Notice* at ¶¶ 61, 81.

management practices must not constrain ISPs from taking professionally defensible steps to meet consumers' needs and protect basic network functioning.[77]

B. Mobile Broadband's Distinct Attributes Merit More Tailored Regulatory Treatment

It is appropriate – and necessary – for the agency to follow through on its tentative concept of treating wireless differently if the agency adopts new prohibitions on blocking and commercially unreasonable practices. While it is true that mobile has dramatically expanded as a data service since 2010, it also is true that wireless networks' special engineering challenges remain even as traffic demands have sharply escalated.

The overview provided in Section I.C sketches out basic engineering facts that remain challenges in 2014, even though the wireless industry has made impressive technical strides in recent years. Spectrum is still at a premium, and frequency use is still shared among any one provider's many customers – who typically seek different types of services at the same time, involving different data streams and protocols, often while on the move. Consequently, wireless network engineers still actively engage in dynamic management techniques unique to wireless, while also working to address the same kind of basic management requirements (*e.g.*, minimizing traffic congestion, safeguarding network infrastructure) that all broadband networks share. Wireless networks also still require a higher degree of unified control, largely because of their reliance on spectrum. The FCC got the fundamental need for the wireless distinctions right in 2010, and nothing warrants a shift in that approach.

Accordingly, the Commission should adopt the *Notice's* proposal to retain the tailored no-blocking rule of the 2010 Open Internet regulation for mobile broadband ISPs,[78] subject only

[77] As TIA has explained in the past, this includes steps designed to protect a broadband network's security, shield consumers from unlawful or undesirable material, and support public safety needs.

[78] *Notice* at ¶ 105.

to the modification affording wireless providers the same flexibility as wireline providers to enter agreements for terms of service above a [baseline][best efforts] level. The language should, as the *Notice* suggests, remain the same: "A person engaged in the provision of mobile broadband Internet access service, insofar as such person is so engaged, shall not block consumers from accessing lawful websites, subject to reasonable network management; nor shall such person block applications that compete with the provider's voice or video telephony services, subject to reasonable network management."[79]

Similarly, the Commission should adopt the *Notice's* proposal to forego a ban on commercially unreasonable practices with respect to wireless networks.[80] Mobile technology is still fluid and, in comparison to wireline technologies, new to market. It would be difficult for the FCC to craft viable "reasonableness" factors for wireless networks today.

C. The Commission Should Explicitly Recognize The Value Of Prioritization Of Traffic Generally And Allow Specialized Services To Continue Developing

As the *Notice* acknowledges, consumers today are being served by many services that are "prioritized" in some fashion simply by virtue of being carried on a managed network[81] – and all networks are managed, in one fashion or another, to ensure that all broadband Internet users are served.[82] Consumers would suffer if new regulations inadvertently undermined networks' ability to deliver services with the quality that users have come to expect. Expert evidence already before the Commission explains that several types of popular consumer services, such as voice over Internet protocol ("VoIP") service and online gaming, depend on prioritization to overcome

[79] *Id.* at ¶ 94.

[80] *Id.* at ¶ 140.

[81] *Id.* at ¶ 52. TIA takes no position on the *Notice*'s questions concerning paid prioritization; our focus is on the need to ensure that prioritization as a technical matter is understood and appreciated.

[82] *See supra* Section I.C.

difficulties with latency and jitter that can be made worse by traffic congestion.[83] The same holds true, with particularly serious consequences, for the growing use of high-definition video for a range of needs such as telehealth and public safety.[84] Prioritizing these uses over less technically demanding ones, such as email and much web surfing, serves particularized needs at certain times without sacrificing good Internet service to all.[85]

The Commission therefore should explicitly reject calls to restrict or prohibit prioritization broadly.[86] A blanket prohibition on the differentiation between categories of traffic could produce a "one speed" Internet suited best for email.[87] At the very least, other services that consumers value would be handicapped, including the VoIP (and HD Voice) services that more than 45 million American households have adopted in lieu of traditional telephony.[88] It need hardly be argued that public safety needs should continue to have priority, and many other services important to consumers, businesses, and government also merit prioritization as those needs, and current network technology, require.

In conjunction with recognizing the public interest benefits of prioritization generally, the Commission should maintain its existing approach to specialized services. The *Notice* correctly explains that these services do not rely primarily on the public Internet for transmission but may

[83] TIA January 2010 Comments at 26-27.

[84] *Id.* at 26-27.

[85] *Id.* at 23-27.

[86] *See, e.g.*, Free Press Comments, GN Docket 09-191, WC Docket 07-52 (Jan. 14, 2010).

[87] TIA January 2010 Comments at 10 (noting that "the increased use of shared network capacity … and growing bandwidth needs have combined to place great strains on network resources [with] … no feasible way to solve these problems solely via the addition of capacity. Thus, network engineers have worked to create management tools that rely on the network's intelligence to ensure that users' needs are met and that the benefits of a robust Internet continue to be enjoyed by all. These tools often necessitate use of network intelligence to identify packets as requiring certain levels of prioritization, or to otherwise classify packets, and to afford different packets the differential treatment necessary to serve consumers' needs.").

[88] Industry Analysis and Technology Division, Wireline Competition Bureau, FCC, *Local Telephone Competition: Status as of June 30, 2013*, at 1 (June 2014), *available at* http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0625/DOC-327830A1.pdf.

share the same last-mile connections as broadband Internet access service.[89] Because of that nexus, specialized services can help to spur investment in broadband facilities.[90] They also deliver significant benefits. For consumers, these range from potentially life-saving treatments coordinated through telehealth services such as remote surgery to high-quality video entertainment to energy savings delivered via remote home monitoring. Government and public users enjoy necessary quality of service ("QoS") and security protections for public safety communications and emergency messaging. For businesses, specialized services can support multi-office communications; reduce and stabilize costs, including IT operations and transport expenses; provide access to the latest technology with limited risk; and make it easier to adapt to changing business conditions. Regulatory intervention in this nascent area would suppress these innovative enhancements to consumer welfare.

All services that fall within the umbrella of the "managed" or "specialized services" label may share some common traits and characteristics, black-letter definitional lines would be exceedingly hard to draw – especially as technology continues to evolve.[91] Although specialized services are still nascent in development, they generally require one or several of the following elements: (i) guaranteed (low) packet loss; (ii) guaranteed (low) packet delay; (iii) secure, private connectivity; and (iv) guaranteed bandwidth.[92] These attributes are not uniform across all offerings, however, and different types of managed and specialized services may reside at different places within and across various networks in the future. The Weldon Declaration submitted with TIA's 2010 Open Internet Comments makes clear that "there is a very real risk

[89] *Notice* at ¶ 60.

[90] *Open Internet Order* at ¶ 112.

[91] TIA October 2010 Comments at 9. The Commission to date has appropriately declined to establish strict definitions but has identified AT&T's UVerse, eLearning, telemedicine and smart grid applications as examples of managed and specialized services. *Open Internet Order* at ¶ 150.

[92] Weldon Declaration at 1-2.

that any attempt to explicitly and narrowly define what is a 'Managed Service' or to limit the number or variety of such services that are permitted, will seriously miss the mark and stifle innovation."[93]

In the 2010 Open Internet Order, the Commission struck the appropriate balance with the "specialized services" exemption.[94] In light of the fast-changing variety of specialized services, the early stage of their marketplace emergence, and the lack of documented problems, the FCC need not change course away from simply monitoring their development. Specialized services plainly provide important and valuable benefits to consumers who draw upon them, and they indirectly support deployment of, and innovation on, the public Internet. The FCC should take no steps that would unnecessarily staunch or discourage investment in broadband deployment or upgrades generally.

[93] *Id.* at 9.

[94] *Open Internet Order* at Section III.G.

CONCLUSION

The Commission's record in this complex, multi-phase proceeding already is replete with evidence demonstrating that the imposition of old-style, rigid common carriage regulation could not accommodate the fast-moving technology changes that all broadband networks are experiencing. If the FCC determines that new regulations are needed, it should adopt a flexible, Title I approach in keeping with the pathway set by earlier policymakers, both Democratic and Republican. A case-by-case approach to reviewing complaints concerning individual broadband ISPs would best support ongoing investment in the broadband space – and thereby fuel the competition and innovation that serves consumers.

Respectfully submitted,

TELECOMMUNICATIONS INDUSTRY ASSOCIATION

By: /s/ Danielle Coffey

Danielle Coffey
Vice President, Government Affairs

Mark Uncapher
Director, Regulatory & Government Affairs

Brian Scarpelli
Director, Government Affairs

TELECOMMUNICATIONS INDUSTRY ASSOCIATION
1320 Court House Road
Suite 200
Arlington, VA 22201
(703) 907-7700

July 15, 2014