

COMMENTS OF REASON FOUNDATION ON NOTICE OF PROPOSED RULEMAKING
IN THE MATTER OF RESTORING INTERNET FREEDOM (FCC 17-60), U.S. Federal
Communications Commission, WC Docket N. 17-108, 5/18/2017.

Reason Foundation respectfully submits this comment on the Federal Communications Commission's notice of proposed rulemaking in the matter of Restoring Internet Freedom (hereinafter "Restoring Internet Freedom NPRM").¹

Introduction

For more than a decade, Reason Foundation has undertaken extensive work on the issue of Internet freedom and the regulation of broadband.² Consistent with the findings of the FCC in its Restoring Internet Freedom NPRM, this work finds that regulation of broadband under Title II of the Federal Communications Act would undermine innovation and investment in broadband provision, to the detriment of consumers and the economy.

This comment utilizes Reason Foundation's work and that of others to address both the broad question of whether public utility regulation of the Internet is in the public interest and to answer specific questions raised by the FCC in its Restoring Internet Freedom NPRM.

Is Public Utility Regulation of the Internet in the Public Interest?

Economists have developed a useful framework for analyzing platform technologies such as broadband, characterizing them as intermediating between "two sides" of a market. Examples of such two-sided markets include: newspapers, which act as a platform intermediating between readers and advertisers; broadcast television stations, which intermediate between viewers and advertisers; and payment networks (such as Visa, MasterCard and American Express), which intermediate between merchants and consumers.

In the case of the Internet, the platform—provided primarily by broadband Internet providers — intermediates between content and service providers on the one side, and content and service consumers on the other. But the Internet itself acts as a platform for other platforms, such as search engines (intermediating between advertisers and searchers), social networks (intermediating between advertisers and content sharers), ridesharing apps (intermediating between drivers and riders), and dating sites (intermediating between people seeking dates).

One essential insight of the work of economists on two-sided markets is that platform providers have incentives to increase the number of participants on both sides of the market—and they typically do this through cross-subsidies (using revenue generated on one side of the market to reduce the costs of access on the other side). Thus, newspapers and magazines, both in print and online, often charge readers less

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² See e.g. <http://reason.com/archives/2010/04/28/saving-the-Internet-from-the-f>; <http://reason.com/reasontv/2017/05/19/net-neutrality-nixed-why-john-oliver-is>; <http://reason.com/archives/2015/04/18/how-to-break-the-Internet>; <http://reason.org/news/show/net-neutrality-really-means-in>; <http://reason.org/news/show/net-neutrality-smartphones>;

than the average cost of production in order to increase circulation and thereby drive advertising revenue; in other words, they use (or hope to use) advertising revenue to subsidize readership. (This effect is most obvious for “free” newspapers and news websites that offer unrestricted access to content.) Likewise, most search engines do not charge searchers for using their service, relying instead on revenue from advertisers.

To date, most broadband providers have chosen to use revenue generated directly from consumers through access charges (typically, an initial connection fee plus monthly fees) to cover the bulk of their costs, which include infrastructure development and maintenance, and network management. But not all broadband providers follow this model.

When domestic Internet access was available primarily over the public switched telephone network via analog modem connections, Internet Service Providers (ISPs) developed networks of exchanges at local nodes, enabling consumers to access the Internet via local numbers that in the U.S. were usually not subject to per-minute charges. Some ISPs charged a (usually monthly) fee for Internet access in order to cover their costs. Others, such as NetZero, offered unpriced Internet access in return for users receiving advertisements. NetZero subsequently developed a free broadband Internet offering over Clearwire’s WiMax network and today it offers “free” mobile broadband up to 200 MB/month, which it runs over third party networks.³ But NetZero still offers “free” dial-up Internet access for those who are online for 10 hours per month or less.⁴

As discussed below, recent increases in data use has led some broadband ISPs to begin adopting similar models.

Broadband Provision in the U.S. is Highly Competitive

Commissioner Clyburn, in his dissent to the Restoring Internet Freedom NPRM, claims that a broadband provider is “a monopoly platform when it comes to connecting edge providers to the broadband providers’ end-user customers.” But the evidence contradicts this claim. Broadband provision is a highly competitive market, with multiple different forms of access – fixed line (including cable, fiber and DSL), mobile (including 3G, 4G/LTE), and satellite. Driven by this competition, the forms of access have been constantly evolving, with innovation in both fixed line and wireless forms.

FCC data shows that as of June 2016, all U.S. households have access to at least one fixed line broadband provider capable of delivering download speeds of 3Mb/s or more and upload speeds of 768kb/s or more – and 90% of households have access to at least two such providers.⁵ Meanwhile, in 2015, 99% of U.S. residents had access to LTE mobile broadband service with speeds of at least 10 Mb/s down and 1 Mb/s up.⁶ And as of June 2016, 99.1% of U.S. households had access to Satellite broadband of 3Mb/s down and 1 Mb/s up.⁷ In other words:

- 99% of U.S. households have a choice of at least three broadband providers (including fixed line, mobile and satellite).

³ See: <http://www.netzero.net/start/landing.do?page=fd/plans-mobile-static-s>. Among the third party networks NetZero has used are Verizon and Sprint: <http://www.phonenews.com/netzero-wireless-signs-new-agreements-with-verizon-sprint-23196/>

⁴ <http://store.netzero.net/account/showService.do?serviceId=nz-dialup>

⁵ Available at: https://apps.fcc.gov/edocs_public/attachmatch/DOC-344499A1.pdf

⁶ Federal Communications Commission, *2016 Broadband Progress Report*, FCC 16-6, GN Docket No. 15-191, Table 4, p. 37. Available at: https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-6A1.pdf

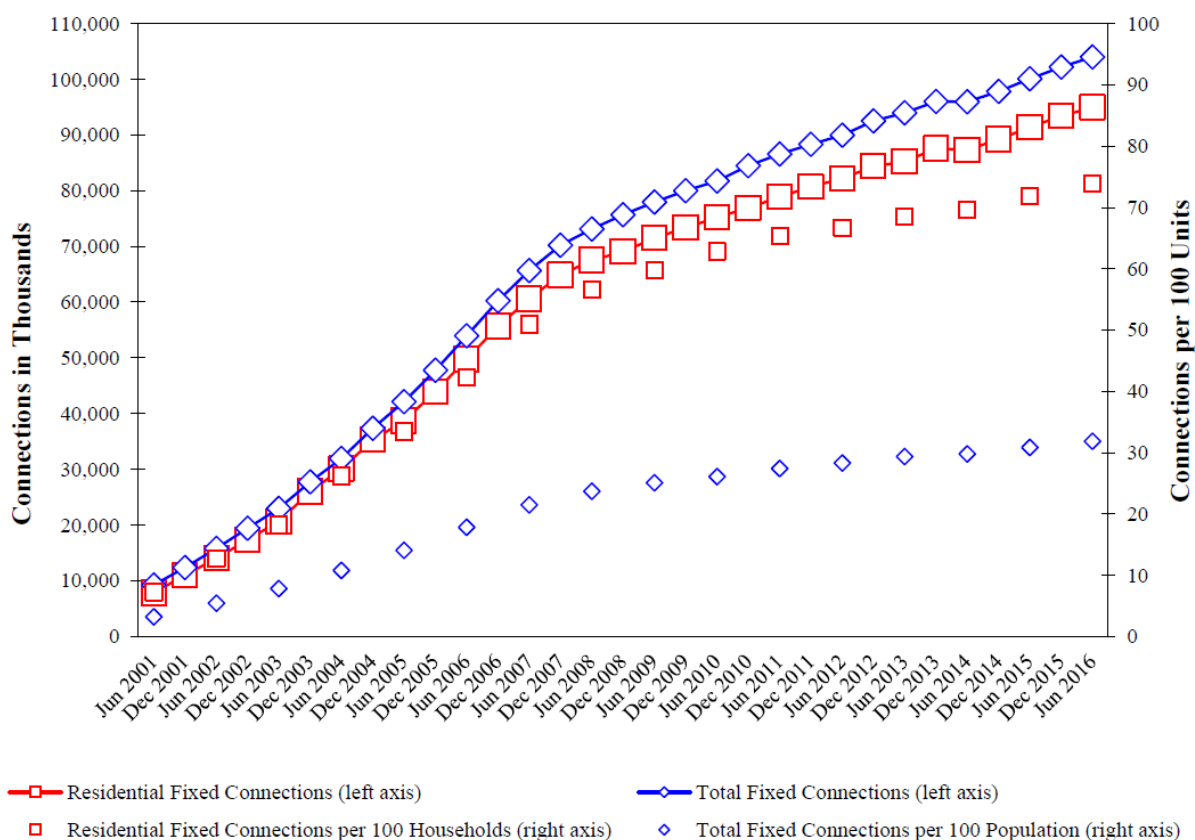
⁷ Ibid. (starred footnote to Table 4.).

- 90% of U.S. households have a choice of four or more broadband providers.
- 99% of U.S. households had access to at least two broadband providers capable of delivering 3Mb/s down and 1Mb/s up or better.

Competition is Driving Improvements in Speed and Quality, Enabling Improved Content and Services

Competition between broadband providers in the U.S. has driven investment in innovation and infrastructure, which has resulted in continuous improvements in network performance and access – as can be seen in Figures 1 - 3.

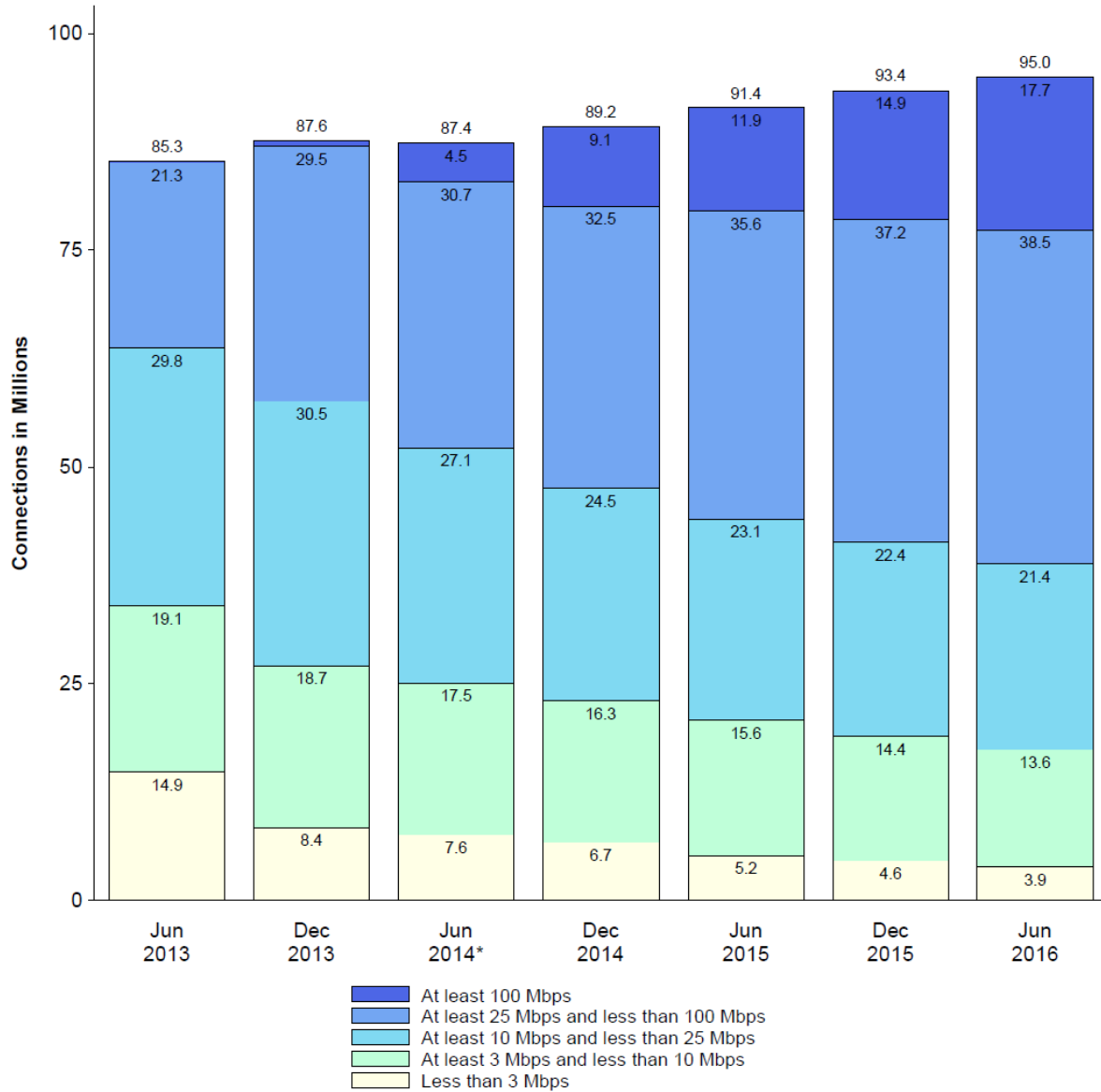
Figure 1: Fixed Connections over 200kb/s in at Least One Direction, 2001-2016



Source: FCC, *Internet Access Services: Status as of June 30, 2016*, Figure 5.

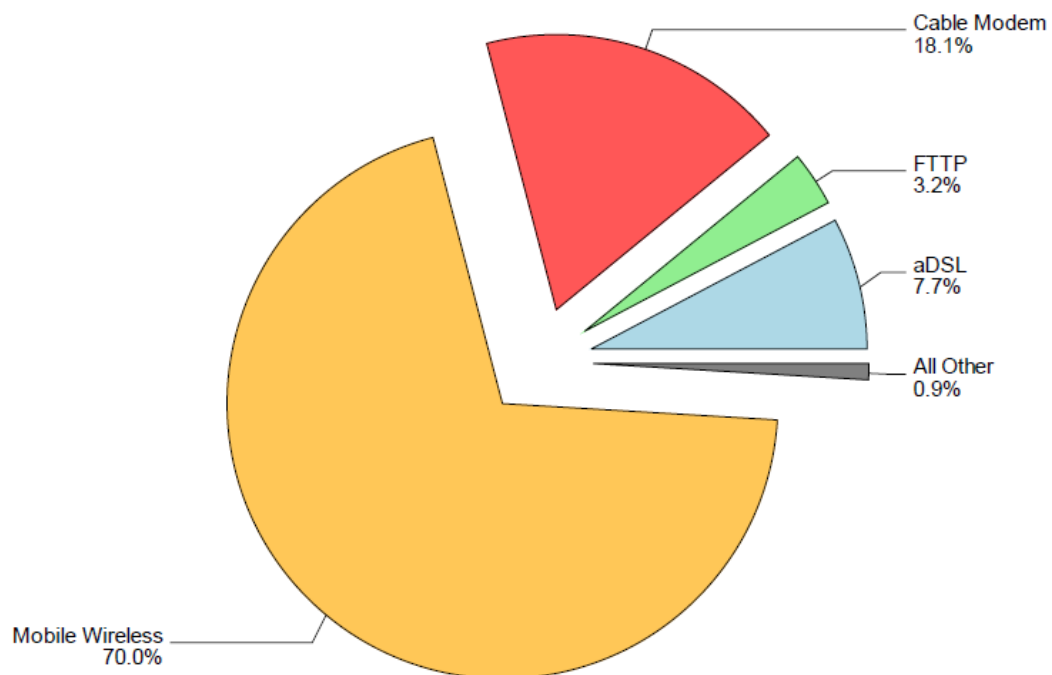
As the speed and quality of broadband access has increased, suppliers of content and services delivered over the Internet have developed new forms of content and services that take advantage of these innovations and consumers have increased their consumption of data. Several video streaming services now offer content in 4K (“ultra-high definition”), which consumes four times as much bandwidth as conventional HD streaming.

Figure 2: Residential Fixed Connections by Downstream Speed 2013-2016



Source: FCC, *Internet Access Services: Status as of June 30, 2016*, Figure 8.

Figure 3: Residential Connections by Technology as of June 30, 2016



Source: FCC, *Internet Access Services: Status as of June 30, 2016*, Figure 14.

Changes in Usage is Leading to the Adoption of New Business Models

In order to ensure that video and other content is available as rapidly as possible and with minimum delay, content providers such as Netflix, Amazon and Google use content delivery networks (CDNs), which cache content at many different locations. However, even with well-positioned CDNs, demand for bandwidth-consuming content has the potential to create blockages at nodes. Cisco forecasts that mobile data traffic alone will grow from approximately two million Terabytes/month in 2017 to over six million Terabytes/month in 2021 – an annual growth rate of 35%.⁸

To accommodate rising use of data and reduce blockages, Broadband ISPs invest in network improvements and management – but these investments are costly. One way to recoup those costs is through charges to content consumers. Another way is to charge content and service providers.

To date, broadband ISPs have largely sought to recoup investments by charging consumers of content and services (i.e. individuals, households and businesses that obtain broadband service from the ISP). But some have experimented with charging content and service providers. For example, in 2014, Netflix entered peering agreements with Verizon, Comcast and AT&T that saw Netflix pay those ISPs for

⁸ <http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html>

improved data delivery across their broadband networks.⁹ The beneficiaries of these agreements were consumers, who saw improvements in the speed of delivery of Netflix content (in the case of Comcast, speeds reportedly rose by 65%).¹⁰

Similarly, several mobile broadband ISPs have entered agreements with companies seeking to encourage consumers to use their services and view their content. NetZero offers “free” and discounted mobile broadband subscriptions in return for users accepting advertisements on their devices.¹¹ AT&T has developed a Sponsored Data plan that enables users to use services and view content provided by a number of companies without eating up data on their plan.¹² Verizon has developed a similar program called FreeBee Data.¹³

Some commentators have argued that it is “unfair” to charge content and service providers fees to offer priority to their data over broadband networks. But it is unclear in what way this is “unfair”. Moreover, the alternatives are arguably less fair. If broadband providers were prohibited from charging access fees to content providers, they could do one of three things: (1) nothing; (2) increase investment in network capacity (improvements in bandwidth capacity, switches, etc.) and charge subscribers to cover these costs; (3) limit broadband speeds of certain types of content during peak hours in order to reduce congestion (“throttling”). Considering each of these in turn:

1. Doing nothing would harm all broadband users, as speeds and quality of service would be reduced.
2. Charging all subscribers for investments would benefit consumers of high-bandwidth-consuming content but harm other subscribers;
3. Throttling high-bandwidth-consuming content would adversely affect consumers of that content.

Compared to these options, the solutions adopted by the ISPs seems eminently reasonable. They are also fair, since content providers and sponsors pass on to their consumers the costs of delivering bandwidth-intensive content and services.¹⁴

From an economic perspective, broadband ISPs are seeking to balance the two sides of the market by enabling providers of content and services to pay for access to the ISP’s network. This is not really any different from newspapers, search engines, or apps covering some or all of their costs by charging advertisers for access to their print, online, or in-app real estate.

As demonstrated above, broadband provision is highly competitive. As such, the ability of broadband ISPs to take actions that would harm consumers are severely limited – since in nearly all cases consumers can simply switch to an alternative provider. Moreover, allowing broadband providers to charge content and service providers for prioritization and/or marketing would incentivize investment in improvements to the network and create opportunities for new entrants with innovative business models. In other words, paid prioritization would both enhance investment and improve competition.

⁹ <https://techcrunch.com/2014/07/29/netflix-and-att-sign-peering-agreement/>;
<https://www.nytimes.com/2014/02/24/business/media/comcast-and-netflix-reach-a-streaming-agreement.html>;
<https://arstechnica.com/tech-policy/2014/04/netflix-and-verizon-reach-interconnection-deal-to-speed-up-video/>

¹⁰ <https://arstechnica.com/information-technology/2014/04/after-netflix-pays-comcast-speeds-improve-65/>

¹¹ <http://www.netzero.net/start/landing.do?page=fd/plans-mobile-static-s>

¹² <https://www.att.com/att/sponsoreddata/en/index.html>

¹³ <http://freebee.verizonwireless.com/>

¹⁴ For example, Netflix currently charges a \$2/month premium for users who receive 4K content.

As such, regulation of broadband as a public utility with rules restricting paid prioritization and/or otherwise constraining the business models adopted by broadband ISPs, is against the public interest.

Interpretation of the Telecommunications Act

1. Reinstating the information service classification of broadband Internet access

The FCC proposes “to reinstate the information service classification of broadband Internet access service and return to the light-touch regulatory framework first established on a bipartisan basis during the Clinton Administration ... [and] to reinstate the determination that mobile broadband Internet access service is not a commercial mobile service.”

In the context of the FCC’s proposal to reinstate the information service classification of broadband Internet access, the Restoring Internet Freedom NPRM asks whether broadband users can access a number of services. Considering these in turn:

- a. **Accessing and retrieving information online:** Yes, broadband users are able to access and retrieve a very wide range of information. Estimates put the total number of websites at over 1.2 billion¹⁵ and the number of web pages indexed by search engines at between 4.6 and 50 billion.¹⁶ A huge range of information is available on these websites and pages, as well as in cloud storage and the deep web. A 2014 estimate put the total storage capacity of the Internet at 10²⁴ bytes (1 million exabytes).¹⁷ By comparison, in 2000 it was estimated that the Library of Congress contained about 3 petabytes (3 x 10¹⁵ bytes) of information (most of it not at that time in digital form)¹⁸ – in other words the Internet is capable of containing about a billion (10⁹) times the amount of information held in the Library of Congress.
- b. **Transforming and processing information online:** Yes, Internet users are able to process and transform many different kinds of information online. The Restoring Internet Freedom NPRM mentions some of these (uploading filtered photos and translating text). In addition, there are numerous websites that offer users the ability to *edit* and *share* text,¹⁹ photos,²⁰ and video,²¹ compare prices and evaluate the merits of various different consumer goods based on user input,²² plan corporate activities,²³ and create self-enforcing contracts,²⁴ among many, many other ways information can be transformed.

Not every broadband Internet user is able to access all the information or all the services available on the Internet. While an enormous amount of information is freely available to anyone with an Internet connection and suitable device, other information, ranging from personal financial and health data to virtual currencies, is held securely and is available only to those with permission to access it. The same is true for the various services described: many are free – but some require payment. However, the

¹⁵ <http://www.Internetlivestats.com/total-number-of-websites/>

¹⁶ <http://www.worldwidewebsite.com/>

¹⁷ <https://www.livescience.com/54094-how-big-is-the-Internet.html>

¹⁸ <http://www.lesk.com/mlesk/ksg97/ksg.html>

¹⁹ Many providers enable users to edit and share text-based materials online. For example, Google Drive and OneDrive enable users simultaneously to edit documents of various kinds.

²⁰ E.g. www.smugmug.com enables users to edit and share photos online.

²¹ E.g. <https://studio.stupeflix.com/en/> enables users to edit video online.

²² See e.g. www.rtings.com

²³ See e.g. www.asana.com

²⁴ <https://blog.aragon.one/the-emergent-ethereum-stack-cbce1895142f>

important point here is that restrictions on access are nearly all the result of actions by providers of information or services, not by the providers of broadband (except inasmuch as those providers are also the providers of restricted-access content or services). And in most cases, the restrictions on access benefit users of the Internet, either by providing a means of financing the provision of content or services (absent these restrictions, the only means of financing content would be through advertising/marketing), or by ensuring the privacy and security of users' data.

The Restoring Internet Freedom NPRM asks "how the Commission should assess whether a broadband provider is 'offering' a capability. Should we assess this from the perspective of the user, from the provider, or some other lens?"²⁵ One way to address this question is by considering the function of broadband provision within the overall context of the Internet.

The Internet as a whole serves to connect billions of computers, facilitating the sharing and utilization of data in myriad ways. In this sense "users" include both providers of content and services and consumers of content and services. The Internet thus serves as a platform over which providers and users interact. Broadband providers act as facilitators of connections to the Internet, enabling the effective functioning of the platform.

The Internet as a platform is characterized by constant change, driven by continuous innovation in the types and uses of information and services. In its earliest form, the Internet primarily served military and academic users exchanging information using email, messaging boards, and ftp servers. As it evolved, the types of information being exchanged and processed diversified dramatically, especially after the development of the hypertext transfer protocol (http) and associated graphical user interfaces. A particularly important aspect of this evolution has been the development and offering of commercial content and services by many users – and increasingly widespread consumption of this content and services.

The Restoring Internet Freedom NPRM asks whether a consumer is "capable of accessing these online services without Internet access service. Could a consumer access these online services using traditional telecommunication services like telephone services or point-to-point special access."²⁶ The answer is that *some* of the services currently offered by content and service providers via the Internet and used by consumers could be accessed via traditional communication services.

For example, someone seeking information regarding the whereabouts of the best location from which to purchase a lawnmower could call a service that stores and supplies such information. Indeed, such services exist, ranging from "directory inquiry" to "concierge" operators. However, these services typically charge a fee and may be considered inferior to those currently available via the Internet: First, such services would be less efficient because of the time it would take to communicate location information: the Internet enables more rapid and automatic identification of a user's location, leading to more rapid identification of relevant answers. Second, users seeking multiple opinions would have to phone multiple services, which would likely be more time consuming than using a search engine or using multiple individual websites or apps. Third, the sources of credibility of such services would likely be less transparent to users than similar services offered via the Internet (which enable users to see others' ratings of services).

Other services available via the Internet, such as the purchase of content, are also available through other means. For example, people make purchases over the phone. However, the speed and cost of delivery of

²⁵ Restoring Internet Freedom NPRM, at p. 9.

²⁶ Ibid. at p. 10.

items that are available in digital form would in most cases be higher if purchased in this way, due to the greater cost of shipping physical items compared to digital delivery via the Internet. (Items could of course be delivered using point-to-point special access—e.g. via dedicated data lines—but that would entail considerable investment on the part of providers and/or consumers, would likely entail consumers agreeing to exclusive arrangements with specific providers, and would be subject to limits created by the physical constraints of such hub-and-spoke delivery. In other words, such potential arrangements would result in less diverse and more costly services compared to delivery via the Internet.)

Some information services available via the Internet would be very difficult to replicate using traditional telecommunication services. For example, services that enable users to share and edit content via the Internet could to some degree be replicated using point-to-point special access (e.g. dedicated data lines), but the cost of facilitating such services would be enormous relative to the cost of providing such services via the Internet. As such, the range and availability of such services would be very limited.

When it comes to email, there is simply no way that traditional telecommunications, including point-to-point special access, could replicate this particular information service made available by the Internet. (To do so would require users to know in advance every person to whom they wished to send email and establish a separate point-to-point connection with that person. That would clearly be impracticable, not to mention enormously expensive.)

Likewise, social networking sites and search engines, two of the most popular information services available on the Internet, simply could not operate using traditional telecommunications services. These services rely on aspects of the Internet that are absent from traditional telecommunications services, such as the domain name system (DNS) protocol, which enable search engines and browsers to identify and route traffic to the IP addresses of websites, and hypertext transfer protocol (http), which underpins the graphical user interface of the web. DNS and http exist because of the Internet and its underlying architecture and protocols (i.e. TCP/IP).

In sum, while traditional communication could replicate to a degree some of the services currently available on the Internet, the Restoring Internet Freedom NPRM is correct in asserting that “offering Internet access is precisely what makes the service capable of “generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information” to consumers.”²⁷ And “Internet access service is not a telecommunications service,”²⁸ per Sections 230 and 231 of the Telecommunications Act.²⁹

2. The Function of DNS and Caching

The Restoring Internet Freedom NPRM asks for “comment on how DNS and caching functions are now used, whether they benefit end users, Internet service providers, or both, and whether they fit into the adjunct –to-basic exception.”³⁰ Taking each in turn:

DNS: As noted above, DNS is of fundamental importance to the functionality of the Internet, enabling users’ devices, though web browsers, search engines and other tools, to identify and connect to websites and web pages. Without DNS, users would only be able to access websites by inputting the IP address of the site. Likewise, sites linked through http would require the use of IP addresses, which would be far less user friendly. Eliminating DNS would likely dramatically reduce the value of the entire domain naming

²⁷ Ibid.

²⁸ Ibid. at p.11.

²⁹ 47 U.S.C. 230, 231.

³⁰ Restoring Internet Freedom NPRM, at p. 13.

system, harming both providers of content and services and users of that content and those services. To suggest that DNS is “incidental” or “adjunct-to-basic” with regard to broadband access is preposterous.

Caching: According to a survey undertaken by Sandvine Inc., in 2016, video streaming accounted for over 60% of downstream (content provider to user) traffic over fixed broadband connections and around 40% of downstream traffic over mobile broadband connections in North America.³¹ Content providers such as Netflix, YouTube and Amazon operate their own content delivery networks (CDNs). These CDNs cache content at many different locations in order to enable more efficient delivery to users. Thus, very clearly, caching is used extensively by one set of users (content providers) in order to benefit another set of users (consumers of content). Search engines also maintain caches of websites, in order to increase search speed. Clearly, caching is not used only “for the management, control, or operation of a telecommunications system or the management of a telecommunications service.” While that can be an important function, caching is also – and mainly – used to enhance the experience of users.

3. Relinquishing “any authority over the Internet traffic exchange.”

In 2013, the OECD concluded a major study on Internet traffic exchange. The main conclusions of that study are worth repeating here:³²

“A survey of 142 000 peering agreements conducted for this report shows that the terms and conditions of the Internet interconnection model are so generally agreed upon that 99.5% of interconnection agreements are concluded without a written contract. That these ‘rules of the game’ are so ubiquitous and serviceable indicates a degree of public unanimity that an external regulator would be hard-pressed to create. The parties to these agreements include not only Internet backbone, access, and content distribution networks, but also universities, NGOs, branches of government, individuals, businesses and enterprises of all sorts—a universality of the constituents of the Internet that extends far beyond the reach of any regulatory body’s influence.

As incumbent networks adopt IP technology, there is a risk of conflict between legacy pricing and regulatory models and the more efficient Internet model of traffic exchange. By drawing a ‘bright line’ between the two models, regulatory authorities can ensure that the inefficiencies of traditional voice markets will not take hold on the Internet.

The Internet has expanded to cover the globe, with many emerging economies growing at a faster pace and closing the ‘digital divide’ gap with OECD countries; yet some emerging economies still suffer from the effects of lack of competition or regulatory liberalisation. Evidence shows that, when allowed to do so, market participants will self-organise efficient Internet exchange points, producing Internet bandwidth to the benefit of the local economy and significantly reducing their costs, including in foreign currency. This course of action is strongly recommended in economies that do not yet have abundant domestic means of Internet bandwidth production.”

In other words: market actors have strong incentives to develop efficient rules for Internet traffic exchange – and have done so; attempts by government actors (in this case the FCC) to impose pre-

³¹ Sandvine, *2016 Global Internet Phenomena: Latin America and North America*, Waterloo, ON: Sandvine, 2016. Available at: <https://www.sandvine.com/trends/global-Internet-phenomena/>

³² OECD: *Internet Traffic Exchange: Market Developments And Policy Challenges*, Paris: Organisation for Economic Cooperation and Development, Directorate For Science, Technology And Industry Committee For Information, Computer And Communications Policy Working Party On Communication Infrastructures And Services Policy, DSTI/ICCP/CISP(2011)2/FINAL, January 31, 2013. Available at:

emptive regulation in place of such rules would impede the development of rules by market actors and almost certainly be inferior.

4. Determining the Need for the Bright Line Rules

The insights from the OECD's analysis of Internet traffic exchange should also inform the FCC's thinking when addressing the question of whether it should regulate certain aspects of the conduct of broadband providers. In its Restoring Internet Freedom NPRM, the FCC seeks comment on whether it should "keep, modify, or eliminate the bright line and transparency rules."³³

The bright line rules introduced in the *Title II* order banned three practices of broadband providers: blocking, throttling and paid prioritization. Similar to attempts by government to regulate Internet traffic exchange, bans on throttling and paid prioritization impede self-organization, is likely inefficient – and harms users. Taking these in reverse order:

Paid prioritization: As noted above, paid prioritization is an efficient and fair solution to the challenges created by bandwidth-hogging content. It enables the platform providers – broadband ISPs – effectively and efficiently to balance the two sides the market that they intermediate. And it ensures that content consumers and other users each pay a fair price for access to content.

Bandwidth throttling in general is a practice that is necessitated when data flows exceed network capacity. In addition, throttling of specific content on a network may be justified in order to reduce the risk of overflow. Moreover, pre-emptive throttling of bandwidth-hogging content is an appropriate strategy to deploy in order to incentivize the providers of such content to negotiate paid prioritization.

Content blocking is a more complicated issue. It may be appropriate to block illegal or harmful content (such as copyright violating material or websites inciting murder) – but that is not what is at issue here. A basic principle of the Internet since its inception has been "neutrality" towards content. Most broadband ISPs have committed voluntarily to principles of "net neutrality" as spelled out by the FCC in 2005:³⁴

- Consumers are entitled to access the lawful Internet content of their choice.
- Consumers are entitled to run applications and services of their choice, subject to the needs of law enforcement.
- Consumers are entitled to connect their choice of legal devices that do not harm the network.
- Consumers are entitled to competition among network providers, application and service providers, and content providers.

These seem like reasonable, voluntary principles, the application of which is likely to ensure that the Internet remains a place of freedom, without requiring a formal "no-blocking" rule.

³³ Restoring Internet Freedom NPRM, at p. 27.

³⁴ FCC, *Policy Statement*, FCC 05-151. Available at: https://apps.fcc.gov/edocs_public/attachmatch/FCC-05-151A1.pdf