Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
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Request for Comments on Petition for Declaratory Ruling Regarding Internet Management Policies	)	WC Docket No. 07-52
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COMMENTS OF
THE INFORMATION TECHNOLOGY AND INNOVATION FOUNDATION

I. Introduction

The Information Technology and Innovation Foundation (ITIF) welcomes the opportunity to comment on the critical issues raised in the Federal Communication Commission's "Request for Comments," WC Docket No. 07-52. The ITIF is a non-profit, non-partisan think tank committed to articulating and advancing a pro-productivity, pro-innovation and pro-technology public policy agenda. Consistent with this mission, ITIF believes that access to high-speed broadband is critical for all citizens if they are to fully participate in and benefit from the increasingly digital economy.

In its "Petition for Declaratory Ruling," Free Press, et al. asks the Commission to clarify that the "reasonable network management" exception in the Commission's "Policy Statement on the Appropriate Framework for Broadband Access to the Internet over Wireline Facilities" does not apply to an Internet Service Provider (ISP) – specifically Comcast – "intentionally degrading an application or class of applications."[1] On the contrary, ITIF argues that the Commission's "Policy Statement" needs no clarification and that the Commission rightly recognized that the "reasonable network management" exception applies to ISPs that delay or otherwise limit certain classes of peer-to-peer traffic.

We believe that FCC policies should encourage investment in and deployment of high-speed broadband. Nonetheless, even with aggressive deployment of higher speed networks, bandwidth will continue to be scarce for the foreseeable future, if for no other reason than demand will continue to grow and networks will experience peak demand periods. As a result, we believe that ISPs should have the right to ensure a fair and efficient distribution of bandwidth among their subscribers. There are at least three legitimate ways they can do this. First, they can manage their networks by delaying or otherwise limiting data-intensive traffic during peak periods, such as subscribers uploading and downloading files from peer-to-peer networks using BitTorrent, eDonkey, and other protocols. In addition to network management tools, the second way is pricing mechanisms to encourage more efficient use of the network. The third is expanding network capacity. All efficient networks – telephone, electricity, etc., are managed, while most inefficient networks – highways, for example – are not, and the latter face significant performance challenges.[2] The notion that broadband networks are in some way fundamentally different than other networks and should deal with capacity limitations only through network expansion is not supported by either logic or the long evidence from other network infrastructures.

There are two reasons the Commission's exception applies to ISPs that manage network traffic, particularly from subscribers using certain peer-to-peer protocols. The first is that peer-to-peer traffic poses particular technical challenges for shared medium access networks such as those that use the Data over Cable Service Interface Specification (DOCSIS) to transport data over a cable network.[3] Specifically, as we explain in more detail below, due to the nature of peer-to-peer networks and applications, this type of traffic greatly increases the amount of data subscribers upload to the Internet, which in turn decreases the amount of bandwidth available to all subscribers on the network. Because of this, it is reasonable for ISPs to manage their networks by delaying or limiting certain high bandwidth-using peer-to-peer traffic during periods of peak usage.

The second reason is that although some subscribers may use peer-to-peer networks to access legal content, statistics show that more than 90 percent is copyright-protected content that subscribers download and upload without paying for it.[4] It is perfectly reasonable for ISPs to limit traffic from these subscribers because they are not paying their fair share. First, their computers act like servers by uploading massive amounts of data, but don't pay higher fees for using more bandwidth that companies with high traffic services would. In addition, these subscribers download and upload mostly copyright-protected content without paying for it, which increases overall high-bandwidth traffic. This is because if these same subscribers had to pay for the content, they would be unlikely to download and upload as much of it.

This does not mean, however, all potential network management practices are legitimate. For example, specifically blocking traffic to limit competition is not valid. Thus, the FCC properly took action when Madison River blocked its subscribers from accessing Vonage's Voice over IP (VoIP) telephone service. Clearly Madison River is a case of a company degrading links to competing content, which is discriminatory and anti-competitive. One also could envision an ISP using network management tools to limit subscribers' access to competing content. This does not appear to be the case with Comcast's practices. On the contrary, it appears Comcast is using general network management tools to address the impact of certain high-bandwidth traffic on the network.

Moreover, if ISPs are to engage in practices such as metered pricing or peer-to-peer management, they should make it clear to subscribers (and application providers) what they are doing, how they are doing it, and what types of traffic may be affected. This means that ISPs should set transparent network management policies ensuring that subscribers know their likely speed of access, whether they may encounter delays with certain connections or services, and whether they will have less than optimal access to some content or services. If ISPs make this information clearly available to consumers before they subscribe to the service, users who want unconstrained access to largely illegal content through peer-to-

peer services can choose another provider.[5] Finally, the Commission already has procedures for addressing subscribers' complaints about their ISPs' policies via the Enforcement Bureau. Additional regulation is unnecessary.

II. Peer-to-Peer Networks and Applications

Peer-to-peer networks and applications enable users to exchange digital files, such as music, videos, software, and e-books, without having to download them from a few central computer servers. In a peer-to-peer network, users' computers act as equals ("peers"), both storing and receiving files. Napster was by far the most popular of the original peer-to-peer networks for exchanging illegal music and other content.[6] In 2000, several recording companies and musicians successfully sued Napster under the Digital Millennium Copyright Act (DMCA) and the court rightly ruled that the site should be shut down. However, the allure of getting something of value without paying is strong and other sites have emerged, albeit with different architecture.

Users engage in three types of peer-to-peer activity. One is when they request and download files. Another is when they simultaneously upload and download files. The third, and most common, is when users allow their computers to upload files to other requesters ("seeding" files). Peer-to-peer protocols – such as BitTorrent – are popular because they allow users to assemble a file from pieces of data they obtain directly from other users, enabling them to download files much more quickly than downloading from a central server. A user seeking a file first creates a "torrent," which is a very small file that describes the content the user is seeking along with tracking information. The user then connects to a server that tracks torrents (or in some peer-to-peer networks users' computers also act as trackers), which tells the user's computer which other users have the pieces necessary to compile the complete file, such as a video. In order for users to get completed files, others must upload bits of the files to the network for them to access.

III. Peer-to-Peer Traffic Increases Network Congestion

It is the upstream traffic on peer-to-peer networks (when users are uploading files for others to access) that causes the most congestion. While this congestion poses technical challenges for all types of broadband networks, it is particularly challenging for cable networks.[7] This is because cable networks do not have the same capabilities for managing upstream traffic as do other types of broadband networks, due to the fact that the allocation procedure for multiple cable modems to access upstream channels is more complex.[8] This is not a problem when users exchange e-mails, access online games, and download the occasional file. The problem is that users on peer-to-peer networks send and receive huge files – such as videos – so they consume much more upstream and downstream bandwidth. In addition, some peer-to-peer protocols reward users who "seed" more files, further increasing congestion on particular networks. This unique aspect of peer-to-peer protocols also means that ISPs that try to build their way out of the problem by expanding their network capacity instead become a target for more peer-to-peer traffic. This is because a faster broadband service will enable users to download and upload files more quickly, which makes them popular targets for other users seeking files in a peer-to-peer network.

Even a few peer-to-peer users can clog a network. One study found that web response time increased by a factor of 2.5 when only 15 BitTorrent users were active on a simulated network with 150 users, upstream bandwidth of 5.12 megabits per second (mbps) and downstream of 30.34 mbps.[9] Adding to the problem is the fact that peer-to-peer protocols are extremely popular, largely because they enable users to obtain a vast array of music, movies, or software without paying for them. BitTorrent alone claims 160 million users worldwide.[10] In August and September 2007 users connecting to peer-to-peer networks in Asia, the Middle East, and Europe produced more Internet traffic than all other applications combined, more than 80 percent in some countries.[11] In the United States, due to the popularity of YouTube and other video streaming services, users of HTTP (web) applications consumed 46 percent of total traffic in 2007 while users on peer-to-peer networks occupied 37 percent, with news groups, non-HTTP video streaming, gaming, and VoIP comprising the remaining 17 percent of traffic.[12]

With peer-to-peer applications generating more than a third of network traffic, U.S. ISPs face daunting network demands. Moreover, peer-to-peer traffic doesn't just clog public networks, it also presents a challenge for private ones. This is why network managers at many U.S. colleges and universities are deploying tools to prevent students from accessing peer-to-peer networks, particularly if they are using them to obtain copyright-protected material. For example, students connecting to peer-to-peer networks accounted for 90 percent of traffic on the University of Florida's network in 2003. This drove the university to develop a network management tool (cGrid, originally called Icarus) to reduce network congestion. The results were significant. When the University implemented the tool in 2004, upstream bandwidth use dropped by 85 percent and downstream by 40 percent. The cost savings were even more significant. The reduced strain on the network enabled the university to defer $2 million in router and switch upgrades, save $300,000 in other network management tools and $185,000 in staff expenses in the first year of implementation.[13]

IV. Peer-to-Peer Traffic and Illegal File Sharing

Many net neutrality advocates argue that peer-to-peer services have legitimate uses and that ISPs should not be allowed to single out this traffic for network management purposes. This argument ignores the fact that most peer-to-peer users are uploading and downloading copyright-protected content illegally. If these users had to purchase this content, peer-to-peer traffic would significantly decline. For example, 8 percent of U.S. households (6 million) in 2006 downloaded at least one free illegal copyright-protected video using a peer-to-peer network, while only 2 percent of households paid to download videos.[14] Moreover, 60 percent of U.S. online consumers do not believe it is a serious offense to download movies illegally, although 80 percent of the same respondents would not steal a DVD from a store.[15] Digital music piracy over peer-to-peer networks also is rampant. Of the 5.5 billion music files users downloaded from peer-to-peer sites in 2006, only 9 percent were legal.[16] All of these "free" file transfers add up to significant costs for content providers. The Motion Picture Association of America estimates that in 2005 the U.S. motion picture industry lost $6.1 billion to the illegal distribution of digital and physical copies

of movies.[17] Like the trade in illegal videos, music piracy comes with a cost. A 2006 study found a strong link between increases in illegal file sharing and reductions in record sales.[18]

Perhaps the most notorious and flagrant illegal peer-to-peer service is The Pirate Bay, located in Sweden, which proudly specializes in helping users locate free or cheap copyright-protected movies, music, software, and even e-books.[19] Despite the fact that the Swedish government recently charged The Pirate Bay's owners for copyright infringement and despite the vast amount of illegal content they list on their site, they nonetheless argue that they are operating within the law.[20] Specifically, the owners of The Pirate Bay argue that because their servers only contain indexes of the files and not the files themselves (these are stored on users' computers around the world), they are not breaking the law.[21] It is beyond the scope of this brief to say whether The Pirate Bay violates copyright law, but it certainly contributes to piracy by helping users get illegal content. As long as illegal peer-to-peer services like The Pirate Bay operate with impunity and continue to be popular, ISPs need to be able to manage their impact on their networks.

There is another problem with illegal file sharing over peer-to-peer networks. In HTTP networks, information uploaders (content providers) pay to support the network. Conversely, heavy peer-to-peer uploaders consume much more in bandwidth services than they pay for so they fail to contribute their fair share to network expansion. As a result, not only are these users getting content without paying, they are acting like content providers without paying their fair share to support the network.

Governments finally are beginning to take action against peer-to-peer services, recognizing that many primarily exist to give users access to illegal content. In addition to Sweden, in early 2006 Swiss and Belgian authorities shut down Razorback, which was then one of the world's largest eDonkey peer-to-peer services.[22] In Spain, where peer-to-peer traffic consumes more than 70 percent of Internet traffic, the government made it a criminal offense for peer-to-peer services and ISPs to allow any unauthorized

downloading.[23] France also is considering legislation requiring ISPs to work with a new, independent government authority to identify sites that allow users to link to illegal content and warn them to stop. While it is important for governments to shut down illegal peer-to-peer services, for the foreseeable future peer-to-peer services with large amounts of content that violate copyright law will continue to be available. As a result, governments should not prohibit ISPs from managing their networks to ensure that access to these services does not prevent other subscribers from engaging in legitimate activities.

V. Managing High Bandwidth Demand

ISPs have three main tools to manage high bandwidth demand. They can expand their networks, restrict usage with pricing schemes based on data or speed caps, or they can delay or otherwise limit data intensive traffic during peak periods. Many advocates, including Free Press, argue that more bandwidth is the answer.[24] They believe that if ISPs just build "the big pipe" there would be no need for pricing tools or network management practices. Of course, we all want a bigger pipe, but network expansion and capacity improvements require significant capital investment that ultimately will have to be paid for by price-sensitive consumers.[25] Moreover, optimal design of any network must balance investment needs with peak traffic demands. Seldom do networks, whether telecommunications or others, build enough capacity to meet peak needs, because this means that much of the network will remain under-utilized during other times. Similarly, Free Press and many other advocates argue that if networks were symmetrical, with equal amounts of upstream and downstream bandwidth, peer-to-peer traffic would not present a problem. This argument ignores the fact that investments in symmetrical networks do not represent the most efficient use of scarce investment capital since the vast majority of users download more data than they upload, and will do so for the foreseeable future.

ISPs in the United States and elsewhere are investing in increased network capacity to keep up with bandwidth demands. Cable companies are deploying technologies to reclaim analog bandwidth, such as switched digital video (SDV) technology, splitting optical fiber nodes, and rolling out the latest version of

DOCSIS.[26] With SDV, cable broadband providers can more efficiently broadcast digital video either via a typical cable TV system or via the Internet, freeing up additional bandwidth.[27] The DOCSIS standard, originally released in 1997, enables cable companies to deliver Internet access over their existing hybrid fiber coaxial (HFC) infrastructure. The latest version, DOCSIS 3.0, significantly increases transmission speeds for both uploading and downloading data.[28] In addition, cable companies are exploring ways to increase spectrum capacity, possibly even by building fiber to the home.[29] Telecommunications companies are doing the same. For example, both Verizon and AT&T are delivering broadband services (FIOS and U-verse, respectively) over fiber optic networks across the United States. These investments in network capacity will result in faster broadband networks and better services for all subscribers. Even with these improvements ISPs need other tools, such as metered pricing and network management, to keep up with increasing bandwidth demand, particularly from peer-to-peer traffic.

Metered pricing and data caps for broadband services are common in many nations. For example, ISPs in more than half of the 30 Organization for Economic Co-Operation and Development (OECD) nations apply data caps to their subscribers. [30] This means that once subscribers reach the data cap threshold, they can either pay an additional fee per megabyte downloaded, or receive data at a slower speed. However, despite its prevalence elsewhere, ISPs in the United States are only now exploring metered pricing as a tool to manage broadband network congestion. Yet, metered pricing is hardly a new concept for American consumers. Most network infrastructure already is metered, including electricity, water, gas, mail, and increasingly roads.[31] Wireless service providers apply metered pricing similar to data caps by charging subscribers different fees depending on how many minutes and text messages they use. Alternately, some broadband networks are metered by speed. Subscribers who want faster speeds pay more, while those who are content with slower speeds pay less.

Despite the fact that metered pricing is a familiar approach for many types of services, some have criticized Time Warner's recent announcement that it would begin testing a new pricing model that would charge higher fees to subscribers who use large amounts of bandwidth.[32] These critics argue that differential pricing is fundamentally unfair because consumers should pay the same regardless of their data consumption. On the contrary, this is perhaps the fairest approach because it ensures that subscribers who use more bandwidth pay more for the resources they consume and gives low-income subscribers the option to pay less. Critics also suggest that the pricing scheme would scare off new subscribers or cause current subscribers to switch to its competitors. Beside the fact that this is an issue that ISPs should be able to decide, it is actually more likely that subscribers will be drawn to the option of paying only for the bandwidth they need and getting a faster, more efficient, and potentially lower-priced service. Nonetheless, pricing and data caps need to be reasonable and nondiscriminatory.

In addition to network expansion and metered pricing, ISPs need network management tools to address network congestion to slow down or otherwise limit high bandwidth traffic, especially peer-to-peer traffic. Free Press and others argue that network management tools block subscribers from accessing legitimate content. On the contrary, when ISPs such as Comcast use network management tools to delay some traffic during times of peak congestion, they are not blocking subscribers from downloading or uploading content (whether legal or illegal) over peer-to-peer networks. This is because subscribers who decide it takes too long to download a file from one peer can get the file from someone else on a different ISP's network. Similarly, subscribers who find it too slow to upload files can try again when the network is less congested. Thus, in a managed network it is still possible for subscribers to engage in peer-to-peer activity. As long as ISPs clearly disclose these policies to their subscribers and their express purpose is to manage the network, as opposed to discriminating against competing services, they are reasonable network management tools that optimize the service for the majority of subscribers who use less bandwidth and ensure that those who have high demands can still use the service, albeit at a reduced speed.

VI. Conclusion

ITIF appreciates the opportunity to comment on the issues raised by the Commission in its "Request for Comments." We believe that universal access to broadband is an important goal and that users have the right to access lawful Internet content. As long as ISPs' network management policies are transparent and fair they fall well within the "reasonable network management" exception in the Commission's "Policy Statement" and are in accordance with the Commission's Internet access principles.

Respectfully Submitted,

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