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Comments on the European Commission's Public Consultation on Specific Aspects of Transparency, Traffic Management and Switching in an Open Internet

I welcome the opportunity to comment on the European Commission's Public Consultation on Specific Aspects of Transparency, Traffic Management and Switching in an Open Internet.[1] I submit these comments as a professor of law and, by courtesy, electrical engineering at Stanford University whose research focuses on Internet architecture, innovation and regulation and as a German citizen who cares deeply about the future of the Internet in the European Union. My book "Internet Architecture and Innovation," which was published by MIT Press in 2010 and just appeared in paperback, is considered the seminal work on the science, economics and politics of network neutrality. My papers on network neutrality have influenced discussions on network neutrality all over the world.[2] I have testified on matters of Internet architecture, innovation and regulation before the US Federal Communications Commission.[3] I have not been retained or paid by any of the parties to this consultation.

My recent paper "Network Neutrality and Quality of Service: What a Non-Discrimination Rule Should Look Like,"[4] which I attach, directly addresses many of the issues raised by this consultation. The paper explores the relationship between network neutrality, non-discrimination rules and Quality of Service in detail. In particular, the paper:

- offers the first in-depth analysis of the relationship between network neutrality and Quality of Service;
- proposes a framework that policy makers can use to evaluate alternative proposals for network neutrality rules and to assess specific forms of discriminatory conduct;
- evaluates existing proposals for non-discrimination rules and proposes a non-discrimination rule that policy makers should adopt around the world – a rule that the Federal Communications Commission adopted at least in part; and

[1] My comments draw in part on comments I submitted to BEREC's Consultation on Network Neutrality earlier this summer.
[2] van Schewick (2007); Frischmann & van Schewick (2007).
[3] See, e.g.,van Schewick (2008b); van Schewick (2010f); van Schewick (2010e).
[4] van Schewick (2012).

- provides the first detailed analysis of the Federal Communications Commissions' non-discrimination rule and of its implications for network providers' ability to manage their networks and offer Quality of Service.

In the process, the paper explains

- why non-discrimination rules that are *based on an antitrust framework* or *ban only behavior that is anticompetitive* do not sufficiently protect users and innovators against all forms of discrimination that network neutrality proponents are concerned about; and
- why non-discrimination rules that *ban discriminatory conduct that is not disclosed* do not adequately protect the values that network neutrality regulation is designed to protect, even in markets where consumers have a choice of more than one Internet service provider. This insight is particularly relevant for the debate over wireless network neutrality in the US and for the network neutrality debate in Europe, Canada or Australia.

The following comments highlight some of the key insights of the paper that may be useful for the European Commission in considering this topic.[5] I also add some additional comments that draw on my earlier work. The numbering of questions follows the numbering of questions in the consultation form for organizations.

1. TRAFFIC MANAGEMENT

Question 5: Please provide your views on the following ways/situations where traffic management may be applied by ISPs.

5a) Applied to deliver management services (e.g. to ensure a guaranteed quality of service for a specific content/applications)

Answer:

There are different types of Quality of Service, which create different social benefits and social costs. As a result, any answer to this question needs to differentiate among different classes of services.

Network providers should not be allowed to offer different types of service to different provider-defined classes of applications, regardless of whether the network provider treats like traffic alike.

By contrast, forms of QoS should be allowed if they meet the following conditions:

(1) the different classes of service are made available equally to all applications and classes of applications;
(2) the user is able to choose whether and when to use which class of service; AND
(3) the network provider charges only its own Internet service customers for the use of the different classes of service. (This restriction would not constrain interconnection agreements in any way. Thus, payments among interconnecting networks would remain possible.)

[5] Throughout these comments, I draw heavily on van Schewick (2012) (attached).

The network neutrality debate is often framed as a debate for or against Quality of Service. As my attached paper shows, the reality is much more nuanced. Many network neutrality proposals allow some, but not all forms of Quality of Service, with different proposals drawing the line between acceptable and unacceptable forms of Quality of Service in different ways.

Underlying the differences between the proposals are disagreements over the social benefits and costs of the different forms of Quality of Service. In this respect, my attached paper offers interesting new insights. Most network neutrality proponents agree that network providers should not be allowed to *offer Quality of Service exclusively to one or more applications within a class of "like" applications,* and my paper shares that view.[6] For example, a network provider should not be allowed to offer a low-delay service only to its own Internet video application, or only to selected unaffiliated video applications. This type of Quality of Service interferes with users' ability to use the applications of their choice without interference from network providers and enables network providers to use the provision of Quality of Service as a tool to distort competition among applications within a class, which is exactly what network neutrality rules are designed to prevent.

By contrast, some participants in the debate see no problems with *allowing network providers to offer different types of service to different provider-defined classes of applications, as long as the network provider treats like traffic alike.* In other words, they would allow network providers to provide different types of service to different provider-defined classes of applications that are not alike, as long as they do not discriminate among classes of applications that are alike or among applications within a class of like applications. This requirement is often called *"like treatment."*[7] Under this approach, a network provider would be allowed to offer low-delay service to Internet telephony, but not to e-mail, as long as it does not treat Vonage differently from Skype, or Gmail differently from Hotmail.[8] In the US, the AT&T BellSouth Merger conditions and various draft bills in Congress allowed this form of Quality of Service.

The positive stance towards forms of Quality of Service that provide like treatment is based on the assumption that discriminating among classes of applications that are not alike is socially harmless and should therefore be allowed. As this paper shows, this assumption is not correct. In many cases, discrimination among classes of applications hurts some classes of applications, even if the classes are not alike. For example, some Internet applications such as Internet telephony applications, Internet messaging applications or Internet video offerings compete with network-provider services that are sold separately from Internet access and do not run over the Internet-access portion of the network provider's access network. In these cases, discriminating against all applications in that class allows the network provider to favor its own offering without discriminating among applications within the class. Moreover, applications in a class can be harmed

[6] For a detailed analysis of this form of Quality of Service, see Section "Ban Discrimination Among Like Applications and Classes of Applications" in van Schewick (2012) (attached).

[7] For a detailed analysis of this form of Quality of Service, see Section "Allow Discrimination Among Classes of Applications That Are Not Alike" in van Schewick (2012) (attached).

[8] Internet telephony is sensitive to delay, but e-mail is not, so the two classes of applications are not alike. See Box 2: Quality of Service in van Schewick (2010a) (attached).

by differential treatment even if they do not compete directly with applications in other classes that are treated more favorably.[9]

In addition, like treatment negatively affects several of the factors that have fostered application innovation in the past. *First,* like treatment removes the *application-blindness* of the network. Allowing network providers to treat classes of applications differently requires the network provider to identify the different applications on its network in order to decide which class they belong to and determine the appropriate type of service. Since the concept of "like applications" is not well defined, network providers have broad discretion to decide which applications are alike, which allows them to deliberately or inadvertently distort competition among applications or classes of applications. *Second*, like treatment violates the principle of *user choice*. Under like treatment, network providers, not users, choose which application should get which Quality of Service. Since users' preferences for Quality of Service are not necessarily the same across users and may even vary for the same user over time, letting network providers determine which applications gets which Quality of Service will result in levels of Quality of Service that do not meet users' needs. *Third*, like treatment harms application innovation by requiring innovators to convince network providers that their application belongs to a certain class. Requiring network providers to take action before an application can get the Quality of Service it needs violates the principle of *innovation without permission* and reduces the chance that new applications actually get the type of service they need. *Finally,* disputes over which classes of applications are alike, or whether a certain application belongs to a certain class, are likely to be frequent and difficult to resolve, creating high costs of regulation.

Thus, contrary to what is commonly assumed, forms of Quality of Service that respect the principle of like treatment do not adequately protect the values that network neutrality is designed to protect and should not be allowed under a network neutrality regime.

By contrast, Quality of Service architectures *where network providers make different types of service available equally to all applications and classes of applications and where users choose whether and when to use which type of service* do not raise similar concerns.[10] *First*, they preserve the *application-blindness* of the network: The provision of Quality of Service is not dependent on which applications users are using, but on the Quality-of-Service-related choices that users make; thus, the network providers does not need to know anything about which applications are using its network in order for this scheme to work. The network provider only makes different classes of service available, but does not have any role in deciding which application gets which Quality of Service; this choice is for users to make. As a result, network providers cannot use the provision of Quality of Service as a mechanism to distort competition among applications or classes of applications. *Second*, since users choose when and for which applications to use which type of service (in line with the principle of *user choice*), they can get exactly the Quality of Service that meets their preferences, even if these preferences differ across users or (for a single user) over time.

[9] See in van Schewick (2012) (attached), pp. 47.

[10] For a detailed analysis of this type of Quality of Service, see Section "Ban Application-Specific Discrimination, Allow Application-Agnostic Discrimination," Subsection "Allowing the Network to Evolve" in van Schewick (2012) (attached).

Third, in line with the principle of *innovation without permission*, an innovator does not need support from the network provider in order for his application to get the Quality of Service it needs. The only actors who need to be convinced that the application needs Quality of Service are the innovator, who needs to communicate this to the user, and the user, who wants to use the application. This greatly increases the chance that an application can get the type of service it needs.

In sum, this type of user-controlled Quality of Service offers the same potential social benefits as other, discriminatory or provider-controlled forms of Quality of Service without the social costs. With appropriate restrictions on charging and with provisions that protect the quality of the baseline service from dropping below unacceptable levels, this type of Quality of Service should be allowed under a network neutrality regime.[11] In particular, network providers should be allowed to charge only their own Internet access service customers for the use of the different classes of service.[12]

Opponents of network neutrality regulation have created the impression that policy makers need to choose between protecting users and application innovators against interference from network providers on the one hand and innovation in the network and the needs of network providers on the other hand. As the paper shows, it is possible to protect users and innovators while giving network providers the tools they need to manage their networks and allowing the network to evolve. Thus, regulators can have their cake and eat it, too.

5b) Taking into account the sensitivity of the service to delay or packet loss

Answer: problematic

Under the proposal outlined under question 5k) below and in the attached paper, a user would be able to choose a low-delay service for any application (including those sensitive to delay) as long as the conditions outlined under question 5k) are met.

By contrast, an Internet service provider would not be allowed to unilaterally assign low-delay service to applications it deems "sensitive to delay."

As explained in more detail in the attached paper,[13] "[a]ny measure that singles out an application or class of applications for differential treatment tilts the playing field against some applications or classes of application and interferes with users' decisions about how to use the network, creating significant social costs.[14] The fact that the application-specific practice may serve a network provider's "legitimate business interest" as understood by the antitrust laws (e.g., if the

[11] A network provider who is allowed to charge for Quality of Service has an incentive to degrade the quality of the baseline, best-effort service to motivate users to pay for an enhanced type of service. To mitigate this problem, the rules should require the regulatory agency in charge of enforcing network neutrality rules to monitor the quality of the baseline service and set minimum quality standards, if the quality of the baseline service drops below acceptable levels. See references cited in footnote note 397 of van Schewick (2012) (attached).

[12] See van Schewick (2010e); van Schewick (2010a), pp. 10-12. The question of whether and, if yes, whom network providers should be allowed to charge for Quality of Service or other forms of preferential treatment is outside the scope of this article. For a short overview of the options, see *Box 3: Charging for Quality of Service* and notes 15-20 and accompanying text, all in van Schewick (2012) (attached).

[13] van Schewick (2012) (attached), p. 55.

[14] van Schewick (2010d). See also footnotes (and accompanying text) 136 to 141, 299 to 309, 312 to 263 in van Schewick (2012) (attached).

goal of the practice is to manage congestion or to engage in price discrimination to recover the fixed costs of network infrastructure), is not sufficient to overcome the ban.[15] The social costs of application-specific discrimination result from the discriminatory conduct as such and are independent of the network provider's motivation. Even application-specific discrimination that does not seem to have the potential to harm any applications (e.g., providing QoS to different classes of applications according to their needs, or prioritizing time-sensitive applications over non-time-sensitive applications during times of congestion) creates considerable social costs.[16] At the same time, network providers can usually realize their legitimate goals using application-agnostic means that are not similarly harmful to application innovation, user choice, or the Internet's ability to reach its social, cultural or political potential. In the rare cases in which a network management problem cannot be solved in application-agnostic ways, the reasonable network management exception allows the network provider to deviate from the non-discrimination rule in narrowly tailored ways.[17]"

For a more complete answer to this question, see the discussion under Question 5 h) and in the attached paper.[18]

5c) Used to implement or manage compliance with explicit contractual restrictions (e.g. on P2P or VoIP) of the Internet access product accepted by the user)

Answer: problematic

As explained in more detail in Section 2 below, Internet service providers should not be allowed to contractually restrict the use of certain applications.

5d) Targeting types/classes of traffic contributing most to congestion

Answer: problematic

See answer to questions 5b) above and 5h) below.

5e) Targeting heavy users whose use is excessive to the extent that it impacts on other users

Answer: may be acceptable

Whether this practice is acceptable depends on whether it is implemented based on application-agnostic criteria and is not restricted to specific applications or classes of applications used by these users. For a longer explanation and examples, see the attached paper.[19]

5f) Applied during busy times and places, when and where congestion occurs

Answer: may be acceptable

[15] See footnotes 144 to 155 and accompanying text in van Schewick (2012) (attached).
[16] See footnotes 295 to 360 and accompanying text in van Schewick (2012) (attached).
[17] See *Box 17: The Exception for Reasonable Network Management* in in van Schewick (2012) (attached).
[18] See Section "Allow Discrimination Among Classes of Applications That Are Not Alike" in van Schewick (2012) (attached), pp. 42-52.
[19] van Schewick (2010a) (attached), pp. 52-53, 58.

As explained in more detail under Question 5k) below, all congestion management should be narrowly tailored, i.e. as application-agnostic as possible and result in as little discrimination or preference as reasonably possible. This requirement also includes restricting measures designed to manage congestion to the times and places when and where congestion occurs.

5g) affecting all applications/content providers in the same way (application-agnostic)

Answer: appropriate (see answer under question 5k below).

Note: The definition of application-agnostic used below differs from the one given in question 5g).

5h) affecting similar applications/content providers of the same category in the same way

Answer: problematic

As explained in the discussion of forms of Quality of Service that respect like treatment under question 5a on pp. 3-4 of these comments, the harm from this type of traffic management may not be immediately apparent. Still, as I explain there and in more detail in the attached paper,[20] allowing Internet service providers to differentiate among different classes of applications that are not alike, as long as they do not differentiate among applications within each class does not adequately protect the values that network neutrality is designed to protect.

As explained there, in many cases, discrimination among classes of applications hurts some classes of applications, even if the classes are not alike. Moreover, applications in a class can be harmed by differential treatment even if they do not compete directly with applications in other classes that are treated more favorably. In particular,[21] when a network provider singles out a class of like applications for special treatment without discriminating among applications within the class, the resulting harm may be less apparent than in cases in which the network provider discriminates against specific applications within a class. After all, if all applications in the class are treated the same, they still compete with each other on a level playing field. Focusing only on competition among the applications within a class is too narrow. On the Internet, different uses constantly compete for users' time and attention. Differential treatment that treats a certain class of applications worse than others in a way that harms their usability or attractiveness to users (as opposed to differential treatment that does not harm the affected applications because they do not need the better treatment) imposes a tax on the developers and users of the affected application that affects user behavior and the applications' chances in the marketplace. As the co-founders of the online video company Zediva explained in a letter to the FCC: "Discriminatory network management of this type [that singles out specific applications or classes of applications in order to deal with congestion] would put the affected applications at a severe disadvantage. Companies that offer these applications and services will be less able to reach their users during times of congestion, which in turn may affect their success in the market (who wants to use an application or service that is less usable during peak time, when most people actually want to use the Internet?) and their ability to get funding – thus squashing innovation before it has had a chance to prove itself in the

[20] van Schewick (2012), pp. 42-52.
[21] The rest of this paragraph is copied from van Schewick (2012), p.47.

marketplace."[22] Differential treatment that makes a class of application less usable or attractive to users also harms users whose applications are affected by the differential treatment. It constrains their ability to use the Internet as they see fit either generally, or, when the differential treatment is used for congestion management, during peak times, when people want to use the Internet most.[23] Thus, treating classes of applications differently may harm users and applications even if the classes of applications are not alike.

Finally, as set out in question 5a and in the paper, like treatment negatively affects several of the factors (application-blindness, user choice and innovation without permission) that have fostered application innovation in the past, with negative consequences for users and application innovation.

5i) Used without other grounds, against services competing with the ISP's own services

Answer: problematic

The harms of this behavior are the same as discussed in question 5j) below.

5j) Implemented at the full discretion of the ISP

As I have explained elsewhere, ISPs often have an incentive to exclude or differentiate among applications to manage congestion on their networks.[24] However, any measure that singles out specific applications or classes of applications to manage bandwidth imposes certain harms that network neutrality proponents are concerned about. First,[25] any form of exclusion or discrimination allows the network provider, not the users, to choose which applications will be successful on its network. This not only distorts competition among applications on the network provider's network, but also removes an important part of the mechanism that creates innovation under uncertainty, reducing the quality of application innovation.[26] The threat of future discrimination will often reduce the incentives existing and future application providers have to innovate (not just those of the application provider that is being discriminated against) and will make it more difficult for them to get funding.[27] The resulting decline in the amount and quality of application innovation limits the Internet's value for users and its ability to contribute to economic growth.[28] Discrimination not only deprives all Internet users of the value of future applications that would have been developed but for the threat of discrimination. It also harms the network provider's Internet access customers who cannot use the application that is being discriminated against. For applications through which users interact with others (e.g., Internet telephony or online gaming), the exclusion also harms other network providers' Internet access customers by preventing them from using the application to interact with users whose Internet access provider is blocking the application. Finally, exclusion

[22] Srinivasan & Gupta (2010). As the Zediva letter and conversations with entrepreneurs and investors show, this is not a theoretical concern. For another publicly documented example, see van Schewick (2008a), p. 2
[23] van Schewick (2010b).
[24] van Schewick (2008b), pp. 5-6; van Schewick (2010d), pp. 264-266.
[25] The following text is adopted from van Schewick (2012) (attached), p. 20.
[26] See *Box 4: The Importance of User Choice* and footnotes 51 to 52 and accompanying text, all in van Schewick (2010a) (attached).
[27] See footnotes 174 to 175 and accompanying text in van Schewick (2010a) (attached).
[28] van Schewick (2010d), pp. 356-361.

may impair the Internet's ability to improve democratic discourse, to facilitate political organization and action, or to provide a decentralized environment for social and cultural interaction in which anyone can participate.[29]

These social costs of discriminatory conduct are created by the conduct as such;[30] they do not change depending on the network provider's motivation. If an application is being blocked, it cannot reach its customers. Users will be unable to use it and the application developer and his investors will be unable to reap its benefits, whether the network provider is blocking the application to manage congestion or to exclude a competitor. Thus, the social harm – the reduction in application developers' incentives to innovate and in investors' willingness to invest, users' inability to use the Internet in the way that is most valuable to them, or their inability to participate in social, cultural or democratic discourse related to blocked content – is caused by the blocking as such, not by the motivations that are driving it. As a result, the fact that an ISP is blocking or discriminating against an application to manage congestion does not automatically excuse the behavior. Instead, such behavior should be subject to the rule described under questions 5k) below.

5k) other differentiation criteria (please specify)

Answer:

Regulators or legislator in the EU should adopt a non-discrimination rule that bans application-specific discrimination, but allows application-agnostic discrimination.[31,32] Differential treatment is application-specific if it is based on application or class of application, or, put differently, if it is based on criteria that depend on an application's characteristics.[33] This general rule should be coupled with an exception for reasonable network management, which would allow narrowly tailored deviations from the non-discrimination rule if a network management problem cannot be addressed in application-agnostic ways.[34]

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[29] See, e.g., Balkin (2009);van Schewick (2010d), pp. 364-365.

[30] The following paragraph is adapted from van Schewick (2012) (attached), p.21.

[31] For a detailed discussion of this proposal, see Section "Ban Application-Specific Discrimination, Allow Application-Agnostic Discrimination" in van Schewick (2012) (attached).

[32] In the Federal Communications Commission's Open Internet Proceeding, this proposal was supported by, e.g., networking experts (e.g., Reed (2010); NYSERNet (2010)); venture capitalists (e.g., Burnham (2010); Wilson (2010)), entrepreneurs (e.g., Borthwick (2010); Srinivasan & Gupta (2010)) and non-profit organizations (e.g., The Council of Scientific Society Presidents (2010); North American Benthological Society (2010); Botanical Society of America (2010)).

[33] Relevant characteristics of an application include what the attached paper calls "application" (i.e. the specific instance of an application a user is using, e.g., Vonage vs. Skype), application type (e.g. e-mail vs. Internet telephony), the application-layer protocol or transport-layer protocol the application is using (e.g. SIP vs. Skype's proprietary protocol, or TCP vs. UDP), or the application's technical requirements (e.g., latency-sensitive vs. non-latency-sensitive applications). Since the term "applications" stands for applications, content, services or uses, the ban on application-specific discrimination applies equally to discrimination based on criteria that depend on characteristics of content or characteristics of a service or use. Thus, discrimination against certain content based on, e.g., publisher, author, content type, subject matter, or viewpoint would all be prohibited by this approach.

[34] More formally, to qualify as reasonable network management, the practice would have to further a legitimate network management purpose and be narrowly tailored to address that purpose. In the context of network neutrality rules, the term "network management" refers to technical measures whose purpose is "to maintain, protect, and ensure the efficient operation of a network." (Center for Media Justice, et al. (2010), pp. 38-39) Network management includes,

This approach reinforces key architectural principles on which the Internet was based without locking in the original architecture of the Internet itself. It balances the public interest in network neutrality with the legitimate interests of network providers. It prevents network providers from interfering with user choice or distorting competition among applications or classes of applications, while providing them broad flexibility to differentiate and price their Internet service offerings and manage their network in application-agnostic ways. The rule allows network providers to offer some forms of user-controlled Quality of Service and provides certainty to market participants.

As I explain in the attached paper,[35] this rule should apply to all forms of differential treatment, regardless of the purpose (i.e., to all forms of network management (i.e., not just to congestion management), to the offering of traffic classes, or to other forms of differentiation). As the paper shows, any measure that singles out an application or class of applications for differential treatment tilts the playing field against some applications or classes of applications and interferes with users' decisions about how to use the network, creating significant social costs. At the same time, network providers can usually realize their legitimate goals using application-agnostic means that are not similarly harmful to application innovation, user choice, or the Internet's ability to reach its social, cultural or political potential. Based on these insights, the rule takes away all the tools that would allow network providers to deliberately or inadvertently interfere with competition and user choice – those involving application-specific discrimination –, while leaving the tools that cannot distort competition or violate user choice – those involving application-agnostic discrimination.

By legitimizing a broad range of discriminatory conduct (that is, all conduct that is application-agnostic), the rule gives network providers great flexibility to realize legitimate goals such as congestion management, price discrimination or product differentiation, albeit through means that do not interfere with the values that network neutrality rules are designed to protect. For example, during times of congestion, a network provider could give one person a larger share of the available bandwidth than another, for example because this person pays more for Internet access or has used the Internet less over a certain period of time.[36] But it could not throttle the bandwidth available to a specific online video application (e.g., BitTorrent or YouTube) or to online video in general.[37]

The proposed rule allows network providers to freely engage in application-agnostic ways of managing their network.[38] Application-agnostic network management coupled with user-controlled

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e.g., managing congestion or protecting the security of a network. (On the definition of network management, see also Center for Democracy & Technology (2010), pp. 41-43; Center for Media Justice, et al. (2010), pp. 38-39.) To qualify as narrowly tailored, the practice would have to, among other things, be as application-agnostic as possible and result in as little discrimination or preference as reasonably possible.[34] This formulation mirrors proposals by many network neutrality proponents in the US. See, e.g., Open Internet Coalition (2010), pp. 48-50; Center for Media Justice, et al. (2010), pp. 35-41. (This footnote is adapted from van Schewick (2012) (attached), *Box 17: The Exception for Reasonable Network Management* on p. 53.)

[35] See Section "Ban Application-Specific Discrimination, Allow Application-Agnostic Discrimination" in van Schewick (2012) (attached).

[36] That would be application-agnostic discrimination.

[37] That would be discrimination based on application or class of application.

[38] Network management practices that treat traffic differently based on application-agnostic criteria would be allowed under the proposed non-discrimination rule as such, since that rule allows any differential treatment that is application-

prioritization gives network providers the tools they need to maintain the quality of the Internet experience for all users, even during times of congestion, while preserving the application-blindness of the network and the principle of user choice to the extent possible. Network providers would be able to enforce fairness among users and prevent aggressive users from overwhelming the network by allocating bandwidth among users in application-agnostic ways, but how a user decides to use its "share" of bandwidth, both in general and at a particular point in time would be decided by the user. To the extent that applications benefit from relative prioritization at times of congestion, network providers could allow users to choose which applications to prioritize within the user's bandwidth envelope during times of congestion.[39] As long as the ability to prioritize is offered equally to all applications or classes of applications (i.e. not tied or restricted to specific applications or classes of applications) and the choice of which applications to prioritize is left to the user, this form of network management would be consistent with the non-discrimination rule proposed above. At the same time, the reasonable-network-management exception provides a safety valve that allows network providers to react in more application-specific ways if a problem cannot be solved in an application-agnostic way.[40]

From a technical perspective, application-agnostic network management has the added advantage of removing the incentive for users to masquerade their applications to evade or take advantage of certain application-specific treatment in the network, freeing resources at the network provider and at users.

Tools for application-agnostic congestion management are available today. As the experience of Comcast shows, it is possible to protect the quality of the Internet experience of all Internet service customers in application-agnostic ways. Comcast, the largest provider of broadband Internet access services in the US,[41] adopted an application-agnostic congestion management system in response to the FCC's Order against Comcast in 2008.[42] According to Comcast, "Comcast's trials and subsequent national deployment indicate that this new congestion management system ensures a quality online experience for all of Comcast's HIS [High Speed Internet] customers."[43] Beyond Comcast's approach, vendors have developed network management solutions that allow the network provider to allocate bandwidth among users in application-agnostic ways, while letting users choose the relative priority of applications within the bandwidth allocated to them.

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agnostic. Thus, under the proposed rule, application-agnostic network management practices would not need to meet the requirements of the reasonable network management exception. See footnote 364 in van Schewick (2012) (attached). On the definition of network management, see *Box 17: The Exception for Reasonable Network Management*, ibid. For a longer discussion of the policy arguments driving the treatment of network management measures proposed in the text, see van Schewick (2008b), pp. 4-8; van Schewick (2008a); van Schewick (2010b). See also footnotes (and accompanying text) 152 to 155, 190 to 197 and 207 to 214 in van Schewick (2012) (attached).

[39] van Schewick (2008b), pp. 7-8; Jordan & Ghosh (2010), pp. 12:17-12:20.

[40] For a more detailed description of the reasonable network management exception proposed by this paper, see footnote 34 in these comments and *Box 17: The Exception for Reasonable Network Management* in van Schewick (2012) (attached).

[41] Leichtman Research Group (2012).

[42] For descriptions of Comcast's application-agnostic network management system, see Comcast Corporation (2008); Zachem (2009); Bastian, et al. (2010).

[43] Bastian, et al. (2010), Section 8.

Application-agnostic congestion management has also become common in Canada. At the time of the Canadian investigation into Internet service providers' network management practices in 2008/2009, many Canadian providers were singling out peer-to-peer file-sharing applications for special treatment, throttling the bandwidth available to them or interfering with these applications in other ways.[44] In 2009, the Canadian Radio-television and Telecommunications Commission (CRTC) adopted rules that require the Internet traffic management practices of Canadian Internet service providers to be, among other requirements, narrowly tailored and as application-agnostic as possible.[45] Since then, most of the larger Canadian Internet service providers, most recently Bell Canada and Bell Aliant, have changed their practices in response to these regulations. In January 2012, Rogers remained the only larger Canadian provider that was still engaging in discriminatory network management.[46]

The proposed rule is also compatible with new standards that are currently being developed by the Congestion Exposure Working Group in the Internet Engineering Task Force.[47] These standards would evolve the existing standards for the TCP/IP protocol suite in a way that allows the network provider to determine how much a specific user is contributing to congestion at any point in time. This information would allow network providers to manage their networks based on a user's contribution to congestion – an application-agnostic criterion.[48]

The proposed rule allows network providers to offer certain (though not all) forms of Quality of Service. In particular, it allows network providers to offer different classes of service, if (1) the different classes of service are offered equally to all applications and classes of applications; (2) the user is able to choose whether and when to use which class of service; and (3) the network provider is allowed to charge only its own Internet service customers for the use of the different classes of service. [49,50,51]

Finally, by clearly specifying in advance which behavior is and is not allowed, the rule provides certainty to all market participants. Network providers would know how they can manage their networks, and application developers (and their investors) could be sure that they will not be discriminated against.

Canada and the United States have already adopted similar regulations for Internet traffic management practices.

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[44] See Parsons (2009).

[45] Canadian Radio-Television and Telecommunications Commission (2009), Section I. Framework for determining acceptable ITMPs, paras 20-43.

[46] See Parsons (2009). Since then, most of the larger Canadian Internet service providers, most recently Bell Canada and Bell Aliant, have changed their practices in response to the regulations regarding network management that the CRTC adopted following its investigation. In January 2012, Rogers remained the only larger Canadian provider that was still engaging in discriminatory network management. Schmidt (2012); Geist (2011).

[47] See Internet Engineering Task Force (2010).

[48] For an overview, see Briscoe, Woundy & Cooper (2012); Jacquet, Briscoe & Moncaster (2008).

[49] See also the discussion on of user-controlled Quality of Service on pp. 4-5 of these comments.

[50] This restriction would not constrain interconnection agreements in any way. Thus, payments among interconnecting networks would remain possible.

[51] While the first two conditions directly flow from the proposed non-discrimination rule, the third condition is based on additional considerations and would need to be encoded separately.

In 2009, the Canadian Radio-television and Telecommunications Commission (CRTC) adopted rules that require the Internet traffic management practices of Canadian Internet service providers to be, among other requirements, narrowly tailored and as application-agnostic as possible.[52]

While the FCC's Open Internet Order did not adopt the exact non-discrimination rule proposed in these comments and in the attached paper, the proposal heavily influenced the FCC's non-discrimination rule for fixed broadband Internet access services. In particular, whether discriminatory behavior complies with the proposed rule (i.e. whether it is application-agnostic) is one of the factors the FCC will use to determine whether the conduct violates the FCC's non-discrimination rule and the reasonable network management exception.[53]

2. TRANSPARENCY AND SWITCHING (CONSUMER CHOICE)

Questions 12-23 (Consultation Form for Organizations)

The Commission's approach to network neutrality as described in the consultation, which relies on increasing transparency and making it easier to switch providers, will not solve the problems resulting from blocking or discrimination. In particular, the Commission's approach overestimates the ability of users to discipline providers and would unduly restrict the availability of unrestricted Internet offerings to the detriment of society.

Instead, the regulatory framework should prohibit any form of blocking and include a non-discrimination rule that bans application-specific discrimination and allows application-agnostic discrimination.[54] Both rules should apply regardless of the market share of the Internet service provider and of the prevalence of the practice at the market level and should be subject to the reasonable network management exception described in question 5k) above.

As set out under Section 2 of the consultation document, the Commission is not concerned about blocking, discrimination or restricted offerings as long as (a) consumers are informed about these practices and (b) unrestricted offerings are available that consumers can switch to. As a result, the consultation document focuses primarily on ways to increase transparency and reduce switching costs. This focus is too narrow.

1. The threat of switching will not discipline Internet service providers *(Question 18 a)*.

The Commission's approach rests on two assumptions that are both problematic:

First, the Commission's approach is based on the assumption that if a network provider unduly discriminates against an application that users would like to use, users can switch to another network provider who does not discriminate against the affected application. The threat of switching, proponents of this approach assume, will discipline providers.

[52] Canadian Radio-Television and Telecommunications Commission (2009), Section I. Framework for determining acceptable ITMPs, paras 20-43.
[53] For a detailed analysis of the FCC's non-discrimination rule, see van Schewick (2012) (attached), pp. 59-64.
[54] This non-discrimination rule is described in more detail in question 5k) above and in van Schewick (2012) (attached), pp. 52-59.

This assumption fails to recognize that the market for Internet services is characterized by a number of factors – incomplete customer information, product differentiation in the market for Internet access and for wireline and wireless bundles, and switching costs – that limit the effectiveness of competition and reduce consumers' willingness to switch.[55] Rules that require network providers to disclose whether and how they interfere with applications and content on their networks reduce the problem of incomplete customer information, though only to some extent. They do not remove any of the other problems. As a result, they still leave network providers with a substantial degree of market power over their customers that enables them to restrict some applications and content on their network without losing too many Internet service customers. Disclosure rules also do not affect the cognitive biases, cognitive limitations and externality problems that lead users to underestimate the benefits of switching providers compared to what would be in the public interest. A more complete analysis is copied below.

Due to all of these problems, less users would switch providers in response to actual discrimination or exclusion (and, consequently, providers will be less deterred by the treat of switching) than would be necessary for switching to have the desired disciplinary effect. Thus, even if there is competition in the market for Internet access services, disclosure cannot replace substantive regulation as a tool to discipline providers.

While the consultation document notes some of the reasons that may make the threat of switching less effective in disciplining providers, it does not draw the necessary conclusion – that taken together, the various factors discussed above provide network providers with a substantial degree of market power over their customers that enables them to restrict applications and content on their network without losing too many Internet service customers.

The experience in Europe, Canada and the market for mobile Internet services in the US shows that these are not just theoretical concerns. The markets for Internet service in Europe and Canada are considerably more competitive than the market for wireline, fixed Internet services in the US.[56] Still, as the results of BEREC's investigation show, many Internet service customers in the EU are subject to restrictions on their fixed or mobile Internet services.[57] In Canada, the 2009 investigation of the Canadian Regulatory Agency CRTC into Internet service providers' network management practices showed that at the time, many Canadian providers were singling out peer-to-peer file-sharing applications for special treatment, throttling the bandwidth available to them or interfering with these applications in other ways.[58] Under the FCC's Open Internet Order, providers of mobile Internet services in the US are subject to only limited restrictions on their ability to block

[55] On the arguments in this section, see Section "Ban Discrimination That Is Not Disclosed" in van Schewick (2010a) (attached).
[56] On the state of competition in the market for wireline Internet services in the US, see van Schewick (2012) (attached), p. 34 and Box 10.
[57] Body of European Regulators for Electronic Communications (2012).
[58] This sentence and footnote are adopted from van Schewick (2012) (attached), pp 46-47. For an overview of Canadian providers network management practices as disclosed during the proceeding, see Parsons (2009). Since then, most of the larger Canadian Internet service providers, most recently Bell Canada and Bell Aliant, have changed their practices in response to the regulations regarding network management that the CRTC adopted following its investigation. In January 2012, Rogers remained the only larger Canadian provider that was still engaging in discriminatory network management. Schmidt (2012); Geist (2011).

applications and are free to discriminate.[59] Although the market for mobile Internet services in the US is considerably more competitive than the market for wireline Internet services (according to the FCC's 2010 National Broadband plan, 77% of the population lives in census tracts with three or more 3G providers[60]), wireless carriers have engaged in various forms of discriminatory conduct since the adoption of the Open Internet Order. Examples are Verizon Wireless' conduct towards tethering applications,[61] Verizon Wireless', AT&T's and T-Mobile's actions towards Google Wallet,[62] and AT&T's actions towards Face Time.[63] These examples suggest that in these countries, competition does not prevent Internet service providers from interfering with applications, content or services on their networks.

Question 18 a): Please explain what barriers to switching ISPs still exist (if any) and how they can be overcome. Please mention in your reply all direct and indirect factors dissuading consumer from switching (e.g. obstacles linked to the terminal equipment, burden of proof regarding a possible breach of contract, etc.)

The attached paper sets out the limits of the Commission's approach with respect to switching costs and disclosure in more detail. For convenience, I copy the relevant part here:

"Disclosure can only discipline providers if there is effective competition.[64] In order for disclosure to have a disciplining effect, customers need to realize that the network provider is discriminating against an application they want to use. They need to be able to switch to another provider that meets their needs and does not impose a similar restriction, and they need to be able to do so at low costs. Even if there is competition in the market for Internet access services, these conditions will often not be met, making this rule an ineffective safeguard against discrimination.

First, even with disclosure, users' decision to switch will suffer from incomplete knowledge, cognitive limitations and cognitive biases. Users may not realize that their network provider is interfering with their application.[65] An application's bad performance may have many reasons (e.g., bad application design, insufficient server capacity, network congestion), and network provider interference will not necessarily be the first explanation that comes to mind.[66] Even if users consider that possibility, many will lack the expertise to investigate the cause of the bad performance.[67]

[59] van Schewick (2010c).
[60] Federal Communications Commission (2010b), pp. 39-40 (noting that these numbers "likely overstate the coverage experienced by consumers, since American Roamer [the source of the data] reports *advertised* coverage as reported by many carriers who all use different definitions of coverage").
[61] van Schewick (2011b).
[62] van Schewick (2011a).
[63] Ziegler (2012); Kang (2012).
[64] The following discussion focuses on the merits of a non-discrimination rule that does not impose any substantive limits on network providers' ability to engage in discriminatory conduct and relies solely on disclosure to discipline providers. It does not focus on the merits of mandating disclosure as a complement to substantive regulation.
[65] It is well established in the economics literature that customers' having imperfect information can provide market power to an economic actor who faces competition in the primary market by enabling the actor to impose restrictions in a complementary market that it would not be able to sustain if the primary market was perfectly competitive. See, e.g., Craswell (1982); Bar-Gill (2006).
[66] van Schewick (2010d), pp. 260-261; van Schewick (2007), pp. 376-377.
[67] For example, while user complaints about problems with BitTorrent on Comcast's network had been circulating for months, the exact method of interference was investigated and documented by Robb Topolski, a Comcast subscriber

While mandatory disclosure of discriminatory practices is intended to address this problem, experience with disclosure requirements in other contexts shows that disclosure is usually less effective at informing consumers than would be necessary for disclosure to have the intended effect.[68] Consumers often do not read disclosures, and in many cases, those who read them do not understand them.[69] For those who read and understand the disclosure, knowing which practices their network provider engages in will not necessarily allow them to make an informed decision. Many users lack the technical expertise to understand how the disclosed practices will affect them. This problem will be particularly pronounced with respect to discriminatory network management practices. Even if users understand how the practice impacts the applications they currently use, they are ill-positioned to assess the social, cultural or political consequences of the disclosed practice, its impact on future application providers' incentives to innovate or its implications for the Internet's ability to support future applications that have not yet been developed. For example, a user who believes that peer-to-peer file-sharing applications like BitTorrent are primarily used for illegal file-sharing and who does not engage in illegal file-sharing himself will not feel burdened by a network management practice that targets peer-to-peer file-sharing applications.[70] Most likely, he will not know about the various economic, technical, social, cultural and political implications of allowing this practice that were discussed above. Since they do not know the full costs of the practice, users will underestimate the benefits of switching. Moreover, many of the benefits of disciplining providers engaged in discriminatory practices by switching to another provider (e.g., more and better future applications) are in the future and uncertain, so users give them less weight than would be justified. Finally, users make the decision to switch based on an assessment of the private costs and benefits associated with switching. Since users bear the full costs of switching, but do not internalize all the social benefits of the decision to switch, they will switch less often than would be in the public interest.

Second, disclosure cannot discipline providers if there is no comparable provider to switch to who does not interfere with the applications customers want to use. Thus, the effectiveness of disclosure depends at least in part on the level of competition in the market for Internet access

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and network engineer, and later confirmed by the Associated Press and the Electronic Frontier Foundation, who had independently run their own tests upon learning of Topolski's research. See, e.g., Eckersley, von Lohmann & Schoen (2007), pp. 1-2. Since the Comcast incident, developers have created a number of tools that allow users to test their Internet connection for various signs of network provider interference. Different tools require different levels of expertise. For a list of measurement tools, see Electronic Frontier Foundation (2008). To help foster the creation of tools that consumers can use to monitor their network connections, the Federal Communications Commission in January 2011 announced a challenge to software developers and researchers "to produce research and create apps that empower consumers to monitor and protect Internet openness." The winners were announced in August 2011. Challenge.gov (2011).

[68] See, e.g., Latin (1994) (product warnings); Edwards (2005) (truth-in-lending); Cate (2006) (privacy); Ripken (2006) (securities regulation); Ben-Shahar & Schneider (2011), pp. 665-679, 704-729 (reviewing the experience with disclosure in a variety of contexts).

[69] See, e.g., Cate (2006), pp. 360-363 (citing studies on privacy notices); Edwards (2005), pp. 229-233 (citing studies on disclosures mandated by the truth-in-lending act); Ben-Shahar & Schneider (2011), pp. 666, 668-669, 671-679, 709-718 (citing studies on disclosures in a variety of contexts); Calo (2012), pp. 1050-1055 (summarizing literature on disclosure from a variety of contexts).

[70] On this and the following, see the discussion in the text surrounding footnotes 190 to 217 in van Schewick (2010a) (attached).

services. In the US, this is a real problem.[71],[72,73] According to the FCC's National Broadband Plan, which was published in 2010, 78% of housing units in the US are in areas served by two wireline, facilities-based Internet access providers, while 13% are in areas where only one such provider offers service.[74] This market structure has been characterized as "duopoly +/-".[75] While a duopoly is often better than a monopoly, duopolists enjoy a degree of market power that enables them to impose restrictions on their customers that they would not be able to impose in a competitive market.[76] Mobile Internet users in the US have somewhat more options: 77% of the population lives in census tracts with three or more 3G mobile providers, 12% in areas with two providers, and 9% in areas with one.[77] In the EU, consumers usually have more providers of fixed wireline broadband service to choose from, since the regulatory framework allows unaffiliated Internet service providers to offer their services over the incumbent's network infrastructure.[78]

Focusing solely on the number of providers, however, will often overestimate the number of viable alternatives available to a consumer who is willing to switch in response to discriminatory conduct. The Internet service offerings of various providers differ substantially in price, performance, and other characteristics on which providers compete.[79] As a result, even if there is another provider, switching in response to the discrimination may require a customer to switch from her most preferred Internet access offering to another offering that may meet fewer of her needs, creating an ongoing cost that will reduce the customer's willingness to switch. In the worst case, the other providers do not meet the needs of the customer at all, making it impossible for her to switch.

[71] See also *Box 10: Competitiveness of the Market for Broadband Internet Access in the US* in van Schewick (2010a) (attached).

[72] Opponents of network neutrality regulation usually have a more optimistic view of the actual amount of competition in the US than the one taken by this paper. For an example, see, e.g., Becker, Carlton & Sider (2010), pp. 502-506. In particular, they use older FCC data based on Internet service availability by zip codes (Becker, Carlton & Sider (2010), p. 503), which overstates the amount of competition (United States Government Accountability Office (2006), p. 18), treat mobile broadband Internet service as a substitute (Becker, Carlton & Sider (2010), p. 504-505) instead of treating it as a complement for wireline Internet services (Free Press (2009b), pp. 42-43, 104-105; Free Press (2009b), pp. 40-44; Free Press (2009a), p. 46 Fn. 109; Free Press (2010), pp. 45-47; Federal Communications Commission (2010b), pp. 40-41), ignore or downplay the impact of switching costs (Becker, Carlton & Sider (2010), p. 503), bundling and differentiation in the market for Internet services on the effectiveness of competition, and do not reflect the more recent decisions by AT&T and Verizon to stop expanding their fiber offerings (Becker, Carlton & Sider (2010), p. 504).

[73] The market for wireline broadband services in Europe is more competitive. See the text surrounding footnote 245 in van Schewick (2010a) (attached).

[74] 4% of housing units are in areas that are served by three wireline, facilities-based broadband Internet access providers (usually a DSL or fiber provider, a cable company and a cable over-builder). 5% are in areas with no wireline provider. Federal Communications Commission (2010b), p. 37. The data is based on the FCC's Form 477 data. This form counts the number of providers who offer service to at least one subscriber in a certain geographic area, without checking whether different providers offer service in overlapping geographical areas. While the National Broadband Plan tries to correct for this deficiency (Federal Communications Commission (2010b), p. 62, footnote 6), the data is likely to overstate the amount of competition to individual households. See United States Government Accountability Office (2006), p. 18.

[75] See, e.g., Farrell (2006), p. 202.

[76] See, e.g., Farrell (2006), pp. 202-205.

[77] Federal Communications Commission (2010b), pp. 39-40 (noting that these numbers "likely overstate the coverage experienced by consumers, since American Roamer [the source of the data] reports *advertised* coverage as reported by many carriers who all use different definitions of coverage"). On the market structure for mobile broadband in Europe, see, e.gMarcus (2008), p. 35.

[78] See, e.g., European Commission (2007), pp. 18-47 (discussing market data and the existing regulatory framework); Marcus, et al. (2011), pp. 49-50; Cave & Crocioni (2011), p. 58.

[79] The following discussion draws in part on van Schewick (2010d), pp. 262.

For example, cellular providers compete on many factors such as price, coverage, devices, roaming agreements, services and, more recently, bandwidth usage caps on data plans.[80] If the other providers that do not discriminate against the application do not offer the coverage a customer needs, switching is not a realistic option. Similarly, cable networks that have been upgraded to DOCSIS 3.0 and networks offering fiber-to-the-premises are able to offer peak download speeds of more than 50 Mbps. By contrast, the peak download speeds feasible on networks offering fiber-to-the-node or on traditional DSL networks are significantly lower.[81] In the US, cable providers have generally upgraded their networks to DOCSIS 3.0, while Verizon and AT&T have stopped expanding their fiber offerings.[82] As a result, analysts expect that within a few years, 75% of the population will live in areas that will have only one service provider – the cable provider – that can offer peak download speeds of more than 50 Mbps. Only 15% of the population will likely have access to two such providers.[83] Thus, for most users interested in the highest available peak download speeds, switching providers in response to discriminatory conduct will not be a viable option.[84]

The trend toward bundling differentiates the market further, giving providers additional market power.[85] Cellular providers bundle voice, text messaging and mobile Internet access service. Wireline providers bundle telephony, television and wireline Internet access. Cable customers may not think of the digital or satellite television service offered by phone networks as a perfect substitute for their cable television; on the other hand, customers of a conventional telephony provider may not trust the digital telephony offered by cable companies.[86] Though it is possible to switch only the Internet service and keep the other offerings, this will significantly reduce the bundle discount. The problem is exacerbated if the network provider offers exclusive content or exclusive devices that are valuable to the customer.[87] For example, while AT&T was the exclusive provider of the iPhone, AT&T Wireless customers may have hesitated to switch to another cellular provider that does not offer or support the iPhone.[88] Thus, product differentiation in the market for Internet services and in the market for wireline or cellular bundles makes switching to a different provider that meets fewer of their needs less attractive to customers, and gives network providers an

[80] Federal Communications Commission (2010b), pp. 39-40.
Federal Communications Commission (2010b), p. 42; Crawford (2011), pp. 247-248.
[82] Crawford (2011), pp. 246-249
[83] Federal Communications Commission (2010b), p. 42.
[84] Susan Crawford has called this the "looming cable monopoly." Crawford (2010).
[85] The following discussion draws in part on van Schewick (2010d), pp. 263.
[86] In a survey of broadband users in the US, the FCC found that 39% of broadband service customers with a choice of more than one broadband provider "said that having to change their current bundle of Internet, TV, and phone service was a *major* reason for keeping service. Federal Communications Commission (2010a), p. 3.
[87] For example, an empirical study of competition between cable television and direct broadcast satellite (DBS) multi-channel services showed that while customers generally tend to switch from cable to DBS when the quality-adjusted price of cable increases substantially, the availability of regional sports channels reduced DBS penetration, either because it raised consumers' switching costs or because it increased product differentiation between the two types of services (Wise & Duwadi (2005), pp. 695, 699–700).
[88] In September 2011, Sprint's CEO Dan Hesse noted that the fact that Sprint wasn't offering the iPhone was "the No. 1 reason customers leave or switch" (Lublin & Ante (2011)).

additional degree of market power over their Internet service customers which allows them to impose restrictions they would not be able to impose in a perfectly competitive market.[89]

Even if there is more than one provider that can meet a user's needs, switching is not an option if all providers in this group engage in the discriminatory conduct.[90] For example, there was a period during which all mobile providers in France and Germany were contractually banning the use of Internet telephony applications over mobile Internet connections. Similarly, the CRTC's review of the network management practices of Internet access service providers in Canada, where users have considerably more options for Internet access than in the US, showed that many providers were engaging in discriminatory traffic management practices that targeted peer-to-peer file-sharing applications.[91] Moreover, once discrimination is generally allowed as long as it is disclosed, different providers may discriminate against different combinations of applications, making it difficult to find a provider that meets the customer's needs and does not interfere with any of the applications the customer wants to use.

Third, the market for Internet services is characterized by significant switching costs that reduce consumers' willingness to switch and limit the effectiveness of competition.[92] Switching costs are the costs a customer incurs when switching to a competitor.[93] Switching costs make consumers' demand less elastic, enabling a provider to charge a higher price.[94] They also allow a provider to impose other restrictions that it could not impose in a perfectly competitive market. Whether these costs will prevent a customer from switching depends on the value the customer places on the excluded application and on the magnitude of the switching costs. Thus, discrimination against popular applications like Google or Facebook that users view as essential will be more likely to motivate users to switch than discrimination against a newly launched application.

Switching costs in the market for Internet services are substantial. Consider first the obvious financial expenses that may be associated with switching providers. A customer who cancels a long-term contract with his provider before the end of the term will be charged an early termination fee.[95] When switching from a broadband-over-cable service to a digital-subscriber-line (DSL) service, a

[89] That product differentiation may provide sellers with some degree of market power is well established in the literature (Carlton & Perloff (2005), pp. 203–205).
[90] van Schewick (2010d), pp. 259-260.
[91] For a summary of Internet service providers' responses in that proceeding, see Parsons (2009).
[92] The following six paragraphs draw in part on van Schewick (2010d), pp. 261-264. For an attempt to calculate the costs of switching broadband providers in France, see Krafft & Salies (2008); Krafft & Salies (2009). See also Cullen & Shcherbakov (2010) (estimating the explicit and implicit switching costs in the US wireless industry at approximately $230).
[93] For an in-depth overview of the economic literature on switching costs, see Farrell & Klemperer (2007). For a treatment of switching costs in the context of information goods, see Shapiro & Varian (1998), chapters 5 and 6.
[94] E.g., Varian (1999), pp. 604–605; Hausman, Sidak & Singer (2001), p. 164.
[95] For example, HearUsNow.org, a project of the Consumers Union, found that a number of the top broadband providers in the United States charge early-termination fees. For example, at the time of the survey in March 2007, Qwest charged a $200 early-termination fee on a two-year contract for high-speed Internet service, EarthLink charged a $149 early-termination fee on a one-year contract for DSL service, and AT&T (including SBC and BellSouth) charged a $99 early-termination fee (Consumer's Union (2007); Dunbar (2007)). In a survey of broadband users in the US, the FCC found that 32% of broadband service customers with a choice of more than one broadband provider "said paying termination fees to their current ISP was a *major* reason for keeping service." Federal Communications Commission (2010a), p. 3.

consumer will be charged for installation and will have to buy a DSL modem and other new equipment.[96] If (as is common in the United States) the Internet service is bundled with television and telephony, cancellation of the Internet service portion of the bundle may result in a loss, or a partial loss, of the bundle discount, and the loss of that discount may then be a significant ongoing financial cost for the consumer.[97]

Further, switching providers may require a customer to invest a significant amount of time and effort. She will have to search for and compare alternative offerings to choose a new provider. She will have to open an account with the new provider and close her account with her present provider.[98] If she cannot install the access hardware and software herself (which takes time and expertise), she must stay at home for the installation.[99] A customer who has been using an e-mail address offered by the network provider will have to notify various people of her new e-mail address, perhaps have new stationery and business cards printed, update her résumé and her website, and bear the risk of missing e-mail messages sent to the old address.[100] The precise cost of switching e-mail addresses is difficult to measure, but anecdotal evidence indicates that customers view it as substantial. The *New York Times* reported in 2005 that AOL had about 5 million customers who paid $14.95 per month in order to keep using an AOL e-mail address even though they had switched to another broadband-access provider and paid Internet service fees to the new provider.[101]

The exact costs of switching depend on the circumstances. Some customers may use provider-independent e-mail services, such as Hotmail or Gmail; others may not subscribe to a bundle at all. Some customers are not subject to a long-term contract or their contract does not include early termination fees. Sometimes, the new provider may waive the installation fee. In countries with open-access regulation where regulation allows independent Internet service

[96] In a survey of broadband users in the US, the FCC found that 50% of broadband service customers with a choice of more than one broadband provider "said paying set-up or installation fees were major factors in keeping service." Federal Communications Commission (2010a), p. 3.

[97] The customer may switch his whole bundle to the new provider, but that creates other problems, for example by making the decision to switch more complex, or by resulting in the loss of the preferred service offering, for example in television or telephony. In a survey of broadband users in the US, the FCC found that 39% of broadband service customers with a choice of more than one broadband provider "said that having to change their current bundle of Internet, TV, and phone service was a *major* reason for keeping service. Federal Communications Commission (2010a), p. 3.

[98] Providers have considerable influence over this cost. For example, in 2005, AOL paid $1.25 million in fines as part of a settlement with the state of New York, because AOL's customer service representatives were incentivized to dissuade customers from switching away from America Online, "by either making the cancellation process so painful for the customers that they could not bear to continue, or by simply ignoring their requests" (Stross (2005)).

[99] In a survey of broadband users in the US, the FCC found that 43% of broadband service customers with a choice of more than one broadband provider " said dealing with the hassle of getting new service installed was a *major* reason they have kept service." Federal Communications Commission (2010a), p. 3.

[100] On the use of provider-specific e-mail addresses as a way to increase switching costs in Internet services, see Shapiro & Varian (1998), pp. 109–110. In other telecommunications markets such as wireline telephony and mobile telephony, regulation often requires providers to provide number portability, i.e., to enable a customer to keep its phone number when he switches providers. In 2007, the FCC asked for comments on a petition (Mortenson (2007)) to require e-mail providers to forward e-mail to a new e-mail address for a limited time (Federal Communications Commission (2007)), but did not take any further steps in this proceeding.

[101] Stross (2005). In a survey of broadband users in the US, the FCC found that 34% of broadband service customers with a choice of more than one broadband provider "said having to give up their current email address from their ISP was a major reason for not changing service." Federal Communications Commission (2010a), p. 3.

providers to offer their services over other providers' networks, customers may be able to switch to another provider that offers its services over the same physical network; that removes the need to buy new equipment. Also, regulators may adopt policies to reduce switching costs. For example, the EU Universal Service Directive allows Internet service customers to switch providers in response to a change in disclosed discriminatory practices without incurring early termination fees.[102]

Thus, a particular Internet customer may face any combination of the switching costs discussed above. Every customer, however, must go through the process of searching for and choosing an alternative provider and installing and setting up the access software. These hurdles alone may deter switching. Moreover, empirical studies show that the decision to switch depends on the perceived costs of switching, which are not necessarily equivalent to the actual costs. Studies of the UK's market for long-distance telephone service have shown that providers were significantly more likely to retain dissatisfied customers who perceived the switching costs as high than dissatisfied customers who perceived them as low.[103] According to studies of the long-distance and credit-card industries, the perceived costs of switching are significantly increased if the product is perceived as complex, if it has a large number of features, or if it is bundled with other products.[104] This suggests that customers in the market for Internet access services, where services are viewed as complex, are characterized by many features and are often sold as part of a bundle, will perceive switching costs as high.

Finally, research in behavioral economics indicates that even very small switching costs may prevent customers from switching. Individuals exhibit a "status quo bias"—they are much more likely to keep what they already have than rational-choice theory would predict.[105] For example, this bias is exploited by free trials that automatically convert to a paid subscription at the end of the trial period unless the customer calls or writes to prevent this.[106] If, however, the costs of placing a call or writing a letter are sufficient to prevent people from acting, the significantly higher actual (or perceived) costs of switching Internet service providers may prevent many Internet service customers from switching providers, even if their Internet service provider excludes applications or content they would like to use."

[102] Article 20, Section 2. Universal Service Directive.
[103] Ranaweera & Prabhu (2003).
[104] Burnham, Frels & Mahajan (2003).
[105] Status quo bias seems to result from a number of factors. For example, contrary to rational-choice theory, consumers often take past sunk costs into account when making consumption decisions (Samuelson & Zeckhauser (1988), pp. 37–38). Choosing one option and rejecting the other also creates cognitive dissonance, which is reduced by subsequent rationalization that the chosen option is more desirable than it was *ex ante* (Brehm (1956), p. 389). Finally, people tend to regret bad outcomes that are a result of their own action more than bad outcomes that are the result of their inaction, which again leads to a bias for doing nothing (Kahneman & Tversky (1984), pp. 343–344).
[106] Trial subscriptions with a low introductory price that automatically convert to a higher price, or other contracts with automatic renewal also exploit the cognitive bias that people tend to overestimate their future willingness to incur the then immediate costs of switching (or terminating the contract) in order to reap the future benefits (i.e., the savings) resulting from switching (or terminating the contract) (DellaVigna & Malmendier (2004), pp. 381–393).

2. Allowing restricted offerings to exist as long as unrestricted offerings are available does not sufficiently protect the values that network neutrality rules are designed to protect. In particular, it harms users and reduces application innovation to the detriment of society.

Second, the Commission's approach is based on the assumption that the existence of restricted offerings is less problematic if there are unrestricted offerings available that users can switch to. Such an interpretation fails to protect the values that network neutrality rules are designed to protect.

First, due to the factors limiting the effectiveness of competition in the market for Internet services that were just described, the availability of unrestricted offerings is not enough to discipline providers.

Second, the Commission's approach harms users. It harms users on restricted plans: As described in detail in the attached paper, even users who would like to use the restricted application and would use it if their Internet service provider was not restricting it, may not switch to the unrestricted Internet service offering, making them worse off than they would be if their Internet service provider was banned from restricting the application.[107] The Commission's approach also harms users on unrestricted plans, if they cannot use the restricted application or service to interact with users on restricted plans.

AT&T's restrictions on the use of Face Time, Apple's video chat application, in the US illustrate these harms. AT&T only allows customers of some of AT&T's cellular data plans to use Face Time over the cellular Internet; users on all other cellular data plans will not be able to use the application over the cellular Internet. Under the Commission's approach, this would not be problematic since users who want to use Face Time could switch to AT&T's unrestricted offering. AT&T's restriction harm users on AT&T's restricted data plans who would like to use Face Time but are unable to switch (e.g., because AT&T's unrestricted data plan is not the right plan for them for other reasons). These users are unable to use an application they would like to use, which reduces the value of the Internet to them. AT&T's restriction also harms users of unrestricted plans. For example, as Brendan Gramer, a deaf person, explained in Wired recently,[108] deaf Internet users use Face Time to communicate with friends and family in sign language. Even if the deaf person is on an unrestricted plan, it still cannot use Face Time to communicate with friends and family on restricted plans.

The Commission's approach also harms application innovation. User choice is a fundamental component of the mechanism that enables application-level innovation to function effectively.[109] In the current Internet, it is impossible to predict what future applications will be successful. Enabling widespread experimentation at the application-level and enabling users to choose the applications they prefer is at the heart of the mechanism that enables innovation under uncertainty to be successful. If restricted and unrestricted offerings co-exist on the Internet, only some users – those who use unrestricted offerings – participate in this mechanism. By contrast, in

[107] See Section "Ban Discrimination That Is Not Disclosed" in the attached paper.
[108] Gramer (2012).
[109] On the importance of user choice for application innovation, see van Schewick (2012) (attached), pp. 8-9 and Box 4 and the references cited there.

restricted offerings, network providers, not users, pick winners and losers on the Internet. Whom they pick may be driven by a number of motivations that are not necessarily identical with what users would prefer, leading to applications that their users would not have chosen and forcing their users to engage in an Internet usage that does not create the value it could. The threat of discrimination also reduces application developers' incentives to innovate.[110]

Finally, compared to an unrestricted Internet, a co-existence of restricted and unrestricted offerings reduces the size of the potential market that application developers, content providers or service providers have access to, which in turn reduces their incentives to innovate. In an unrestricted Internet, innovators have immediate access to everybody connected to the Internet. This has allowed innovators to offer applications, content or services for niche markets, since they can reach niche audiences even if they are spread over many providers.[111] Even for providers targeting a mass market, the size of the potential market that is immediately accessible is important. Compared to the expected benefits of releasing a new application, content or service on an unrestricted Internet, the expected benefits of releasing an application to those users on unrestricted Internet service offerings and, potentially, motivating users currently on restricted offerings to switch to unrestricted offerings to use the new application are much smaller.

In sum, instead of focusing on measures that increase transparency and reduce switching costs to limit harm to users and application innovation from blocking, discrimination or restricted offerings, the Commission should acknowledge the limits of these approaches and adopt rules that regulate this behavior directly.

3. While measures that increase transparency and reduce switching costs do not sufficiently protect against discriminatory conduct, they serve many other valuable functions and are an important complement to substantive network neutrality rules. Thus, I strongly support the measures to increase transparency and reduce switching costs described in Questions 12-16 of the consultation document.

As I explain in the attached paper,[112] "[w]hile mandatory disclosure alone does not sufficiently protect against discriminatory conduct, it serves many other valuable functions. Thus, it is an important complement to substantive nondiscrimination rules.[113] Disclosure improves competition by providing customers with information that can help them make informed decisions when choosing providers. Disclosure of traffic management practices also enables competitors to differentiate themselves along new dimensions. Today, network providers in the US compete based on maximum upload and download speed and price. If, however, customers are unable to note the differences between the offerings along other dimensions (e.g. how oversubscribed is the network,

[110] See van Schewick (2012) (attached), pp. 25-26.
[111] See, e.g., Anderson (2006).
[112] van Schewick (2012), p. 38.
[113] The following paragraph partly draws on van Schewick (2008b), pp. 1-2. Network neutrality proponents generally support adopting disclosure rules as a complement to substantive regulations. See, e.g., van Schewick (2008b), pp. 1-2; Center for Media Justice, et al. (2010), pp. 63-67; Free Press (2010), pp. 112-121; Open Internet Coalition (2010), pp. 86-92. In the US, network providers have generally argued against any mandatory disclosure rules, whether as a substitute or complement to substantive network neutrality regulation. See, e.g., AT&T Inc. (2010), pp. 188-196; Verizon & Verizon Wireless (2010), p. 132.

how often is traffic management used, how is traffic prioritized), they cannot take these factors into account when making a decision, and network providers do not have an incentive to compete on these factors. Thus, disclosing these characteristics along with more detailed performance measures would not only help consumers make more informed choices, but also motivate Internet service providers to compete along these previously hidden dimensions.[114] More detailed disclosure of traffic management measures may also help alleviate congestion by enabling customers to adjust their behavior. Finally, disclosure provides visibility to regulators, competitors and industry observers and saves costs by removing the need for difficult and costly private investigations into a specific provider's network management practices. For example, in 2007, complaints about problems with BitTorrent and other peer-to-peer file-sharing applications on Comcast's network had circulated on user forums for several months. When asked by a reporter and later by the Electronic Frontier Foundation, Comcast denied that it was interfering with BitTorrent.[115] As a result, users, public interest organizations and reporters had to expend considerable technical effort to understand what Comcast was doing and trace BitTorrent's unusual behavior back to Comcast's intervention.[116]„

3. INTERCONNECTION ISSUES

Not answered.

4. PROCESS

Question 26: Do you consider that intervention by public authorities is necessary at this stage?

a) If so, what would be the appropriate level of intervention?

1. As the results of BEREC's investigation have shown, blocking and discrimination are a real problem, not just a theoretical one. For the reasons set out above, increasing transparency and reducing switching costs does not sufficiently address this problem. Instead, substantive network neutrality rules are needed that explicitly limit Internet service providers' ability to interfere with the application, content and services on their networks.

2. Ongoing blocking and discrimination harms users and the providers of the affected applications today. In addition, the threat of discrimination not only affects innovation in applications, content and services in the future. The threat of discrimination affects innovation today.

[114] See, e.g., Campaign for Democratic Media (2009), paras 26-28, 40-42, 49-51 (arguing in favor of requiring network providers to disclose oversubscription ratios); Lennett (2009), pp. 140-142 (same); IEEE-USA Committee on Communications Policy (2010) (arguing in favor of standardization and disclosure of more detailed performance measures, including metrics for bandwidth, packet loss, latency, jitter and availability), pp. 12-18, 24; IEEE-USA (2010), pp. 1-3 (same).

[115] Reardon (2007); Schoen (2007). This sentence and the next sentence are adapted from van Schewick (2010d), p. 261.

[116] Comcast's method of interfering with BitTorrent was first investigated by Comcast subscriber and network engineer Robb Topolski, who detected the spoofed RST packets that Comcast was using to reset BitTorrent connections. Upon learning of Topolski's research, the Associated Press and the Electronic Frontier Foundation independently ran their own tests and documented the practice. Svensson (2007); Eckersley, von Lohmann & Schoen (2007).

The restrictions highlighted by BEREC's investigation harm users and providers of affected content, applications and services today. Users of the affected applications are unable to use the Internet in the way that provides the most value to them, which reduces the value of the Internet to them. Providers of affected applications, content and services are unable to reach users on restricted plans, which reduces the size of their potential market and of their actual customer base and reduces their ability to profit from their application.

The Commission's questions in the consultation document seem to acknowledge the possibility that discriminatory conduct may have a long-term effect on innovation in applications, content and services. This is correct. As I explain in the attached paper,[117] "application developers who must decide whether to realize their innovative ideas and investors who consider funding them face the fundamental risk that the network may discriminate against the application at any time, which would reduce the affected application provider's ability to reap the benefits associated with her innovation. Thus, the threat of discrimination reduces application developers' incentives to innovate and their ability to get funding.[118,119]"

However, as many conversations I have had with innovators and investors indicate, the lack of certainty about regulatory protections coupled with a very real threat of discrimination affects innovation today. The attached letter from the online video company Zediva, filed with the US Federal Communications Commission, illustrates this threat.[120] It also explains – in a very concrete way – how different forms of network neutrality rules may affect specific companies' ability to operate successfully on the Internet. As I explained elsewhere, this is just one example of many.[121] Over the past few years, many entrepreneurs have told me that potential investors identified the risk of blocking or discrimination as one of the main risks associated with their company and used this fact to justify their decision not to fund them.[122] Even those who haven't had similar conversations with funders yet are usually concerned about the problems described by Zediva. Thus, Zediva's story is not an outlier. It stands for the problems faced by many start-ups and innovators.

You may wonder why we don't hear more from entrepreneurs, if this is the case.[123] My conversations with entrepreneurs suggest a number of reasons:

First, entrepreneurs focus on getting their product to market and making it the best product they can. They do not have the time to follow the latest twists and turns of the policy debate in Washington, Brussels or elsewhere and write letters to the relevant regulatory agencies.

Second, many do not come forward because they fear that network providers may retaliate against them in the future. I used to hear this a lot from application and service providers in the

[117] van Schewick (2012), pp. 25-26.
[118] See, e.g., Lessig (2008), pp. 7-8; van Schewick (2010d), pp. 270-273.
[119] As I know from many conversations with entrepreneurs and investors, the threat of discrimination reduces entrepreneurs' ability to get funding today. For two publicly documented examples, see van Schewick (2008a), p. 2 and the letter from the founders of the online video company Zediva to the FCC (Srinivasan & Gupta (2010), pp. 1-2). See also Lessig (2008), pp. 7-8.
[120] Srinivasan & Gupta (2010).
[121] van Schewick (2010g).
[122] I described the experience of one start up in testimony to the Federal Communications Commission (van Schewick (2008a), attached).
[123] The following text is adopted from van Schewick (2010g).

mobile space. But over the past year, this concern has started to come up in many conversations with innovators whose applications and services run over wireline networks.

Third, many start-ups do not want to draw public attention to their vulnerabilities, fearing it may scare potential investors away.

And finally, having been declined funding is not something that entrepreneurs like to brag about.

3. There is a gap between network providers' private interests and the public interest in open networks that the Commission needs to take into account.

Some participants in the debate argue that network providers will not restrict applications, content and services in socially harmful ways since more applications, content and services make their networks more attractive. For example, this argument is made by BEREC's draft document on competition issues and its guidelines on network neutrality and Quality of Service. This argument is only partly correct. Neither the interests of the network provider and users nor the interests of the network provider and the public are aligned. Network providers' interests often differ from users' interests, and even if they do not, network providers do not know what exactly users want.[124] Network providers' private interests and the public interests with respect to the evolution of the Internet diverge as well:[125] For a variety of reasons, network providers capture only a small part of the social value resulting from an open Internet. For example, they only capture some of the social benefits associated with application innovation or of the social benefits resulting from improved democratic discourse.[126] Moreover, most of the gains they are able to capture are uncertain and will be realized in the future, which leads network providers to discount them even more.[127] Thus, when network providers decide whether to discriminate among applications or classes of applications, the immediate private benefits of discriminating (i.e. the higher profits resulting from exclusionary conduct or from discriminatory network management) will often be higher than network providers' hyperbolically discounted share of the private benefits of refraining from discriminatory conduct.

Thus, the public's and network providers' interests diverge, so regulators cannot rely on network providers to protect the public interest in an open, unrestricted Internet.

4. The Commission's thinking about network neutrality should be guided by the underlying goals of network neutrality regulation.

The commission should think about any network neutrality framework in light of the underlying goals of network neutrality regulation. As I explain in the attached paper, network neutrality rules are intended to preserve the Internet's ability to serve as an open, general-purpose infrastructure that provides value to society over time in various economic and non-economic ways. There is, however, a lot of uncertainty on how to get from a high-level commitment to network neutrality to a

[124] See footnotes 352 to 356 in van Schewick (2010a) (attached) and accompanying text.
[125] For a detailed discussion, see van Schewick (2010d), pp. 355-371 (describing the public interest), 371-375 (describing network providers' private interests and why they diverge from the public interest).
[126] van Schewick (2010d), pp. 373-374. See also Frischmann (2005); Frischmann & van Schewick (2007), pp. 400-403, 424-425; Hogendorn (2012).
[127] van Schewick (2010d), pp. 374-375.

specific set of rules. The paper proposes a framework that policy makers and others can use to interpret existing network neutrality rules in light of the goals of network neutrality regulation or to decide whether specific discriminatory conduct should or should not be allowed under a network neutrality regime. According to that framework, network neutrality rules should meet the following criteria:

- Network neutrality rules should preserve the factors that have allowed the Internet to serve as a platform for application innovation and economic growth and as a platform for free speech and decentralized economic, social, cultural and political interaction in the past. As I explained elsewhere, these factors are:[128]
    - *Innovator choice:* Innovators independently choose which applications they want to pursue; they do not need support or "permission" from network providers in order to realize their ideas for an application (this factor has also been called "*innovation without permission"*). Adding additional decision-makers who need to endorse the idea or take action before an idea can be realized reduces the chances that innovative ideas can be realized.[129]
    - *User choice:* Users independently choose which applications they want to use, without interference from network providers. Letting users, not network providers choose which applications will be successful is an important part of the mechanism that produces innovation under uncertainty.[130] At the same time, letting users choose how they want to use the network enables them to use the Internet in a way that creates more value for them (and for society) than if network providers made this choice.[131] (See *Box 4: The Importance of User Choice* on p. 9 of the attached paper.)
    - *Application-Blindness:* The network is application-blind. An application-blind network is unable to distinguish among the applications on the network, and, as a result, is unable to make distinctions among data packets based on this

[128] The factors that have fostered application innovation in the past factors are described in detail in van Schewick (2010d). For a short overview, see van Schewick (2010f). For a brief discussion of the factors that are at the core of the Internet's political, social and cultural potential, see van Schewick (2010d), pp. 359-365; Benkler (2000), pp. 565-568; Balkin (2009). The original Internet created an environment characterized by these factors as a consequence of its architectural design. In particular, they are the result of the application of the layering principle and the broad version of the end-to-end arguments. On the layering principle, the broad version of the end-to-end arguments and their relationship to the original architecture of the Internet, see footnote 2 in in van Schewick (2010a) (attached) and van Schewick (2010d), pp. 61-75, 96-103; van Schewick (2004). On early arguments that the architecture of the Internet, due to the end-to-end arguments, created a beneficial environment for innovation that regulation should preserve, see Lemley & Lessig (1999) (in the context of the debate over open access to cable networks) and, in the context of network neutrality, Lessig (2001); Lessig (2002); Wu (2003); Wu & Lessig (2003); van Schewick (2004); Wu (2004); Cerf (2006); Lessig (2006); Lessig (2008).

[129] On innovation without permission in the original Internet, see van Schewick (2010d), pp. 204, 211, 293. On the impact of innovation without permission on innovation, see van Schewick (2010d), pp. 345-348. See also Cerf (2006), pp. 1,4; Balkin (2009) (focusing on the social, cultural and political implications).

[130] See van Schewick (2010d), pp. 349-351; van Schewick (2010f), p. 6. See also footnote 52 in van Schewick (2010a) (attached).

[131] See van Schewick (2010d). pp. 362-363. See also Cerf (2006), pp. 1-3, 7. On the importance of user choice for the Internet's social, cultural and political potential, see, e.g., Balkin (2009); van Schewick (2010d), pp. 359-365.

information.[132] The application-blindness of the network ensures that network providers cannot interfere with innovators' and users' choices, that they cannot distort competition among applications (or classes of applications) or reduce application developers' profits through access fees[133] (we may call this "*innovation without fear"*).

- *Low costs of application innovation:* The low costs of application innovation not only make many more applications worth pursuing, but also allow a large and diverse group of people to become innovators.[134] If there is uncertainty (e.g., about technology or user needs) or user needs are heterogeneous, a larger and more diverse group of innovators will create more and better application innovation than a smaller, less diverse group of innovators, and these applications will better meet the needs of Internet users.[135] In the current Internet, there is uncertainty and user needs are heterogeneous, so the conditions under which innovator diversity increases the amount and quality of innovation are met.[136]

- Network neutrality rules should not constrain the evolution of the network more than is necessary to reach the goals of network neutrality regulation.

- Network neutrality rules should make it easy to determine which behavior is and is not allowed to provide much-needed certainty for industry participants. For application providers, uncertainty over the level of protection provided by the rule reduces their incentives to innovate and their ability to get funding.[137] For network providers, uncertainty over the legality of network management practices or of different forms of Quality of Service may make it more difficult to manage their network and may limit the evolution of the network infrastructure. Uncertainty over the regulatory regime may also reduce network providers' incentives to invest more generally.[138]

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[132] The original Internet was application-blind, which was a consequence of its architecture, in particular of the broad version of the end-to-end arguments and of the layering principle. See footnote 2 in the attached paper and van Schewick (2010d), pp. 72-75, 217-218; van Schewick (2004). See also, e.g., Cerf (2006), pp. 1-4, 7; Reed (2010). For a short summary of the importance of application-blindness, see van Schewick (2010f), pp. 3-4. For a detailed analysis, see van Schewick (2010d), pp. 215-281, 286-295, 349-353, 355-365. See also Benkler (2000), pp. 565-568; Balkin (2009); van Schewick (2010d), pp. 359-365 (all focusing on the social, cultural and political implications).

[133] Access fees are fees that the network provider imposes on application and content providers who are not its Internet service customers. Access fees come in two variants: In the first variant, a network provider charges application or content providers for the right to access the network provider's Internet service customers. In the second variant, which is sometimes called "paid prioritization" or "third-party-paid prioritization," a network provider charges application or content providers for prioritized or otherwise enhanced access (e.g., access that does not count towards the users' monthly bandwidth cap) to these customers. On access fees, see, e.g., van Schewick (2010e). See also footnotes 15 to 20 in the attached paper and accompanying text.

[134] For a short version of the argument, see van Schewick (2010f), pp. 2-3, 5-6 and van Schewick (2010e), pp. 4-5. On low cost of application innovation in the original Internet, see van Schewick (2010d), pp. 138-148. On the impact of low cost innovation on who can innovate, see van Schewick (2010d), pp. 204-213. See also Benkler (2000), pp. 565-568; Balkin (2009) (both focusing on the social, cultural and political implications).

[135] For a short version of the argument, see van Schewick (2010f), pp. 5-6 and van Schewick (2010e), pp. 4-5. For the detailed version, van Schewick (2010d), pp. 298-349.

[136] See van Schewick (2010d), p. 356.

[137] See footnotes 174 to 176 in van Schewick (2010a) (attached) and accompanying text.

[138] See footnotes 171 to 173 in van Schewick (2010a) (attached) and accompanying text.

- Network neutrality rules should keep the costs of regulation low.

5. The Commission should aim to specify applicable rules and guidelines in advance to provide much-needed certainty to industry participants.

The current regulatory framework for dealing with discriminatory conduct leaves all decisions over the legality of specific discriminatory conduct to future adjudications. As my paper shows, such an approach creates considerable social costs.[139] Such an approach fails to provide much-needed certainty to industry participants. Network providers still will not know which forms of network management are acceptable, which constrains the evolution of the network more than necessary. Application developers will not know in advance against which discriminatory conduct they are protected. This decision will only be made after they have been discriminated against and gone through a long and expensive process. The resulting uncertainty reduces their incentives to innovate and their ability to get funding. Moreover, an approach that decides ex post whether a specific form of discriminatory conduct is allowed creates high costs of regulation and tilts the playing field against those – end users, low-cost application developers and start-ups – who do not have the resources to engage in extended fights over the legality of specific discriminations in the future. Finally, as the paper shows, deciding the legality of specific discriminatory conduct in individual adjudications is unlikely to lead to decisions that adequately protect the values network neutrality rules are intended to protect.

6. What network neutrality rules should look like

My proposal for a non-discrimination rule and for a reasonable network management exception is set out in question 5k) above. Detailed suggestions for other network neutrality rules are beyond the scope of these comments, but I have written and testified about these questions before[140] and would be happy to discuss them further.

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Thank you for considering these views. Please do not hesitate to contact me at schewick@stanford.edu if you would like to discuss these issues further.

Sincerely,

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[139] See Section "Problems with Case-by-Case Adjudication" in van Schewick (2010a) (attached).
[140] See, e.g., van Schewick (2010b) (overview); van Schewick (2010f) (overview; describing the factors that have fostered application innovation in the past and that a network neutrality regime needs to protect); van Schewick (2012) (non-Discrimination rule and reasonable network management); van Schewick (2010e) (access fees).

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