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Network Non-Discrimination and Quality of Service

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Over the past ten years, the debate over "network neutrality" has remained one of the central debates in Internet policy. Governments all over the world have been investigating whether legislative or regulatory action is needed to limit the ability of providers of Internet access services to interfere with the applications, content and services on their networks.

In addition to rules that forbid network providers from blocking applications, content and services, rules that forbid discrimination are a key component of any network neutrality regime. *Non-discrimination rules* apply to any form of differential treatment that falls short of blocking. Policy makers who consider adopting network neutrality rules need to decide which, if any, forms of differential treatment should be banned. These decisions determine, for example, whether a network provider is allowed to provide low-delay service only to its own streaming video application, but not to competing video applications; whether network providers can count only traffic from unaffiliated video applications, but not their own Internet video applications towards users' monthly bandwidth cap; or whether network providers can charge different Internet access charges depending on the application used, independent of the amount of traffic created by the application.

The precise contours of a non-discrimination rule have *important implications*: Non-discrimination rules affect how the core of the network can evolve, how network providers can manage their networks, and whether they can offer *Quality of Service*.[1]

On Monday, I published a white paper titled *Network Neutrality and Quality of Service: What a Non-Discrimination Rule Should Look Like*. It discusses the relationship between network neutrality, non-discrimination rules and Quality of Service in more detail. The paper:

* 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;

* Offers the first in-depth analysis of the relationship between network neutrality and Quality of Service; and

* Proposes a non-discrimination rule that policy makers should adopt around the world – a rule that the FCC adopted at least in part.

The paper is *relevant to several ongoing policy debates*. Earlier this month, the FCC announced the members of its Open Internet Advisory Committee. The Committee will focus on issues addressed in the FCC's Open Internet rules, such as reasonable network management practices and technical standards. The question of how the FCC's non-discrimination rule affects Quality of Service and other network management practices will feature prominently in these discussions. The legal appeal of the Open Internet Order focuses in part on the substantive merits of the FCC's Open Internet rules, including the merits of its non-discrimination rule. And whether the FCC wins or loses the legal appeal of the Open Internet Order, the question of which, if any, network-discriminations require legal action will remain relevant for years to come. Across the Atlantic, the European Commission and the member states are still exploring what set of network neutrality rules, if any, they should adopt. As part of that effort, the group of European Regulators for Electronic Communication Networks and Services (BEREC) in June started a consultation focused on various aspects of the relationship between

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network neutrality and Quality of Service – the very topics rigorously addressed in this white paper.

This blog post summarizes the paper's most important findings. Alternatively, you can read an even more condensed summary (pdf, scribd, 2 pages), an executive summary (pdf, scribd, 15 pages), or the full paper (pdf, scribd, 64 pages).

A Framework for Evaluating Network Neutrality Proposals and Discriminatory Conduct

Network neutrality proponents generally agree that network neutrality rules should 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 specific set of rules*. The paper proposes a balanced framework for evaluating different options for network neutrality rules, or for examining specific instances of discriminatory conduct.

The framework includes criteria that account for what has made the Internet the robust multi-use platform it is today while preserving industry autonomy and flexibility for network providers to innovate. The specific elements of the framework are as follows:

- Preserve the factors that have allowed the Internet to foster application innovation, improve democratic discourse, facilitate political organization and action, and provide a more decentralized environment for social, cultural and political interaction in which anybody can participate: *User choice, application-blindness, innovation without permission, and low costs of application innovation*. (A short explanation of these factors and why they are important is here (pdf).)
- Not constrain the evolution of the network more than is necessary to reach these goals.
- Make it easy to determine which behavior is and is not allowed to provide much-needed certainty for industry participants.
- Keep the costs of regulation low.

A Proposal for a Non-Discrimination Rule: Ban Application-Specific Discrimination, Allow Application-Agnostic Discrimination

The paper applies this framework to *evaluate existing non-discrimination proposals from a variety of sources*, including academics, industry participants, and policymakers; the proposals have varying degrees of support both in the U.S. and abroad. Those proposals are: Allow all discrimination; ban all discrimination; ban discrimination that would be considered harmful under an antitrust standard; ban discrimination that is anticompetitive or harms users; ban discrimination that is unreasonable; ban discrimination that is not disclosed; ban discrimination among like applications and classes of applications, but allow discrimination among classes of applications that are not alike and application-agnostic discrimination; ban application-specific discrimination, but allows application-agnostic discrimination. (Throughout the paper, "applications" is used as shorthand for "applications, content, services, and uses.")

As the paper shows, only one of the rules realizes the goal of network neutrality regulation while avoiding unnecessary social costs. The rule *bans application-specific discrimination, but allows application-agnostic discrimination*. This is the rule policy makers should adopt.

The proposed rule 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. Technically, the rule reinforces important architectural principles on which the Internet's original architecture was based. During the FCC's Open Internet proceeding, this rule was supported by market participants (including Brad Burnham and Fred Wilson, two leading VCs), network engineers (including David Reed, one of the architects of the original Internet) and non-profit organizations.

Other interesting insights from this section:

- Non-discrimination rules that *ban discrimination that violates an antitrust framework* or *ban behavior that is anticompetitive* are under-inclusive. Since they are based on a different theoretical framework that only considers a narrow range of economic harms, they do not capture many of the instances of discrimination that network neutrality proponents are concerned about.
- 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*.
- *Case-by-case approaches* that leave the decision over which discriminatory conduct should be banned to future adjudications do not provide adequate protection to users and innovators, either. However, the *strategic interests of policy makers and big stakeholders* are aligned in favor of open-ended case-by-case approaches, so it is not surprising that many of the negotiated compromise proposals (e.g., the Google/Verizon legislative framework or the Waxman/Boucher draft bill) focus on this type of approach.

The FCC's Non-Discrimination Rule and Its Impact on Network Providers' Ability to Offer Quality of Service

The Open Internet Order's non-discrimination rule for fixed broadband Internet access *bans discrimination that is unreasonable*, subject to reasonable network management. Whether specific discriminatory conduct is unreasonable will be decided in future case-by-case adjudications. As a result, it is *not immediately apparent which types of differential treatment the rule forbids*. Drawing on a close reading of the text of the order and the results of the paper, the paper sets out the FCC's non-discrimination standard as clarified by the text of the order and shows how it may apply to specific discriminatory conduct, in particular to the provision of Quality of Service.

First, like the analysis in this paper, the Open Internet rules are based on a broad theoretical framework that considers a broad range of economic and non-economic harms. All provisions must be interpreted in light of this framework. The order explicitly rejects attempts to base non-discrimination rules on an antitrust framework. Banning only discrimination that violates the antitrust laws or is "anticompetitive," the order explains, would be too narrow and would not capture all instances of discrimination that the Open Internet rules are concerned about.

Second, as the paper shows, the FCC will evaluate discriminatory conduct under the non-discrimination rule and the reasonable network management exception based on how well they preserve three of the factors used to evaluate alternative options for non-discrimination rules and specific discriminatory conduct throughout this paper: *user choice, application blindness and innovation without permission*. Since the analysis of specific discriminatory conduct throughout this paper was based on the exact same factors, the results of the paper imply how the conduct would fare under the FCC's rules. In particular, they suggest which forms of Quality of Service would be allowed under the FCC's non-discrimination standard as clarified by the text of the order.

Third, while the FCC did not adopt the non-discrimination rule proposed by this paper, the proposal heavily influenced the FCC's non-discrimination rule. 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. Thus, the paper's discussion of application-specific and application-agnostic discrimination can illuminate the rationale underlying the FCC's rule as well as help apply these provisions to specific instances of discriminatory conduct in the future.

Many network neutrality proponents were disappointed by the FCC's Open Internet rules. While they are not perfect, the paper shows that they provide the FCC with a powerful set of tools to protect users and innovators against discrimination by providers of Internet service. In addition, the FCC can rely on the network neutrality conditions governing the C-Block of the 700 MHz Band, purchased by Verizon Wireless, and those in the Comcast-NBC merger agreement. Ultimately, the power of the rules will depend

on the Commission's willingness to live not just by the text of the rules, but by the text and spirit of the full order. As Commissioner Copps put it at the FCC's open meeting in December 2010 at which the Open Internet Order was adopted,

"If vigilantly and vigorously implemented by the Commission—and if upheld by the courts—today's Order could represent an important milestone in the ongoing struggle to safeguard the awesome opportunity-creating power of the open Internet."

Network Neutrality and Quality of Service

Currently, the relationship between network neutrality and Quality of Service is uncertain and contentious. Often, it is *not immediately apparent how a specific non-discrimination rule affects network providers' ability to offer Quality of Service*. To address this problem, the paper explains how eight different non-discrimination rules and the FCC's non-discrimination rule affect network providers' ability to offer Quality of Service.

The network neutrality debate is often framed as a debate for or against Quality of Service. As the 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, the paper offers interesting new insights.

Ban provider-controlled Quality of Service to individual applications within a class of like applications

Most network neutrality proponents agree that allowing network providers to offer Quality of Service exclusively to one or more applications within a class of like applications should be prohibited, and this paper shares that view. 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.

Ban Quality of Service to provider-defined classes of applications, even if the provider treats like traffic alike

By contrast, many network neutrality proponents 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.") 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.[2] 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. 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.

Allow certain forms of user-controlled Quality of Service

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. As the paper shows, 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. Under the *non-discrimination rule proposed by this paper* and the *FCC's non-discrimination rule*, these are the only forms of quality of Service that network providers would be able to offer.

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.

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[1] While the original Internet provides a single best-effort service for all packets (i.e., the network does its best to deliver data packets, but does not provide any guarantees with respect to delay, bandwidth or losses), a network that provides Quality of Service offers different types of service to different data packets.

[2] Internet telephony is sensitive to delay, but e-mail is not, so the two classes of applications are not alike.

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