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FEDERAL COMMUNICATIONS COMMISSION
Office of the Secretary

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Re: Comments Regarding the Notice of Proposed Rulemaking in the Matter of Preserving the Open Internet (GN Docket No. 09-191) and Broadband Industry Practices (WC Docket No. 07-52)

Scott Jordan is a **Professor of Computer Science** at the University of California, Irvine. He is participating in the **Technical Advisory Process** as part of this proceeding. His research focuses on traffic management, including both technical mechanisms and public policy.

The comments here do not necessarily represent the views of anyone but him.

The following comments are presented in the spirit of constructive criticism, intended to inspire improvement of the proposed rules. I agree with the goals stated in the NPRM, but believe that further improvement of the proposed rules can simultaneously increase the likelihood of achieving these goals and decrease the likelihood of negative unintended consequences.

Competition:

Concern: The Commission Goals are focused on promoting competition. However, the proposed rules **do not explicitly encourage the offering of end-to-end Quality of Service (QoS)**. The lack of availability of end-to-end QoS may cripple the competitive offering of many developing and future services.

> Discussion: Some services, such as high quality VoIP and video conferencing, require end-to-end QoS, i.e. QoS that traverses more than one broadband Internet service provider's network. However, the proposed rules neither require nor encourage broadband Internet service providers to peer with each other to offer end-to-end QoS. Internet standards exist that allow broadband Internet service providers to communicate with each other to collaboratively provide end-to-end QoS. However, for end-to-end QoS to be offered, providers must be able to obtain QoS from each other.
>
> Furthermore, a few aspects of the proposed rules may even discourage end-to-end QoS. Under the proposed rules, if multiple broadband Internet service providers agree to collaborate to offer end-to-end QoS, it is unclear whether the proposed rules permit them to honor the QoS requests of each other, and if so, whether the proposed rules permit them to charge peering providers for this service.
>
> **Idea #1:** Principle #4 could be modified to explicitly state that if a provider of broadband Internet access service uses QoS to support its own services, then it **should make available such QoS at reasonable prices to its own subscribers and to the provider's peering providers**.[1]

Concern: If a broadband Internet access service provider does offer QoS to its own subscribers, the proposed rules **do not prohibit the provider from offering QoS at unreasonable rates**. This may allow a provider to favor its own QoS-enabled services over those of competing application providers.

> Discussion: Increasingly, broadband Internet access service providers use QoS to increase the quality of their own voice and/or video services. However, even if such QoS was offered directly to the provider's subscribers so that these subscribers could obtain equal quality voice and/or video service from competing application providers, the proposed rules do not require the QoS to be offered at reasonable rates.

[1] The term "peer" is used here to include both transit arrangements and settlement-free peering. The rules should encourage broadband Internet service providers that have settlement-free peering to incorporate settlement-free honoring of each other's QoS requests. Similarly, the rules should encourage broadband Internet service providers that have a transit for payment relationship to honor each other's QoS requests as part of the transit contract and corresponding payment. With respect to charges, if a broadband Internet access provider uses QoS to support its own services, then it should make available to its residential and business subscribers QoS at reasonable prices. I envision this offering would likely be in the form of a QoS add-on option to a broadband service plan for a small additional fee. The fee would entitle the subscriber to QoS treatment for a specified amount of user-marked packets, and would cover the costs of QoS within the service provider's network as well as any QoS transit charges that the provider may incur.

Idea: Reasonable rates would be ensured by Idea #1 above, which requires both the offering of QoS and at reasonable rates.

Concern: The NPRM seems to be primarily concerned (as it should) with traffic management practices that can be implemented only by broadband Internet access service providers. However, the proposed rules may be interpreted as applying to traffic management practices that can be competitively offered by many other non-facilities based providers.

Discussion: Traffic management practices that are implemented at or above the transport layer, e.g. caching of content, can be implemented not only by a broadband Internet service provider but also by competing non-facilities based providers. Because competition is already present, the proposed rules need not apply.

Idea #2: The rules could be modified to explicitly **apply only to traffic management practices that are implemented below the transport layer**. The definition of broadband Internet access service should be modified to encompass only services that reside below the transport layer or are required to manage the network. Access to lower layer Internet services such as QoS should then be guaranteed (on a nondiscriminatory basis or without unreasonable discrimination) to all high layer services and applications.

Managed Services:

Concern: The intent of creating a category of *Managed Services* seems to be to allow implementation of QoS to enable high quality services. However, if Managed Services are not subject to the same rules as unmanaged services, then providers of broadband Internet access service **may be allowed to implement QoS solely to support their own *Managed Services***. This would completely undermine the Commission's goal of promoting competition in services that require QoS.

Discussion: Increasingly, broadband Internet access service providers use QoS to increase the quality of their own voice and/or video services. For instance, many cable providers use QoS for their own VoIP subscribers' voice traffic, and telephone companies are increasingly using QoS to support their video services. If these VoIP and video services as designated as *Managed Services*, then these providers may choose not to offer QoS directly to their subscribers for use with other *unmanaged services*. As a result, if the subscribers obtain voice or video services from providers other than their broadband provider, then they will not experience the same quality.

Idea: **The need for a separate class of Managed Services can be eliminated** using Idea #2 above, by refining the rule on nondiscrimination to apply to *all traffic management practices implemented below the transport layer*. With this refinement, broadband Internet access providers would be allowed to implement QoS below the transport layer to support voice and video services without being required to designate such services as *Managed Services*. However, using Idea #1, if a broadband Internet access service provider uses QoS to support its own services, then it would be required to make available QoS at reasonable prices to its own subscribers and to the provider's peering providers.

Concern: **Any definition of a category of *Managed Services* is unlikely to survive** as the Internet, telephone networks, cable networks, and wireless networks continue their long-term trend toward technology convergence.

Discussion: For at least 25 years, there has been a trend toward technology convergence of the Internet, telephone networks, cable networks, and wireless networks. Although lower layer protocols will continue to differ based on the characteristics of the physical connection, these four types of networks will continue to converge at the IP layer and above, and to offer an increasingly similar set of highly diversified services and applications. This convergence makes me very skeptical that one can define a category of Managed Services in a manner that will not quickly become obsolete as new services and applications are created.

Idea: **The need for a separate class of Managed Services can be eliminated** using Idea #2 above. With proper definitions, the rules can be equally applied to all forms of broadband Internet access, independent of the technology used and independent of the applications supported. An exception can be made when QoS is used solely to support services that fall under Title VI of the Communications Act.

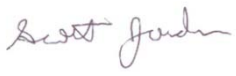
Wireless Networks:

Concern: The Commission wishes the proposed rules to have broad application, but the NPRM is **unsure how the rules should apply to wireless networks**. If the rules for wireless networks are different than for wired networks, there is a significant danger that wireless network rules could be too lenient, resulting in a lack of competition in wireless network applications. There is also a danger that wireless network rules could be too stringent, resulting in crippling of efficient wireless network traffic management.

Discussion: Although wireless networks require substantially greater traffic management than wired networks, these differences occur only below the transport layer. Therefore, the same rules should apply to wireless and wired networks, and the *application of the rules* to wireless and wired networks **should only differ below the transport layer**.

Idea: The proposals given in Idea #1 and Idea #2 above can also address this concern effectively, since the rules can be equally applied to all forms of broadband Internet access, independent of the technology used. Wireless networks may use more stringent traffic practices below the transport layer, but these would not violate any of the proposed rules. Wireless networks, as with wired networks, should allow access to lower layer QoS through an interface at the IP layer. Such an interface would then allow wireless broadband Internet access service providers to practice efficient and effective traffic management, without the need for them to prohibit particular applications or prohibit tethering.

Respectfully submitted,



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