Política Económica y Regulatoria en Telecomunicaciones

Regulatory and Economic Policy in Telecommunications

Núm. 7 | nov'11

Revisión de los Fundamentos Económicos Aplicados a la Regulación de los Mercados de Comunicaciones Electrónicas

Gabinete de Estudios de Economía de la Regulación (GEER)
Dirección de Regulación y Relaciones Sectoriales
Telefónica España

Telefónica

The impact of multisided markets on the debate over optional transactions for enhanced delivery over the Internet

J. Gregory Sidak
(Chairman, Criterion Economics L.L.C and Ronald Coase Professor of Law and Economics, Tilburg Law and Economics Center (TILEC))

Resumen

La regulación de Internet supone un nuevo campo en la regulación mundial de las telecomunicaciones. En el centro del debate sobre la regulación de Internet está la llamada regulación de la "neutralidad de red", que es una serie de recomendaciones políticas que tienden a limitar la capacidad de los operadores de red de gestionar su tráfico. Una de las políticas más controvertidas de la regulación de la neutralidad de red es la prohibición de la opción de transacciones "business-to-business" entre los proveedores de servicios de banda ancha de Internet (ISP) y los proveedores de contenido para mejorar la calidad de servicio (QoS) en la entrega de paquetes a través de Internet. Los responsables políticos deben tener en cuenta adecuadamente las implicaciones de la naturaleza multilateral de los mercados de banda ancha sobre los riesgos y ventajas de las transacciones opcionales con calidad de servicio mejorada. Debido a que el mercado de acceso de banda ancha es multilateral, los acuerdos entre negocios para dar una calidad de servicio mejorada reforzarían los efectos positivos de red y disminuiría las externalidades negativas. Por otra parte, estos mercados de varias caras evitan que los operadores de redes tengan el incentivo a perjudicar o discriminar a determinados contenidos, obviándose este aspecto en la regulación de la neutralidad de red.

Abstract

A new arena of global telecommunications regulation is regulation of the Internet. Central to the debate over Internet regulation is so-called "network neutrality" regulation, which is a series of policy prescriptions that would restrict the ability of network operators to manage network traffic. One of the more controversial policies of network neutrality regulation is a ban on optional business-to-business transactions between broadband Internet service providers (ISPs) and content providers for enhanced quality of service (QoS) in the delivery

of packets over the Internet. Policy makers must adequately consider the implications of the multisided nature of broadband markets on the risks and merits of optional transactions for enhanced QoS. Because the market for broadband access is multisided, business-to-business transactions for enhanced QoS would foster positive network effects and diminish negative externalities. Furthermore, multisided markets prevent network operators from having the incentive to harm or discriminate against certain content, obviating this facet of network neutrality regulation.

1. Introduction

The new battle in telecommunications regulation—said by some to decide the future of the Internet—centers on an arcane notion dubbed "network neutrality." Based on theories that innovation in Internet content and applications is threatened by Internet service providers' (ISPs') network-management practices, proponents of network neutrality regulation have called for regulations that would ban network operators from blocking certain content and charging content and application providers for higher quality transmission across their networks (known as quality of service, or QoS). The issue has sparked a decade-long debate involving top industry players and scholars in law and economics. The question of whether telecommunications regulators should ban network operators and content providers from entering into optional business-to-business transactions for QoS has become the center of the network neutrality debate.

However, proponents of network neutrality regulation ignore that, due largely to the multisided market for broadband access, permitting network operators to charge content providers for enhanced QoS in optional, voluntary transactions would foster innovation in both network infrastructure and Internet content and applications. Moreover, because complementary demand for broadband and content exists, network operators have no incentive to impede the development of Internet content.

Regulators should support policies that promote positive network effects and reduce negative network externalities. Network effects exist when demand for a service increases as the size of the network increases. By increasing broadband penetration, optional transactions for QoS foster positive network effects. Charging content providers instead of end users for QoS would yield a Pareto efficient outcome because content providers are more willing and able to pay for enhanced QoS than are end users. Permitting optional business-to-business transactions for QoS would also help network operators recover their sunk investments, which would promote innovation in the core of the network. Proponents of network neutrality regulation justify a ban on optional business-to-business transactions for QoS by arguing that such transactions would hinder innovation in Internet content and applications. Consequently, they argue, such transactions would reduce positive spillovers to end users created by Internet content. However, business-to-business transactions for QoS would not threaten positive spillovers from content, because innovation in network infrastructure promotes innovation in content and applications. Conversely, without network capabilities that can support bandwidth-intensive Internet applications, end-user demand for those applications is limited.

In addition to fostering positive network externalities, policy makers aim to reduce negative externalities. A ban on business-to-business transactions for QoS would exacerbate negative network externalities. If enhanced QoS were free, content providers would be more likely to overconsume bandwidth, which would worsen network congestion and thereby degrade the quality of service for all content and applications, particularly those applications that are latency sensitive, such as real-time video. Optional business-to-business transactions for QoS would create a market mechanism to mitigate such network congestion.

Finally, proponents of network neutrality regulation argue that in business-to-business transactions for QoS, network operators would ignore content-related spillovers and thus overcharge for enhanced QoS, which would reduce investment in content. However, because of the complementary demand between broadband access and Internet content, network operators would have the incentive to internalize such positive spillovers. Again, increasing demand for content would increase demand for broadband access. Therefore, network operators have the incentive to promote investment in and demand for Internet content. The multisided market for broadband access should mitigate regulators' concerns for innovation in Internet content.

2. The Multisided Market for Broadband

Telecommunications services have joint demand. For example, a telephone call is valued by both the caller and the recipient, and a visit to a website is valued by both the consumer doing the browsing and the owner of the website. In a "two-sided" market of this sort, the demand that one party has for the product is complementary to the demand that the other party has.[1] Over-the-air television programs are free to the viewer because advertisers pay broadcasters to assemble audiences to receive advertisements. Google searches are free to Internet users because Google sells highly focused advertising that responds to the interests revealed by the Internet user's search request. The owner of a broadband network faces a multisided market because it needs content providers to supply content and applications on the Internet, and it also needs end users to demand access to the Internet content. In this way, a network operator can be considered an intermediary that brings together two parties —the end user and the content provider— to an exchange that occurs over the Internet.

In the multisided market for broadband access, complementarity of demand exists among the network, content, applications, and devices. Network operators rely on Internet content, applications, and devices to attract end users to subscribe to Internet access. Email was the "killer-application" that generated the demand for dial-up Internet access. Without email, there would have been significantly less need for dial-up Internet access. Downloading graphics-intensive images and videos was made possible by broadband connections, but broadband penetration did not really accelerate in the United States until the price of broadband access approached the price of dial-up access and a second telephone line.

3. Should Content Providers or End Users Pay for Enhanced QoS?

Both content providers and end users benefit from, and thus have complementary demand for, use of the broadband network. When a consumer uses the network to search on Google, the search is valued by both the user, who gains information, and by Google (the content provider), which earns advertising revenues. Both sides of the market exhibit positive demand for broadband use, and both sides should therefore pay a positive price. The same principle applies to specific network features, such as enhanced QoS in the delivery of data packets over the Internet.

If the quality of an application such as video conferencing would improve from enhanced QoS, both the end user and the content provider are willing to pay for this service. The user enjoys a superior broadband experience, and the content provider benefits from increased demand for its product as a result of the improved end-user experience. Figure 1 depicts the demand for priority delivery. If, as a consequence of network neutrality regulation, only end users are permitted to pay for priority delivery, then end users would purchase only a limited quantity of prioritized packets, Q_1. If the content provider is permitted to pay for enhanced QoS, then a higher quantity, Q_2, of prioritized packets would be purchased, which results in a larger consumer benefit. Additionally, allowing content providers to pay for service would help contribute to covering the sunk costs borne by network operators, thus increasing their incentives to invest and innovate.

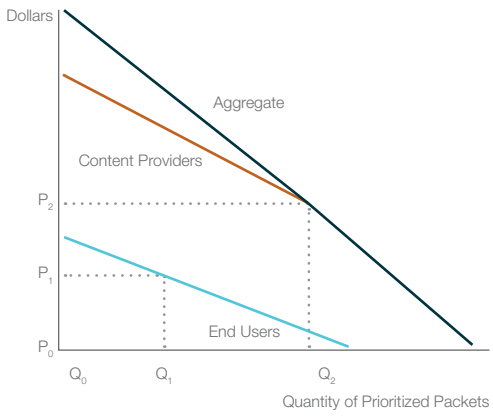

Figure 1: The Multisided Market for Enhanced QoS

Content providers are also in a better position to pay for enhanced QoS than end users. Network operators can achieve lower transactions costs by contracting with content providers rather than end users, because there are significantly fewer content providers than end users, and therefore fewer negotiations required. End users have high

(1) See, e.g., David S. Evans, *The Antitrust Economics of Multi-Sided Platform Markets*, 20 Yale J. on Reg. 325 (2003); Jean-Charles Rochet & Jean Tirole, *Platform Competition in Two-Sided Markets*, 4 J. Eur. Econ. Ass'n 990 (2003). The seminal article on two-sided markets is William F. Baxter, *Bank Interchange of Transactional Paper: Legal and Economic Perspectives*, 26 J.L. & Econ. 541 (1983).

uncertainty regarding which applications they will use and which applications will require enhanced QoS. In contrast, content providers have a better understanding of whether the applications they offer require real-time delivery.

Ramsey pricing indicates that the price (more precisely, the markup above marginal cost) for products sharing common cost should be based on the inverse of the elasticity of demand. If content providers are less price-sensitive than end users, as depicted in Figure 1, then it is optimal to charge content providers a higher share of the common cost for enhanced QoS. There is no economic reason why end users should cover all the costs of the network when both parties benefit from its use. Furthermore, the economic literature on two-sided markets recognizes that increasing the overall level of charges to one side results in rate reductions on the other side, regardless of the competitiveness of the market.[2] Thus, even a monopolist network operator would reduce rates to one side of the market if, concomitantly, it charged higher rates to the other.

The multisided market for broadband delivery therefore has significant implications for achieving Pareto improvements. Conditional on content providers and advertisers having a greater willingness to pay for enhanced QoS than end users, the ability to charge content providers (and their advertisers) for enhanced QoS of data packets would generate a greater quantity of prioritization and a correspondingly greater level of consumer surplus. This economic insight is hardly new. Robert Crandall and I made this identical point in 1995 concerning universal service policy for (then-unbuilt) interactive broadband networks:

> [P]olicymakers should consider that advertisers are, in a manner of speaking, a potential source of subsidies for access to, and usage of, interactive broadband networks. Advertisers, of course, have long subsidized the consumption of "free" programming offered by radio broadcasters and over-the-air television stations. Similarly, the presence of advertising on cable television enables consumers to pay a lower subscription fee than they otherwise would be charged. Moreover, the interests of advertisers are closely aligned with those of consumers of programming in the sense that both groups seek policies that expand output and reduce prices for telecommunications services of all kinds, irrespective of the technological mode of signal delivery. Regulation that restricts output in telecommunications markets impairs the welfare of both viewers and advertisers. This commonality of interests arises from the fact that the demand for broadcast programming—and, by extension, the demand for interactive broadband services—is the vertical summation of two demand curves: the viewers' demand for programming and the advertisers' demand for audiences. As in the case of any multiproduct firm, the provider of interactive broadband services will likely have common fixed costs of production that are high relative to the incremental costs of programming or infrastructure deployment. Those common fixed costs are optimally distributed in inverse relation to the elasticity of demand. Access charges and usage charges can be borne either by the advertiser or the subscriber. If, however, the advertiser has the more price-inelastic demand, it is optimal from the perspective of economic efficiency for the advertiser to bear the disproportionate share of those costs. This result may also be considered equitable in the sense that it advances the goal of universal service by keeping the prices of access to, and usage of, interactive broadband networks lower than they would be in the absence of advertiser support.[3]

In short, each party in a multisided market can contribute to the recovery of the sunk costs required to build a broadband network. There is certainly no basis in economic theory to presume that it would be socially optimal for end users to pay for the entire cost of building a high-speed broadband network while the companies that deliver content or applications to those same end users over that network —and therefore derive substantial economic advantage from its use— pay nothing.

The ability to charge content providers for enhanced QoS in optional business-to-business transactions would also increase economic welfare by increasing broadband penetration, because it would enable network operators to

(2) See, e.g., Evans, *supra* note 1; Rochet & Tirole, supra note 1; Baxter, *supra* note 1.
(3) Robert W. Crandall & J. Gregory Sidak, *Competition and Regulatory Policies for Interactive Broadband Networks*, 68 S. Cal. L. Rev. 1203, 1219-20 (1995).

subsidize access prices for income-constrained or price-sensitive end users who currently forgo broadband entirely. Such marginal customers tend be minorities with lower incomes and less education, relative to the overall population.[4] By charging content providers for enhanced QoS in voluntary transactions, a broadband network operator could recover sunk costs, reduce prices to consumers, and subsidize access to more price-sensitive customers, thereby increasing overall broadband penetration.

4. Promoting Positive Network Effects and Minimizing Negative Network Externalities

Regulators should seek to promote positive network effects while mitigating negative network effects. Positive network effects accrue as broadband penetration rises. Optional business-to-business transactions for QoS would increase broadband penetration and therefore increase network effects. Proponents of network neutrality regulation have argued that charging for enhanced QoS would reduce investment in Internet content, presumably because it would raise the cost of supplying new content. However, permitting network operators to charge for enhanced QoS in voluntary business-to-business transactions would encourage investment in network infrastructure, which would promote investment in content.

a. The Goal of Increasing Positive Network Effects

One of the most important results from the literature on network economics is the creation, in some product markets, of network externalities.[5] Positive network externalities are benefits to society that accrue as the size of a network grows. For example, an individual consumer's demand to use (and hence her benefit from) a telephone network increases with the number of other users on the network whom she can call or from whom she can receive calls.[6] Some telecommunications regulations, such as policies promoting universal service, are justified as a means to capture, for consumers as a whole, the benefits of network externalities that accrue as the size of the network grows.[7] Such externalities will vary with both the number of consumers having access to the network and the amount by which each consumer uses the network.

This economic relationship has substantial public policy implications, as it is essential that legislators adequately consider the positive network effects that could be eliminated by potential regulatory actions. In terms of proposed network neutrality regulation, as explained above, pricing policies that produce Pareto improvements that increase the size of the broadband Internet network should be encouraged, not prohibited. Thus, the ability of optional business-to-business transactions for QoS to increase the size of the broadband network through the multisided market for broadband delivery weighs against a ban on such transactions.

b. Positive Network Externalities at All Levels of the Internet Value Chain

The multisided nature of the broadband market means that both end users and content providers benefit from improvements in broadband delivery. Therefore, both end users and content providers benefit from innovations in network infrastructure. Proponents of network neutrality regulation have focused on the effects of optional business-to-business transactions for QoS on spillovers created by Internet content and applications. They argue that permitting network operators to charge for enhanced QoS would reduce the supply of Internet content and thereby reduce positive spillovers accruing from Internet content. However, although innovation in content produces spillovers, so does infrastructure innovation and broadband adoption by end users. In particular, when a network operator makes investments in bandwidth, capacity, or efficient routing to improve its services, those investments benefit not only its subscribers and non-subscriber end users whose messages may be routed through the network operator's system, but also content providers that supply

(4) *See, e.g.*, Fed. Commc'n Comm'n, Connecting America: The National Broadband Plan 5 (2010); J. Gregory Sidak, *A Consumer-Welfare Approach to Network Neutrality Regulation of the Internet*, *2 J. Competition* L. & Econ. 349, 467 (2006).
(5) The seminal paper in the literature on network effects is Jeffrey Rohlfs, *A Theory of Interdependent Demand for a Communications Service*, 5 Bell. J. Econ. & Mgmt. Sci. 16 (1974).
(6) *See, e.g.*, Massimo Motta, Competition Policy: Theory and Practice 82 (Cambridge Univ. Press 2004); Lester D. Taylor, Telecommunications Demand in Theory and Practice 9 (Kluwer Academic Press 1994); Bridger M. Mitchell & Ingo Vogelsang, Telecommunications Pricing: Theory and Practice 11 (Cambridge Univ. Press 1991); Jean Tirole, The Theory of Industrial Organization 405 (MIT Press 1988); Stanley J. Liebowitz & Stephen E. Margolis, *Network Effects*, 1 Handbook of Telecommunications Economics 76 (Martin E. Cave, Sumit K. Majumadar & Ingo Vogelsang eds., 2002).
(7) *See, e.g.*, Milton L. Mueller, Jr., Universal Service: Competition, Interconnection, and Monopoly in the Making of the American Telephone System (MIT Press & AEI Press 1997).

content to such subscribers. Both ISP subscribers and content providers that send their data over the network operator's equipment typically receive consumer surplus, in that the value that they receive exceeds the price that they pay. Investment by network operators thus creates "spillover" benefits that the network operators do not capture entirely.

All of these spillovers, not only the spillovers on which proponents of network neutrality regulation focus, should be considered in assessing the social welfare impacts of any proposed regulation of network operators' network-management practices. Optional business-to-business transactions for QoS encourage innovations in network functionality that increase the efficiency of packet delivery. Such enabling innovation encourages and facilitates innovation in real-time and other latency-sensitive content and applications. Proponents of network neutrality regulation have provided no explanation as to why it is necessary or desirable to subsidize content providers whose offerings yield spillover benefits without it being similarly desirable to subsidize ISPs whose offerings likewise yield such benefits.

c. The Goal of Reducing Negative Network Externalities

When economists speak of network externalities, they usually refer to positive spillovers that arise from higher levels of network access and usage. Economists have given less attention to the negative externalities resulting from higher levels of telecommunications network usage. Nonetheless, negative network externalities relating to congestion plainly arise, notwithstanding the conventional view that networks have such expansive economies of scale that capacity is seemingly unlimited. Telecommunications networks are certainly susceptible to congestion. For that reason, correct price signals must be used at every possible point in the network so that users who congest the network bear the social cost of their behavior.[8] If, instead, the owner of a broadband network were constrained to charge the same price to every content provider, regardless of the amount of network congestion that the content provider created, the result would be excess demand and reduced supply—which is to say, shortages of bandwidth and slower transmission speeds.

Internet users are increasingly straining the capacity of broadband networks. For example, peer-to-peer applications were first used to share music files, but have since expanded into other uses. In March 2006, the European Center for Nuclear Research (CERN) in Geneva, the world's largest particle physics laboratory and birthplace of the World Wide Web, banned the use of the Skype voice over Internet protocol (VoIP) service.[9] Among CERN's reasons for blocking Skype were (1) Skype's procedure of relying on users' computers for processor speed and Internet bandwidth to route traffic to store database information, and transforming some computers into so-called "supernodes" that carry disproportionately large burdens, (2) the potential security risks associated with Skype's ability to pass calls through firewalls, and (3) the existing or potential legal ramifications for passing a large amount of telecommunications traffic.[10] Other large institutions and corporations around the world —including the multinational pharmaceutical company Novartis, universities in the United Kingdom and the United States, and European government agencies— barred Skype for similar reasons.[11] CERN's decision to block Skype suggests that network owners may have legitimate reasons to block certain services, such as peer-to-peer applications, based solely on their effect on computer performance and network integrity.

While emphasizing positive network externalities, proponents of network neutrality regulation ignore negative network externalities, especially those relating to congestion. Network capacity is a limited resource. Users who create congestion should internalize the social cost of their behavior. Price signals help achieve that efficient allocation. Suppose that content providers were forbidden to pay broadband ISPs for enhanced QoS of the performance-sensitive content they send to the ISPs' other customers. In the unlikely event that network operators agreed to enhance the QoS of certain traffic anyway at

(8) *See* Christopher S. Yoo, *Network Neutrality and the Economics of Congestion*, 94 Geo. L.J. 1847 (2006); J. Gregory Sidak & Daniel F. Spulber, *Cyberjam: The Law and Economics of Internet Congestion of the Telephone Network*, 21 Harv. J.L. & Pub. Pol'y 327 (1998).
(9) Bruno Giussani, *The Fine Print*, Wall St. J. Eur., Mar. 29, 2006.
(10) *Id.*
(11) *Id.*

the behest of particular content providers, all such providers would have powerful incentives to over-consume QoS resources by always signaling to the ISP that their traffic is performance-sensitive and should therefore be prioritized. In other words, they would disregard the costs to the network of supplying enhanced QoS, including the opportunity costs of reducing shared bandwidth available for other content that may have a greater need for enhanced QoS to create greater social value —as price signals would have shown, had they been allowed. At a price of zero, what provider of content or applications would not demand enhanced QoS? The only economically efficient way to allocate finite QoS resources to content that needs them in the manner that consumers value most is to allow the market to attach prices to them to signal scarcity and cost to market participants.

5. Would Business-to-Business Transactions for QoS Reduce Innovations in Content?

Internet content generates positive spillover effects to end users. Proponents of network neutrality regulation justify a ban on optional business-to-business transactions for QoS on the notion that network operators would fail to account for, or internalize, content-related spillovers when setting prices for QoS. Consequently, the price of enhanced QoS would be prohibitive, discouraging content providers from bringing content to the Internet marketplace or investing in content. The multisided market for broadband delivery gives network operators the incentive to internalize those positive content-related spillovers, contrary to the fears of proponents of network neutrality regulation.

The complementary demand in the multisided market for broadband access and Internet content obviates a ban on business-to-business transactions for QoS. It is a well-established economic principle that if the demand for A increases with the demand for B, then even a monopoly provider of A would have absolutely no incentive to harm the demand for B. Given the strong complementarity of demand for broadband access and broadband content, network operators have no incentive to harm the demand for Internet content, applications, or devices, because to do so would harm the demand for broadband access. Network operators in the United States have invested billions of dollars to build third-generation and fourth-generation Internet access networks. One feature of these "core" networks is to allow for enhanced QoS for real-time applications, whatever they eventually might be. It would be foolish for a network operator to stymie the development of, and the demand for, real-time applications. Doing so would squander billions of dollars in sunk investments.

The conjecture that network operators would disregard positive content-related externalities entirely in setting prices for enhanced QoS services is unsupported. Because such positive externalities exist, network operators have the incentive to internalize positive spillovers in optional business-to-business transactions for QoS. This logic, formalized by Joseph Farrell and Philip Weiser in their development of the concept of "internalization of complementary efficiencies" (ICE), holds even in a market with a monopolist network operator.[12] Rivalry between network operators —cable broadband and telephone DSL providers, for instance— further enhances this incentive. Each network operator competes for the other's customers by striving to offer a better quality experience to consumers. In other words, they have no incentive to degrade their services or induce quality-adjusted price increases that could diminish the supply of Internet content.

The incentive to internalize positive spillovers is not unique to broadband Internet access services. In markets with network effects and demand complementarities, firms typically have incentives to internalize complementary externalities. One such example is the wireless industry, where providers attract customers to their networks by promoting the latest technology in wireless devices and compatible applications. Although wireless carriers typically do not produce these devices and applications themselves, they nonetheless promote them because wireless access and wireless phones and applications are complements. As a result, the number of applications available to wireless service customers —offered by handset manufacturers, wireless service providers, and third-party operators—

(12) Joseph Farrell & Phil Weiser, *Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age*, 17 Harv. J.L. & Tech. 85, 89 (2003).

has increased dramatically over the last decade, notwithstanding the absence of legally binding and enforceable price regulation on wireless network operators. For example, Figure 2 shows the growth in the number of applications available for download on Apple's iPhone App Store. Apple launched its application store in July 2008 with 500 third-party applications available for download.[13] By the end of July 2009, Apple's App Store offered more than 65,000 applications.[14] As of July 2011, the App Store included more than 425,000 applications.[15]

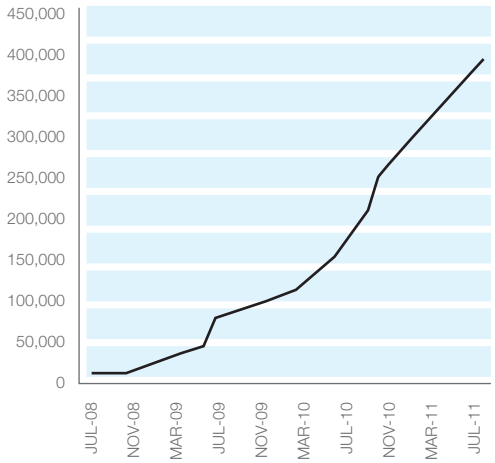

Figure 2:
iPhone Applications available for download, July 2008-July 2011

Source:
Press Release Library, Apple Inc., http://www.apple.com/pr/library

Due to complementary demand for broadband delivery and Internet content, one would expect that network operators would similarly promote the growth of innovations in content and applications.

6. Conclusion

Broadband network operators face a multisided market. End users have complementary demand for broadband access and Internet content. Although proponents of network neutrality regulation advocate a ban on option transactions between network operators and content and application providers for QoS on the rationale that such transactions would impede the development of content, the multisided market for broadband delivery ensures that network operators have incentive to foster innovations i n content. Doing so would increase demand for broadband access. Permitting optional business-to-business transactions for QoS would not reduce investment in Internet content.

Furthermore, permitting content providers to purchase enhanced QoS would contribute to network operators' recovery of sunk investments in their networks. Because content providers are better positioned than end users to pay for QoS, optional business-to-business transactions for QoS would promote investment in network infrastructure. Innovations in the network would further support innovation in real-time applications. Telecommunications regulators considering regulation of broadband networks must account for the ramifications of the multisided market for broadband when assessing proposals to ban optional business-to-business transactions for QoS. By permitting practices such as optional business-to-business transactions for QoS that increase broadband adoption, regulators would reduce negative network externalities such as network congestion while promoting positive network effects.

(13) Press Release, Apple Inc., iPhone 3G on Sale Tomorrow (July 10, 2008), http://www.apple.com/pr/library/2008/07/10iphone.html.
(14) Press Release, Apple Inc., Apple's App Store Downloads Top 1.5 Billion in First Year (July 14, 2008), http://www.apple.com/pr/library/2009/07/14apps.html.
(15) *See* Press Release, Apple Inc., Apple's App Store Downloads Top 15 Billion (July 7, 2011), http://www.apple.com/pr/library/2011/07/07Apples-App-Store-Downloads-Top-15-Billion.html.