



# The Economics of Net Neutrality

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Politicians, businesses, techies, consumer groups, and wide swaths of academia used to agree on one government policy: “Hands off the Internet!” Ironically, though, many of these groups, including Google, Amazon, and Microsoft, today want the government regulators to set key prices to zero in the name of “net neutrality.”

Today’s uproar results because some broadband Internet providers like Verizon, AT&T, and Comcast want to try charging content providers like Google for sending information

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to consumers over their lines. They have also suggested creating special Internet “fast lanes” for particular sites with high-bandwidth needs, such as streaming video, movies and the like. Critics fret that this could be the end of the Internet as we know it. Proponents say that it may help fund infrastructure expansion and promote new innovation by ensuring delivery for time-sensitive and quality-sensitive services.

Net neutrality has no widely accepted precise definition, but usually means that broadband service providers charge consumers only once for Internet access, do not favor one content provider over another, and do not charge content providers for sending information over broadband lines to end users.

In other words, “net neutrality” is actually a friendly-sounding name for price regulation.

We fear that such regulation could substantially reduce investment incentives, distort innovation, and ultimately harm consumers. The government must weigh policy choices carefully: are the benefits of price regulation likely to exceed its costs? We believe that the history of price regulation clearly teaches us that the answer is likely to be no (see, for example, Paul Joskow and Roger Noll’s overview of regulation).

## THE ISSUES

Most net neutrality advocates would grant providers some pricing flexibility that might be thought of as “non-neutral.” It is acceptable, for example, to price customer bandwidth capacity differently. That is, they agree that a broadband provider should be allowed to charge different prices for slow, medium, and

high speed connections. Some proponents also believe that certain application-specific tiering should be allowed. So, for example, broadband providers might be allowed to charge consumers differently for bandwidth-intensive applications.

But that's where agreement ends.

Net neutrality advocates argue that it should be illegal for broadband service providers to charge content providers for sending data down the broadband provider's high-speed lines—no matter how much bandwidth that content uses. And while they might allow tiering by content type, net neutrality advocates would make it illegal to provide fast-lanes for particular sites. That is, they might allow a “video tier” but would not allow exclusive fast-lane access to a particular video provider.

The companies that supply high-speed Internet connections to consumers, like Verizon, Comcast, and AT&T, see it differently. They argue that other companies should not necessarily be allowed to use their property for free, and that they should be allowed to use flexible pricing mechanisms.

This rancorous debate has made its way into

Congress. While some net neutrality proposals have been rejected, advocates continue to bring it back. Among other things, proposed legislation generally would mandate that broadband providers exercise no control over the content that flows over their lines and would bar providers from charging for higher-quality services or prioritizing transmission.

We believe that mandating net neutrality would be inconsistent with sound economic management of the Internet. A mandate would erode incentives to provide broadband Internet access and could prevent new applications or services from ever being developed. Instead of imposing net neutrality, government should remove artificial regulatory barriers that slow the development of broadband and other information technology services. Examples of such barriers include limitations placed on the use of spectrum and anticompetitive local rules, which limit the number of broadband providers and dictate the kinds of services providers can send over their broadband lines. Removing these barriers would encourage investment in broadband infrastructure and stimulate competition. Where there remains insufficient competition, the government's

existing antitrust authority is a sufficient tool to police Internet providers' behavior.

## THE ECONOMICS OF BROADBAND

It is useful, but oversimplified, to think of the Internet in four parts: Content providers like Google, Amazon, and eBay; the Internet backbone networks managed by a host of companies including Level3, AT&T, Sprint, Verizon, and Qwest; broadband service providers like AT&T, Verizon, and Comcast; and end-users—that is, consumers and business.

The Internet backbone remains largely unregulated. For the Internet to function, a large number of networks must interconnect. Network operators agree on interconnection prices through market negotiations. Interconnecting network operators that cover comparable geographic areas and send similar amounts of Internet traffic out of their networks relative to the amount of Internet traffic they receive often carry each other's data for no charge. Providers with imbalanced traffic—for example, a web-hosting firm that primarily sends data out but receives very little—typically pay backbone operators to connect to their networks.

Broadband service pricing also is currently unregulated. The policy debate about net neutrality is really about whether it should be regulated. Net neutrality advocates implicitly say that broadband providers must charge content providers a price of zero and must charge end-users only in certain, prescribed ways.

#### **MANDATING NETWORK NEUTRALITY COULD HARM CONSUMERS**

Until now, content providers have generally not been charged by the companies that bring Internet content to consumers. Net neutrality advocates argue that the current pricing arrangement is in part responsible for the tremendous growth of the Internet. They suggest that the current system, in which everyone connected to the Internet has the same opportunity to reach everyone else, stimulates entrepreneurship and free expression. Larry Lessig, an intellectual leader of the movement, has claimed that the Internet's 'end-to-end' architecture—in which the network is like a simple pipe that connects intelligent applications—has created an ideal environment for innovation (Lessig 2006).

The proponents of the end-to-end view believe that this architecture is a key to the explosive growth in innovation in Internet applications ranging from Amazon to YouTube and therefore, the architecture must be maintained. We take a different view. While we believe there should be appropriate incentives for application innovation, we believe such innovation could be even better for consumers if it could respond to price signals from platform providers, such as broadband producers. So, for example, innovators might take into account potential congestion costs of bandwidth-intensive applications.

The debate is unlikely to be settled anytime soon. As Bruce Owen and Gregory Rosston have pointed out, we simply don't know whether the current setup has been more beneficial than others. Moreover, we have no easy way of comparing what would happen if providers of new high-speed technology were not allowed to charge content providers or create fast lanes with other alternatives.

We do know, though, that mandating net neutrality amounts to price regulation. In this case, the regulation would state, in part, that broadband providers charge content providers a

price of zero. In the short run, such a regulation could help certain groups. The Googles and Amazons of the world would be happy, since they could continue serving customers without paying for the expensive "last-mile" infrastructure needed to reach their homes. Furthermore, as Lessig and others point out, some innovators, like the Indian immigrant who pioneered web-based email, may be able to get their products to market more cheaply. While that benefit is real, so, too, are the costs imposed by price regulation. And price regulations become increasingly costly by distorting investment and innovation.

For example, net neutrality advocates generally abhor the idea of Internet "fast lanes" in which content providers could ensure priority delivery of their content if they were willing to pay for it. Yet, we know a demand for this general type of service exists. This is one reason people and businesses are willing to pay more for faster Internet connections now.

We find it ironic that the net neutrality advocates are willing to say that price discrimination on the basis of general speed and convenience of the Internet connection is acceptable; but discrimination that would

guarantee a site will be available at a certain speed and time is not. The latter is simply a version of peak-load pricing that is used to help solve a host of resource allocation problems ranging from dining at restaurants (early-bird specials) to commuting (higher rush-hour subway prices) to generating electricity (lower prices in the middle of the night).

Moreover, one can imagine some high-valued high-tech uses that could be stymied by one-size-fits-all pricing. Consider so-called telemedicine. This example is constantly trotted out as a potential benefit of broadband, but seems to be forever just around the corner. Perhaps this is not surprising. After all, who wants to risk remote surgery or emergency medical advice if the video stream is sluggish and jerky because of congestion caused by an online game of Doom? Indeed, a Japanese study noted that poor quality images limited medical use of the Internet, but that a very high-speed dedicated link made real-time surgical collaboration possible (Shimizu, *et al.* 2005). If net neutrality proponents have their way, though, it would be illegal for a hospital to pay for a guaranteed “fast lane” on broadband providers’ lines, thus pushing the ever-elusive

goal of telemedicine further into the future.

Some, but not all, proponents would allow so-called “consumer tiering” of service. Thus, for example, consumers could buy high-speed for video content as long as that tier were open to *any* video provider (Lessig 2006). Again, like the phrase “net neutrality” itself, consumer tiering sounds reasonable at first blush, but it raises a thorny issue for regulators—how to define a tier.

If the economics of regulation teaches us anything, it is that price regulation can easily grow and contribute to large inefficiencies. For example, the Federal Power Commission imposed price regulations on natural gas in the 1970s that were later lifted. Initially, gas price regulation operated on a five-tier system, with different rates for different vintages of natural gas. Each tier had a regulated rate depending on when the gas was produced and whether it was being sold on the interstate or intrastate markets. By the time the Natural Gas Policy Act of 1978 was passed, federal regulators had developed 28 separate categories of gas. This kind of policy intervention helped convince decision makers that price controls were difficult to implement and could adversely affect economic welfare (McKie, 1970).

Suppose that net neutrality proponents convinced the government to regulate pricing and tiering—say, through the Federal Communications Commission. Who would define those tiers? What would happen as new innovations come along? Would existing firms use regulation as a way of raising entry barriers for new entrants? Even with natural gas—a relatively homogeneous product—the number of tiers that were regulated quintupled. With the creation and pricing of Internet tiers left for regulators to decide, interest groups could be expected to lobby for special tiers that include their content.

Putting hypothetical future scenarios aside, current developments already show the potential harm from a net neutrality mandate. In a world of rapidly changing technology, the boundaries of “net neutrality” blur rather quickly. Google, one of the louder advocates, may itself be poised to violate the principle it is endorsing. The company’s planned “free” WiFi in San Francisco would deliver paid ads to people who use this service. In other words, as a broadband provider Google would decide how certain content goes from the Internet to your computer—just what some net neutrality advocates fear.

Some content providers are themselves discovering the benefits of pricing mechanisms they would deny broadband providers. Amazon, for example, recently unveiled its S3 storage system. Software developers can store data on Amazon's servers for only \$0.15 per gigabyte stored per month and an additional \$0.20 for every gigabyte transferred. Developers are thrilled—cheap, unlimited, online storage that charges them only for what they use. If a broadband provider tried to sell a similar plan many net neutrality supporters would be up in arms, yet Amazon got nothing but praise.

There is nothing wrong with these plans. Broadband infrastructure is costly and someone has to pay for it. Many consumers may well be willing to see Google-powered ads in return for free access. If net neutrality mandates made such innovative plans illegal, consumers would be worse off.

The point is that there is not one “right” way to charge different customers in these markets, and firms should be allowed to experiment to find out what works best. Because these markets are so dynamic, pricing can be expected to change over time in response to new demands

and opportunities. While ‘net neutrality’ sounds good, it isn't that simple, and mandating it could have serious unintended consequences—like making Google's much-hyped plan for free WiFi illegal. That is precisely why broadband providers should be given the freedom to set prices, unless there is a clear showing of consumer harm.

#### THE RIGHT WAY FORWARD: COMPETITION AND ANTITRUST ENFORCEMENT

Proponents of net neutrality worry that broadband service providers can exercise monopoly power in the market for broadband connections. Without some form of mandated net neutrality, they worry, providers could exercise anticompetitive control over pricing and access, and thus harm consumers.

The general fear is justified. But it does not follow that regulating prices will do any good. Indeed, in industries where technology is changing quickly, we think that such regulation will often do more harm than good.

A review of the evolution of the broadband market provides an instructive picture of how competition evolves in high-tech industries. In early stages of broadband deployment, many

places had no or only limited access to broadband providers. Today, consumers have increasingly more choice. By June 2005, according to the FCC's latest statistics, nearly 90 percent of all zip codes in the U.S. had two or more broadband providers, and 75 percent had three or more. Just because a zip code has multiple providers does not mean that those providers compete directly, so whether “enough” firms compete yet is debatable. But the trend is positive. Even just two years earlier about 70 percent of all zip codes had at least two providers and 58 percent had at least three. In other words, more people are getting served by more providers.

Even if some service providers could exercise some market power, the multi-sided nature of the market means that they still have powerful incentives to offer a wide array of content. Suppose AT&T tries to charge Google for the right to stream video over its high speed fiber and Google refuses to pay. AT&T might allow unfettered access to Google anyway because customers want it. The point is that even firms with market power in one part of the market will not necessarily be able to control content.

What does the state of competition imply

for policy and net neutrality? First, we should recognize that the phrase “net neutrality” is not well-defined and misleadingly implies a simple correct response that would be neither simple nor, we believe, correct. Next, let’s analyze the issue carefully.

Suppose you believe that Internet service providers do not face enough competition to prevent them from behaving anticompetitively. Should we then necessarily mandate how they provide and charge for Internet service?

No. Rather than trying to artificially create what some believe today to be the best Internet architecture, policy should address the root cause of the problem.

Recently, a large group of leading economists joined together to author a statement on broadband policy that points out that two artificial barriers unfortunately reduce competition and choice today (see, Bailey, *et al.* 2006).

First, restrictions on the use of spectrum—those valuable airwaves that carry wireless signals—restrict the growth of wireless broadband providers. Because of outdated regulations, much spectrum simply cannot be put to its highest-valued use. Congress and the

FCC could give the economy a boost by making more spectrum available and allowing licenses to use it to be traded. Thomas Hazlett and Roberto Munoz estimate this boost to be in the hundreds of billions of dollars.

Second, local governments block competition by arbitrarily determining who is allowed to enter the market and what types of services can be provided over broadband lines. New firms wishing to provide broadband services often must obtain local approval, access to rights of way, pay fees, and meet regulatory obligations regarding service provision. Firms already providing service must seek local regulatory approval regarding what information can flow across their broadband lines. Telephone companies hoping to provide video services, for example, must negotiate approval separately with each city. Congress could eliminate most of these wasteful, anti-consumer rules.

Both of these suggestions would improve competition, but government still has an important role to play through antitrust enforcement if the market is not workably competitive.

Say that a monopoly broadband provider favors itself in providing Internet phone service

by charging a competitor like the leading Internet phone provider, Vonage, a fortune. Antitrust laws allow the government to police such behavior, as it has in the past, by not permitting such self-dealing.

The basic message is that government should proceed with care and allow firms to experiment with different forms of pricing. The last thing we want is to snuff out the next Google, eBay or new wireless access provider because it uses a pricing model that deviates from textbook economics or from the status quo, but actually makes sense for economic survival on the Internet.

The Internet and the broadband industry are highly dynamic, making it difficult to know what actually is best for consumers now and in the future. “Hands off the Internet” was good policy when the Internet was brand new, and it’s good policy now.

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