

The Neutral Internet: An Information Architecture for Open Societies

Daniel J. Weitzner <djweitzner@csail.mit.edu>
Principal Research Scientist
MIT Computer Science and Artificial Intelligence Laboratory
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Overview

Over the last decade and a half, the Internet and the World Wide Web have emerged as unprecedented open platforms for speech and innovation. Now, there is a raging debate about how to ensure that the Internet remains open, accessible and innovative, while at the same time, encourage deployment of new broadband network. The debate thus far, however, has proceeded on the mistaken assumption that this is an either/or choice; that we have to choose between a non-discriminatory, slow, insecure network or a potentially discriminatory, high-speed, cleaner Internet tied together with other broadband services. This paper argues that it is possible to preserve the neutral, non-discriminatory essence of the Internet, without sacrificing future growth of new Internet services and other broadband infrastructure.

At the heart of the debate is the question of whether Internet Service Providers ought to be subject to a non-discrimination (aka neutrality) requirement. The pro neutrality camp has argued that neutrality must be legally mandated lest we lose the benefits that the Internet has enabled. Those opposed to neutrality requirements generally view the Internet as a good thing, too; they argue, however, that market forces will assure continued access to the Internet on reasonably neutral terms, and that legislating this requirement will stifle investment in new broadband services.

That there is emerging competition¹ to offer high-speed Internet services is certainly good news, but to suggest that competitive network services have no need of non-discrimination rules is to fly in the face of hundreds of years of common carriage tradition. But competition alone will not necessarily assure the future of the Internet as an open platform, nor obviate the need for baseline non-discrimination requirements, enforced through a light-weight complaint process. For example, the mere fact that there is an competitive market for some telephone services (wireline, wireless, VoIP, etc.), just as there are competitive Internet service providers, is hardly a reason to suggest dropping the basic Title II non-discrimination requirements of the Communications Act. We keep these Title II requirements not because there is a long list of infringements in recent memory, but because they are an integral element of the basic operating requirements of the telephone system. Indeed, the non-discrimination

¹ There is some debate about the degree of concentration in the various segments of the Internet service marketplace, but my argument is not rooted in market power or antitrust analysis.

mandates in the Communications Act are largely self-enforcing and pose little regulatory burden inasmuch as they are the widely accepted mode of operation for the voice telephone network. The same would be true for the Internet provided the enforcement or complaint mechanism was designed to match the light-weight operating style of the Internet.

Just as with common carriage for the telephone network, the open, non-discriminatory nature of the Internet is a public policy goal that stands on its own. It is the openness of the Internet that has given rise to the extraordinary social and economic benefits of the Internet over the last decade. Thus, openness is as important as potential increases in broadband network capacity that some say will only materialize if Internet service providers are allowed to depart from the neutral model on which the Internet is based. This paper seeks to develop a path through the net neutrality debate that will enable policy makers to give priority to protecting the essentially neutral aspects of the Internet on which we depend, while giving maximum flexibility for new services and infrastructure investments that can benefit both Internet and non-Internet services in the future.

Why, then, does the so-called "Net Neutrality" debate seem to present a choice between, on the one hand, preserving the openness and vitality of the Internet we know today, and on the other hand, encouraging the possibility of future growth and investment in high capacity broadband network services? On the one hand, Internet community leaders from ecommerce companies, consumer groups and civil liberties organizations warn that a failure to legislate net neutrality guarantees will result in a loss of the economic, cultural and political benefits that the Internet revolution has brought. On the other hand, telecommunications and cable companies oppose any neutrality regulation, arguing that non-discrimination obligation will limit their incentives to build the type of video-capable broadband networks they believe the market demands.

But are these two goals truly incompatible? The debate, and the very term 'Net Neutrality,' conflates a critical distinction between a focused need for important Internet neutrality principles and the broader question about whether or how to regulate *other* broadband communications networks (such as digital cable television, or interactive services that may be developed separately from the Internet in the future). Internet neutrality is both a factual reality today and a necessity for the future. Whether neutrality or non-discrimination requirements should be applied to broadband networks more generally raises important communications policy questions that should be considered, but need not be decided immediately.

To differentiate those essential features of the Internet that must be protected from regulatory questions about other new broadband networks separate from the Internet, this paper describes four essential features of Internet Neutrality:

1. Non-discriminatory routing of packets
2. User control and choice over service levels
3. Ability to create and use new services and protocols without prior approval of network operators
4. Non-discriminatory peering of backbone networks.

These principles taken together constitute the social contract among Internet service providers that has been indispensable to its great openness and success. They are equally important regardless of whether the service is broadband or narrowband, wireless or wireline, fiber optic, copper pair or coax. Understanding the Internet requires taking this holistic view of the Internet as a set of business, technical and social arrangements. While traditional telecommunications policy thinking divides the world into 'facilities' and different bandwidth levels, these are not the appropriate categories within which we should regulate or de-regulate the Internet. Indeed, the very foundation of the Internet is its ability to connect efficiently a broad array of quite different networks, allowing a publisher of information to reach a global audience without regard to which or what kind of network the recipient is on. To allow the nation's leading Internet access providers to upend this fundamental global understanding would be to undermine the Internet itself.

By distinguishing between *Internet Neutrality* and more general *Net Neutrality*, it is possible to establish basic non-discriminatory neutrality requirements that will preserve the neutral aspects of the Internet that have brought commercial and non-commercial benefits to hundreds of millions of people around the world. At the same time, policy makers should carefully monitor the evolution of new broadband networks and services. As long as those new networks operate in a manner that does not actively interfere with or unfairly compete against Internet services, policy makers should allow the private sector a freer hand in designing and operating new broadband infrastructure.

I. The Neutral Internet

The Internet is neutral. This is a statement of fact about how the Internet is designed and operated, not a matter for debate in public policy circles. The neutrality of the Internet has made it an open platform for the free flow of information, ideas and commerce. The challenge in the net neutrality debate is not to try to decide whether or not the Internet should be neutral, for it is. Rather, the challenge is to identify and preserve (or at least not erode) the essential conditions of neutrality that have characterized the Internet. At the same time, we should not constrain changes in the non-essential aspects of the Internet if we are to continue to encourage growth and innovation by access providers.

Commenting on the threat of a non-neutral Internet, Vint Cerf of Google and Internet founder stated the worry that many have:

“In the Internet world, both ends essentially pay for access to the Internet system, and so the providers of access get compensated by the users at each

end,” said Cerf, who helped develop the Internet’s basic communications protocol. “My big concern is that suddenly access providers want to step in the middle and create a toll road to limit customers’ ability to get access to services of their choice even though they have paid for access to the network in the first place.”²

Traditional telecommunications companies tend to have a different view of this issue. In a statement that is widely credited with unleashing the debate to begin with last year, Ed Whitacre, CEO of AT&T, declared:

“Now what they would like to do is use my pipes free, but I ain't going to let them do that because we have spent this capital and we have to have a return on it. So there's going to have to be some mechanism for these people who use these pipes to pay for the portion they're using. Why should they be allowed to use my pipes? The Internet can't be free in that sense, because we and the cable companies have made an investment and for a Google or Yahoo! or Vonage or anybody to expect to use these pipes [for] free is nuts!”³

What exactly is wrong with making customers or service providers pay for the choices they make? In fact, *we all already pay for the network services that we use in rough proportion to the cost of those services*. Today network costs are allocated between users (who pay for their own access to the Internet) and large services (like Amazon, who pay a much higher price for their Internet connection because they put a lot more traffic load on the Internet). But what would be wrong with a change to this arrangement — allowing large content providers like Google or Amazon to pay for the privilege of having their data get to customers on an expedited basis, or perhaps even to the virtual exclusion of their competitors?

What is wrong is that forcing a web site operator to pay twice so that a user can have access to its content would begin to break the unique many-to-many nature of how information is linked together on the Internet. Once data is put on the Internet (at a Web site, for example), then the speaker can be confident that anyone in the world can reach that data, regardless of which Internet Service Provider they use. While not everyone who requests that data will have the same quality of service, it is up to the requestor to decide what service level is appropriate for his or her needs. The provider of the content need not be involved in this decision and need not worry about negotiating a transport arrangement with every ISP of every potential user. The genius of the Internet is that it avoids this bottleneck and is thus about to act as an extraordinarily open conduit for speech and commerce. This is the heart of what makes the Internet different from other communications networks.

² Arshad Mohammed, *Verizon Executive Calls for End to Google's 'Free Lunch'*, The Washington Post (Feb. 7, 2006) at <http://www.washingtonpost.com/wp-dyn/content/article/2006/02/06/AR2006020601624.html>.

³ *At SBC, It's All About "Scale and Scope"*, BusinessWeek online (Nov. 7, 2005) at http://www.businessweek.com/@n34h*IUQu7KtOwgA/magazine/content/05_45/b3958092.htm.

The Web and other Internet services are built to take advantage of the real time, many-to-many communications capability of the underlying Internet. Many Internet applications we use appear to be largely just point-to-point, such as email. In fact, although the path of any given email is point-to-point, the various ISPs along that path are not known in advance to the sender. It would cripple the functionality of email as we know it if, in addition to knowing the right email address for your intended recipient, you also had to know that recipient's ISP and make arrangements to pay in advance for efficient transit over that ISP's network.

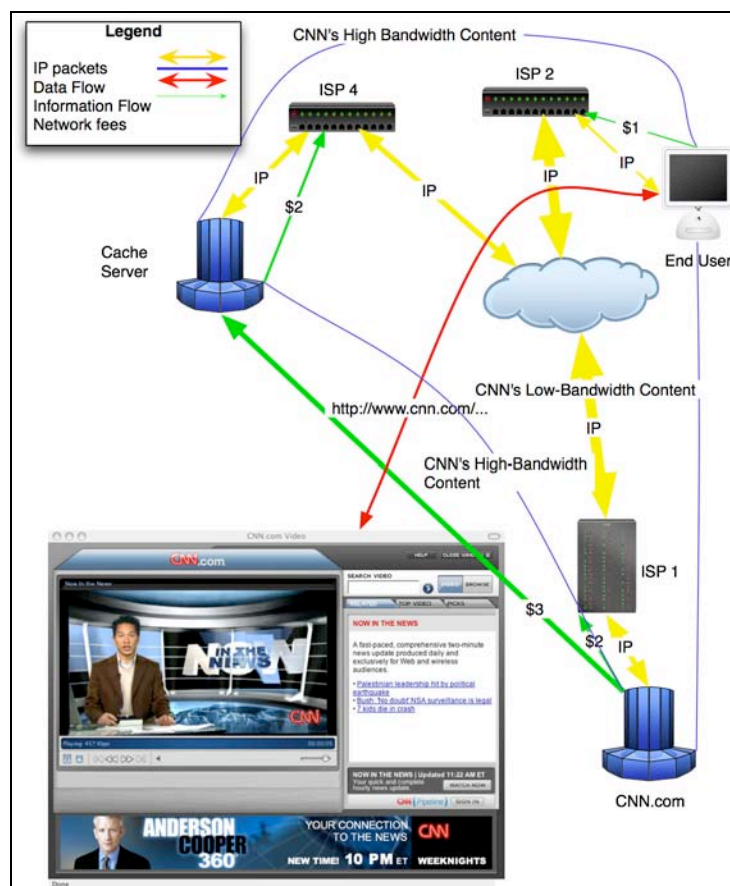
In order to explore the neutral nature of the Internet, I examine two common Internet/Web usage scenarios. While some deduce network neutrality principles from the formalism of Internet architecture (such as the End-to-End⁴ principle), I prefer to look at these application scenarios, both of which are representative of the Internet's potential as a platform for the free flow of information, ideas and commerce, and also the Internet's ongoing capacity to support innovative and unplanned uses for new applications and services. The first scenario presents a sketch of the Internet mechanisms a major news Web site might use today in order to deliver a large volume of text and images, along with streaming video. Following this, I examine the operation of blogs, an example of a leading edge Web application that hardly existed several years ago and developed quite spontaneously, without any central planning or coordination with existing Internet Service Providers.

Scenario A: Multimedia news delivery

This scenario⁵ shows how CNN manages the distribution of multimedia content around the world. A problem that CNN (or any other distributor of high-volume content on the Web) faces is that users "far away" (in network terms) will experience delays in access to content. This is because, among other things, each time an article or video stream is requested, the web server has to send out a new response, even if lots of users are requesting that same document. The general solution is to 'cache' (store) the content at points around the Internet that are closer to large groups of users. This minimizes load on the CNN web server and also reduces the delivery time because the content is closer to the user's location. CNN might use a commercial caching service to achieve better performance in content delivery. While this site is not able to provide video in real-time, it is able, using existing Internet technology, to deliver time-delayed streaming video to a very large user base all around the world.

⁴ Jerome, Saltzer, D. P. Reed, and D. D. Clark, *End-to-end arguments in system design*, ACM Transactions on Computer Systems 2 (1984): 277-288; Lawrence Lessig and Tim Wu, *Ex-Parte Submission in CS Docket 02-52*, (Aug. 22 2003) at http://www.freepress.net/docs/wu_lessig_fcc.pdf.

⁵ The graphic illustrations of these scenarios were originally prepared in collaboration with the Center for Democracy & Technology as part of an informal dialogue among stakeholders.



Scenario A: Multimedia news delivery

The net effect of this elaborate (and expensive) arrangement is better performance for users and the ability to reach more people for CNN. From a user's perspective, the caching is entirely invisible. The user need not take any action to achieve these benefits and all data appears to come from cnn.com. From CNN's perspective, this arrangement has a real cost, but they can decide whether and how much to spend on caching based on the benefit to their business. The cache provider, in order to offer this service, must have access to Internet services (connections) at a large number of ISPs around the world. Those connections are largely indistinguishable from any other connection that any other customer would buy, but if they were not available, then the cache service would not be able to put together this type of globally-operating cache. In turn, the cache provider offers caching service to any (legal) content provider who is willing to pay the fee. There is no discrimination based on content type or on the competitive relationship between the content provider and the ISPs involved.

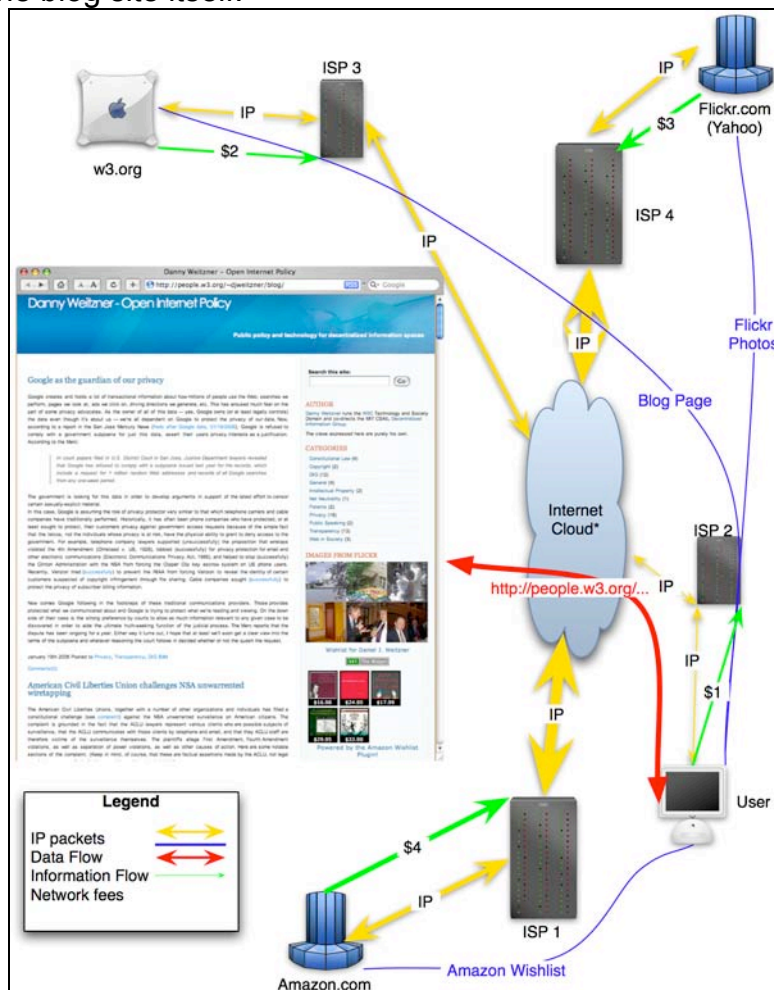
This scenario highlights one way that traffic prioritization is already occurring on the Internet. Caching is just one of many ways to improve the performance of video delivery. Large institutions that can afford to pay the cache services rates can improve

their services, whereas smaller organizations may not be able to afford caching services. But the services are available to all without discrimination.

Scenario B: Decentralized information flow through a mixed-media blog

Internet services such as the World Wide Web and instant messaging depend even more deeply on the many-to-many communications features of the Internet. Some of the most socially valuable and commercially popular services on the Web take advantage of the ability to link together information from many sources across the Web into what appears to be a single information resource (a.k.a. a Web page).

This scenario shows how a new type of service (the blog) is built in an ad hoc manner on top of many of the features on which previous scenarios depend. The blog shown aggregates data from several other Web services (Flickr and Amazon) along with the information on the blog site itself.



Scenario B: Blogs

In examining how blogs in general work, the first key observation is that this and all other blogs were created without any need for permission, either from the blogger's ISP or the sites from which other data has been aggregated. These independent sites have no prior connection arrangements—the linkage of all the sites is made possible by the creativity and coordination of the blog host. To the end user all the data on the page appears to be located at the same URL, but it is actually drawn from a number of different sites. The blog creator presumes that all content included on the blog page will in fact be delivered to the end user, because of the long-standing and fundamental expectation that intermediary ISPs do not block or interfere with any legitimate content on today's Internet. The threat of a non-neutral Internet is that content that the blogger seeks to combine (which may be served from a variety of ISPs) may be unavailable to certain users because the user's ISP might block or degrade access to some of the content aggregated in the blog. It would impose an insurmountable burden on bloggers and other Internet speakers to have to figure out in advance which readers have access to which sets of content and which are blocked from access because of their ISPs' discriminatory policies.

The blog is just one of the current hot new Web applications, credited with enabling a wide variety of political, cultural and economic benefits. Social networking sites such as MySpace are another application that relies on the creativity of the individual and linking among sites possible on today's Internet. Indeed, these applications show how the open, neutral platform of the Internet enables a unique style of decentralized information flow. Though blogs are this year's leading edge application, there is no doubt that other new types of applications and services that we have not yet imagined will come along as well. That will only be possible, however, if we maintain the essential neutrality features of the Internet going forward.

II. Defining and Protecting the Essential Conditions of Internet Neutrality

The neutrality of the Internet arises out of a combination of basic architectural features of Internet and World Wide Web standards, and business practices on the retail and back-end of Internet service provider networks, all in a delicate balance with the competitive market forces that tie service providers, technology developers, and content providers together in a global, voluntary agreement to maintain these practices and standards. This agreement has been maintained out of an implicit but shared belief that cooperation to keep the Internet functioning as an open, interconnected and non-discriminatory platform serves the interests of the parties individually, as well as collectively.

The web of technical and business arrangements that keep the Internet operating is maintained because of the logic of today's Internet marketplace, but it is important to note that it did not arise solely from market forces. Much of the initial protocol design

and implementation occurred in government-funded research labs and saw its initial implementation in the academic community. Even early steps toward commercialization were carefully guided by government funders⁶ and were based on the cooperative spirit that grew up in the pre-commercial Internet days. At the same time, the tremendous growth of the commercial Internet in the 1990s that was responsible for bringing Internet access to hundreds of millions of people around the world was and is a purely market-driven phenomenon. So while it is indisputable that market forces have led the growth of the Internet, we cannot credit the market with creating the initial conditions that made the Internet the success that it is.

Some argue⁷ that market forces will keep Internet access service operating in a non-discriminatory manner. Indeed it is hard to imagine too many people paying for Web access when they can only reach those Websites with whom the ISP has made a special arrangements. However, to use this prediction about future behavior of the market as an argument against law that protects important values is over-reaching. Indeed, if this same view were applied to the voice telephone market, one might conclude that that non-discrimination requirement at the heart of Title II of the Communications Act should be repealed. Following the flawed anti-neutrality logic, the fact that there are a variety of ways to buy voice telephone service and that no one would seriously try to sell telephone service that only reaches a limited group of phone numbers. So in spite of the growing competitive options for accessing the telephone network, the Communications Act still enforces the following non-discrimination requirement:

It shall be unlawful for any common carrier to make any unjust or unreasonable discrimination in charges, practices, classifications, regulations, facilities, or services for or in connection with like communication service, directly or indirectly, by any means or device, or to make or give any undue or unreasonable preference or advantage to any particular person, class of persons, or locality, or to subject any particular person, class of persons, or locality to any undue or unreasonable prejudice or disadvantage."⁸

⁶ See *To authorize the National Science Foundation to foster and support the development and use of certain computer networks*, H.R. 5344, 102nd Congress at <http://thomas.loc.gov/cgi-bin/query/D?c102:2:./temp/~c102eAqlax::>. With this legislation passed in 1992, the Congress allowed the National Science Foundation to begin the transition of the Internet to a service run by the US government and only available to the academic research community, to one that would be available from a variety of commercial providers to anyone around the world for any purpose.

⁷ In his testimony submitted to the U.S. House Subcommittee on Telecommunications and the Internet in March 2006, Progress & Freedom Foundation senior fellow Randolph May noted that “the increasing competitiveness, and the existing contestability, of the broadband marketplace, makes it very unlikely that broadband operators will take any actions of the type intended to be prohibited by the net neutrality prohibitions which consumers value. If they did, consumers would switch broadband providers.” See *Testimony of Randolph J. May on “H. R. _____, a Committee Print on the Communications Opportunity, Promotion, and Enhancement Act of 2006”*, (Mar. 30, 2006) at <http://www.pff.org/issues-pubs/testimony/060330telecom.pdf>.

⁸ *Communications Act of 1934*, 47 U.S.C § 202(a).

The regulatory structure that enforces this provision has changed considerably. Price regulation has been dramatically scaled back and network operators have nearly unlimited freedom to invest in new network services. However, despite all of these changes, the underlying requirement of openness on which the telephone system is based remains.

Given the mixed market and non-commercial provenance of the Internet, the consolidation of the ISP market and the lack of any nondiscrimination requirements for broadband networks,⁹ it is simply impossible to predict that just because market forces support a neutral Internet today, that this will remain the case in the future. Hence, we must identify the essential indicia of Internet Neutrality in order to know what operating principles of the Internet require protection. The essential conditions of neutrality can be summarized as:

1. Content- and provider-neutral end-to-end routing service on non-discriminatory terms.

The *sine qua non* of the Internet is the ability for everyone to connect and have their traffic routed to the desired location. Non-discriminatory routing enables Internet users to find the blogs they are looking for, e-commerce sites to know that they can reach a world market, and political campaigns to be confident that they can reach potential voters (unless they live in China, Iran, or other repressive locales). Any network claiming to offer Internet service must enable users to deliver packets to any other part of the Internet and must accept, on behalf of its customers, packets from any other Internet user or service.

Non-discriminatory routing means similar packets travel across the Internet in a similar manner, but it not mean that every single packet is treated exactly the same way. Engineering considerations result is different routes for different packets. We would consider this reasonable discrimination. But if those differences are used to discriminate against a certain type of content or against a particular speaker, then the discrimination is unreasonable. (Principle 2 below addresses approaches to quality of service standards that can be handled in a non-discriminatory manner.)

The two scenarios above illustrate the importance of this non-discrimination principle. CNN counts on the fact that any user of any ISP can, if he or she chooses, reach the CNN site. If AT&T follows the double-charging pricing model laid out by its CEO Whitacre (CNN pays its ISP to reach the Internet and then pays AT&T to reach its last mile) then users might find themselves unable to access CNN news because CNN and AT&T couldn't agree on a price for service. We are familiar with these disputes in the cable television market where occasionally certain channels are unavailable on certain

⁹ It is important to remember that the narrowband Internet was build on top of a phone network with common carriage obligations. New broadband networks do not have those obligations. See *National Cable & Telecommunications Assn. v. Brand X Internet Services*, 345 F.3d 1120 (2005).

cable systems. However, the Internet's provider-neutral routing has never permitted such a result. Non-discriminatory service provisioning is also necessary to enable the growth of innovative new services such as content caching that facilitate better access to multimedia content. These services rely on being able to connect caching equipment to any ISP where it is needed. Today ISPs are willing to sell cache services this access, but statements from some network operators raise doubts about whether this will remain the case.

Non-discriminatory routing enables blogs, some of which depend upon on-the-fly combinations of information from many different sources, to know that *any* user can reach *all* content on the Web. If some of the content on a blog comes from a site or ISP that didn't manage to negotiate a reasonable price with some network operators, then that blog becomes inaccessible to users of that ISP. Again, given threats to add extra charges for carriage, this sort of breakdown in negotiation is likely. Today, adherence with the non-discriminatory routing principle is universal. Without this adherence, the Internet would lose its uniquely open and democratic character, and risk becoming one more highly centralized and controlled media platform.

2. User control over bandwidth and service levels.

Every user pays for the cost of connecting to the Internet, at the level of service appropriate to their own needs, and then is able to have access to the *entire* Internet, and use any legal application or device in doing so. User control over service level choices must be preserved in order to enable maximum participation in the Internet. "Users" in this context may be individuals who mostly consume content (and only produce a little), or large content providers that serve high volumes of content to others. Principle 1 assures that all parts of the Internet remain connected, but every participant in the Internet may not necessarily be able to connect at the same speed or with the same quality of service. Some cannot afford the highest speed service, others do not have access to networks with high speed, and still others just don't need it. But whatever the reason, a critical aspect of the operation of the Internet is that each user is able to purchase differing levels of service while still remaining connected. Those who read blogs that contain links to video clips might like to see that video at a high quality and speed, but will have to settle for poor picture quality if they can't afford a 6MB per second service. However, they can still read the text and see the images and lower-quality video.

The freedom to buy the bandwidth that one can afford means that hundreds of millions of people around the world have been able to participate in the Internet even if not at high speed. These decisions are always up to the user, not the network operator or the content provider. So while content providers do have mechanisms (caching services) for improving their users' experiences, they know that today anyone can reach their services without the content provider having to pay the user's ISP additional fees on top of that which the user pays. The decentralization of this decision-making has been vital to extending the reach of the Internet.

A key challenge that will face the evolving Internet is adapting to requirements for delivery of high-quality video and other time-sensitive data. Various quality of service standards have been proposed and it is important that Internet Service Providers (include cable and telephone companies) have the flexibility to experiment with different technical standards and business arrangements for meeting these needs. As long as these mechanisms are made available on a non-discriminatory basis, and are offered subject to the choice and control of individual users, it should be possible to preserve the neutral Internet and still adapt to new traffic requirements.

3. Ability to create new protocols and applications on top of existing Internet and Web standards without prior coordination with or approval of network operators.

In order to enable ongoing innovation in new Internet services and applications, ISPs must continue to support current technical standards and avoid blocking the development of new technologies that will be created in the future. In less than a decade of commercial operation, the Internet grew from an environment which supported only a small number of services (email, file transfer, terminal emulation) to a network that supports the World Wide Web, instant messaging, voice-over-IP, streaming video, peer-to-peer file sharing, and numerous other services. That innovation was possible because the underlying architecture of the Internet enables the creation of new services without the agreement and negotiation with network operators. As Tim Berners-Lee, the inventor of the World Wide Web, wrote (in his blog):

When, seventeen years ago, I designed the Web, I did not have to ask anyone's permission. The new application [the Web] rolled out over the existing Internet without modifying it. I tried then, and many people still work very hard still, to make the Web technology, in turn, a universal, neutral, platform.¹⁰

The introduction of new services (such as the Web or instant messaging) has always been viewed by ISPs as a boon, because they increase the demand for Internet access. It is true that these new services, if they become popular, have in some cases required ISPs to make various changes in the way they manage their networks, but these network investments have always been seen as worthwhile by network operators because of the new demand created for Internet service. Similarly, the introduction of new content (such as search services, maps, video sites, and blogs) has until now been viewed by ISPs as a boom, because like new applications they increase the demand for Internet access. Fundamentally, network operators opposed to neutrality no longer are satisfied at benefiting from the increased demand for Internet access, seek to dramatically alter the business model that has been vital to the Internet's success.

¹⁰ Tim Berners-Lee, *Neutrality of the Net*, Decentralized Information Group Breadcrumbs (May 2, 2006) at <http://dig.csail.mit.edu/breadcrumbs/node/132>.

4. Open, non-discriminatory interconnection to Internet peering points.

The global connectivity of the Internet is maintained through a complex set of interconnection (peering) arrangements amongst the world's largest Internet Service Provider networks. While these arrangements, which together form the Internet "backbone," are hidden from view of most users (individual, commercial, non-commercial), they are essential to the Internet's operation. The essential function of these peering arrangements is that they ensure that every ISP is able to offer access to and receive traffic from every address on the public Internet. Without this, the global nature of email, the World Wide Web, and other services would be crippled. Just as Internet Service Providers must maintain neutral, non-discriminatory relationships with users and content providers, so it is important that they maintain open peering arrangements with other networks.

Despite some consolidation¹¹ in control over Internet peering points, I do not see evidence of the need for comprehensive regulation in this area at this time. However, because of the importance of these peering relationships, I suggest that the openness of these vital arrangements be closely monitored.

Caveat: What Internet Neutrality Isn't

While we learn from the above principles about the fundamentals of a neutral Internet, we also learn what is NOT essential to the Internet's neutrality. We learn:

1. Service-level pricing is widespread and is no threat to neutrality, provided each user (endpoint) on the network can choose the level of services appropriate to its needs and provided that many-to-many, end-to-end traffic flow remains possible.
2. Such service-level pricing can be applied at both ends to content providers (for example, a small blog web site needing to purchase less throughput than a popular large news site) *and* end users at the retail level (for example, an ISP offering a low cost monthly plan for casual web browsers, and a higher monthly plan for users that want to engage in extensive file sharing). So long as users across the Internet can choose appropriate levels or amounts of Internet access, the Internet's neutrality principles are not threatened.

¹¹ Recently, mergers of the major telecommunications companies have resulted in consolidation of both the backbone and into other parts of the network. Verizon's acquisition of MCI greatly increased its backbone ownership, as MCI had previously purchased UUNet, one of the originally dominant players in the backbone market. The combination of AT&T (which was already one of the top backbone operators) with SBC (the largest DSL provider in the country) and BellSouth (with a substantial presence in both DSL and backbone service) has increased that company's power across the board. Thus, the two companies that currently control a significant part of the Internet backbone are now also powerful owners of last-mile networks. There is some debate about precisely who controls what part of each segments of the Internet marketplace, however, e.g., *Why are the Mega Mergers of Verizon-MCI and SBC-AT&T bad for California?*. California ISP Association (Aug 25, 2005) at http://cispa.thesupernet.com/oneadmin/newspublish/samplenewspublish.php?news_id=15&start=0&category_id=8&parent_id=0&arcyear=&arcmonth=.

3. Caching is an important part of the Internet today and enables a variety of adaptations for high-bandwidth applications such as streaming video. There is no objection to network operators providing caching services as long as they continue to offer open access to their networks so that unaffiliated caching services are able to compete on a level playing field.
4. A variety of the peering arrangements has helped the Internet to grow and adapt to new traffic patterns. This variety is no threat to neutrality.

Based on the 4 essential principles of Internet Neutrality, I conclude that legislation to protect such neutrality should meet the following requirements:

1. Focus on the essential conditions of Internet Neutrality: The public policy goal should be to preserve access to the neutral Internet but not to reach into the operation of video programming services not carried over the Internet. Therefore, Internet Neutrality rules should not be confused with more general broadband neutrality rules.
2. Avoid supplanting the private-sector-driven innovation process: No command and control regulatory process should be created that would be in a position to approve or disapprove new protocols or business practices. On the other hand, a clear set of legislated rules with a streamlined complaint process adjudicated by the FCC or the FTC should be provided.

We can be hopeful that Internet services and applications will continue to develop in a vigorously competitive environment, without the need for any regulatory intervention. But the neutral character of the Internet is so important to the economic, political and cultural life of the nation that Congress should act now to set out basic rules which will allow the Neutral Internet to continue to flourish and grow.

III. The role of neutrality and non-discrimination requirements in new broadband networks

I have shown that the Internet is neutral in several critical respects and believe that this neutrality should be protected by statute. The application of these same neutrality principles to other high capacity broadband communications networks possibly related to but not synonymous with the Internet, poses a more complex set of questions. I begin by describing various new network offerings either announced or under construction by telco and cable network operators and then consider some service scenarios that raise neutrality concerns. In some cases I conclude that Internet neutrality principles properly apply to these hybrid situations. In other case I believe that careful monitoring and general reliance on existing telecommunications regulation (both Title II and Title VI) , as well as antitrust law will suffice unless there is evidence of actual anticompetitive harm.

A. General description of new broadband marketplace

Over the last few years, major telephone and cable TV companies have announced plans to build new broadband network infrastructure in order provide an array of services. Offers are said to include:

- High definition television service: both channel-based and on-demand.
- High-speed internet access (at rates of 6-15MB or higher)
- Voice telephone service (in some cases using a VOIP technology)
- Other interactive multimedia services

These services raise a variety of questions about which regulatory frameworks do and should apply. Indeed, one of the first rounds of the Net Neutrality debate, the Brand-X case, centered on the regulatory classification of cable modem services used to offer Internet access.

B. Broadband Internet Scenarios

Of the services described above, some directly implicate Internet neutrality while others have no particular relationship with the Internet (though may raise other significant communications policy questions). There is also a middle category in which Internet neutrality questions arise given the close relationship between the services themselves and the Internet. I consider:

- Network charges to carry packets from certain e-commerce Web sites
- Internet-based Voice over IP service using new quality of service techniques
- Television carried over private IP networks (IPTV) not connected to the Internet

In each case, we must ask whether Internet neutrality is harmed in any way and if so, how the four Internet Neutrality principles from Section II apply.

1. Discriminatory access to certain Internet services

An early instigator of the Net Neutrality debate was a statement by the CEO of AT&T, declaring that every packet that traversed his network was going to have to pay, even if they had already been paid for by the originating ISP and even given that the customer requesting the data has also paid for the connection. He said:

"For a Google or a Yahoo or a Vonage or anybody to expect to use these pipes for free is nuts!"¹²

AT&T spokespeople later attempted to clarify that this statement only applied to new broadband infrastructure that was being built by the company. But does the fact that the Internet service is offered over 'new' broadband pipes matter when considering Internet Neutrality? If any network operator actually followed through on this threat and refused to deliver packets to its customer without the originator of the packets first paying a fee, this would directly violate that first principle of Internet Neutrality. The harm is just as

¹² See *supra* note 1.

great regardless of whether the "pipes" are old or new, broadband or narrowband. If we want the Internet to continue to function as a single, interconnected network across the country and across the world, this kind of discrimination must be prohibited.

2. Internet applications – VOIP

Some cable television companies have announced plans to offer Voice-over-IP service. Calls would be carried as IP (Internet protocol) packets but entirely over the cable companies' private network. The packets would be routed directly from the company's network to the public telephone network, never relying on the Internet for routing. In order to provide high quality voice transmission and meet FCC E911 requirements, the cable company will use emerging Internet standards to assure 'quality of service.' It is also likely that the VOIP calls would travel over the same IP service that the cable company uses to offer its cable modem-based Internet access service.

Does Internet Neutrality require that the cable company offer the quality of service technology to competing VOIP providers such as Vonage and Skype? While Internet technology standards are used to assure quality of service, none of the VOIP packets ever touch the Internet outside of the cable company's network. Is this an example of a new broadband service that appears closely related to the Internet but may not require neutrality mandates? Or, is it closely tied up with the Internet such that failure to require neutrality in the operation of this service would harm the Internet as a whole? Clearly, if the cable company's VOIP service came to rely on transit over the Internet, then Internet Neutrality obligations would apply. Absent this, I believe that existing rules for VOIP service are adequate.

3. Non-Internet Broadband services: IPTV

Several telephone and cable TV companies plan to offer television service over IPTV networks. IPTV uses the Internet protocol to carry television images. In these cases it appears that the IP protocol was chosen for its network engineering efficiencies, and because it is a well-known protocol. As with the VOIP example above, the networks carrying IPTV signals may be entirely disconnected from the Internet. Though the data packets look just like those that flow across the Internet, these IPTV packets will remain restricted to the companies' private networks.

Should IPTV network operators be required to offer non-discriminatory access to this IP service, even though it is not connected to the Internet? Given the seeming lack of impact on the Internet, I do not see that extension of Internet Neutrality principles to the cable television market is necessary, absent other competitive dynamics.

IV. Conclusion: Distinguishing Internet Service from Other Broadband Services

The essential characteristics of Internet Neutrality I have described form a social contract that makes the Internet function. That contract is made up of a complex set of technical standards, business practices and interconnection arrangements which are together responsible for the ongoing operation and growth of an unprecedented platform for innovation and freedom of expression. What's more, the social, technical and business arrangements that make up the Internet are not defined by or constrained to any particular range of bandwidth (broadband or narrowband) or carriage medium (fiber optic cable, coax or twisted pair wire). Today's Internet already spans the range of very low capacity narrowband service to high capacity broadband service. Across all of these service types the essential operating principles are the same. Thus, any network operator or service that benefits from the extraordinary reach and power of the open Neutral Internet should be required to operate under the same neutral rules upon which the Internet depends. I believe it is possible to craft a light-weight statutory framework that can protect what is vital about this Internet today without impinging on the development of new broadband networks.

Key to defining a lightweight Internet Neutrality framework is to focus requirements on the Internet alone. We should leave to another debate the question of whether, when or how we may want to apply these principles to other new broadband services that are just now emerging. Perhaps those services will all naturally become part of the Internet as a result of the great benefits of that open platform. Or perhaps other business models will develop, requiring different regulatory considerations. In either case, we ought not try to answer questions about markets that are only just being built, although those should be closely monitored to ensure that they do not intentionally impinge on the growth or robustness of the Internet. We should, however, be sure that the tremendous commercial and cultural benefits that we know flow from the Internet today are protected. Most importantly, as we have recognized that the Neutral Internet has been a platform for ongoing innovation – from email to the Web to instant messaging, blogs and VOIP – we should ensure that the next generation of entrepreneurs have the chance to create the next wave of Internet innovation.

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Weitzner is Principal Research Scientist at MIT Computer Scientist and Artificial Intelligence Laboratory and co-founder of the MIT Decentralized Information Group. He is also Technology and Society Domain Leader of the World Wide Web Consortium. The views expressed here are purely his own and do not reflect the views of the World Wide Web Consortium or any of its members. (Homepage: <http://www.w3.org/People/Weitzner.html>)



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