

The New Network Neutrality: Criteria for Internet Freedom

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The meteoric rise of network neutrality’s prominence as a crucial Internet policy debate has led to current events far outpacing theoretical and historical analyses. This paper addresses this lag in scholarship by contextualizing recent events in relation to historical telecommunications antecedents. In doing so, we critically evaluate the current network neutrality debate and offer a set of technical and policy guidelines for a new, more broadly defined network neutrality. Specifically, we submit that beyond redefining network neutrality, we must connect issues usually dealt with separately—issues that are actually a subset of one overarching concern: Internet freedom. We conclude with an exploration of the social and political impacts of this broader conception of network neutrality and suggest that this “new network neutrality” provides a proactive foundation for supporting the goal of creating a more open and participatory Internet.

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“I think the content providers should be paying for the use of the network – obviously not the piece from the customer to the network, which has already been paid for by the customer in Internet access fees – but for accessing the so-called Internet cloud...If someone wants to transmit a high quality service with no interruptions and ‘guaranteed this, guaranteed that’, they should be willing to pay for that...They shouldn't get on and expect a free ride.” – Ed Whitacre, AT&T CEO, 2006.

The past year witnessed an event unprecedented in modern U.S. telecommunications history. A relatively obscure telecommunications policy debate spilled outside the rarefied airs of Congressional Committees and the Federal Communications Commission's eighth floor to rage across the Blogosphere, major newspapers, YouTube and episodes of *The Daily Show*. This contentious discussion centers on an issue known as “network neutrality,” defined broadly as the non-discriminatory interconnectedness among data communication networks that allows users to access the content, and run the services, applications, and devices of their choice.

Fundamentally, network neutrality forbids preferential treatment of specific content, services, applications, and devices that can be integrated into the network infrastructure. Historically, network neutrality principles have been the foundation for rapid innovation and the Internet's relative openness. Increasingly, however, telecommunications companies have signaled that within the newly “deregulated,” post-*Brand X* landscape, they are eager to create tiered Internet services paralleling the cable television business model.

As Congress debates whether network neutrality protections should be written into current legislation, the battle lines have been drawn between large telecommunications companies who own the pipes, on one side, and Internet content companies and public interest groups, on the other. The meteoric rise of network neutrality's prominence has led to current events far outpacing theoretical and historical analyses. This paper addresses this lag in

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scholarship by contextualizing recent events in relation to historical telecommunications antecedents. In doing so, we critically evaluate the current network neutrality debate and offer a set of technical and policy guidelines for a new, more broadly defined network neutrality. Specifically, we submit that beyond redefining network neutrality, we must connect issues usually dealt with separately—issues that are actually a subset of one overarching concern: Internet freedom. We conclude with an exploration of the social and political impacts of this broader conception of network neutrality and suggest that this “new network neutrality” provides a proactive foundation for supporting the goal of creating a more open and participatory Internet.

Defining Net Neutrality

Network neutrality helps assure that telecommunication infrastructures remain “dumb,” delivering content and services equally in a “best-effort” manner that treats data/content delivery equitably. This best effort entails packets being delivered in a “first-in first-out” method at the maximum speed possible given network constraints. Under network neutrality, network operators do not decide what content users can access and cannot impede the flow or give preferential treatment to particular kinds of content. The loss of network neutrality provisions, in effect, removes a crucial safeguard, thereby increasing the likelihood of a discriminatory telecommunications system.

What is largely a straightforward question of how the network will be operated has been made unnecessarily opaque by some of the actors in these debates—especially public relations representatives of the phone and cable companies who stand to gain the most from an Internet stripped of net neutrality protections. Some industry-funded groups have recast the debate as one over government regulation. “Hands Off the Internet” (see www.handsoff.org), which at one point was spending roughly \$400,000 a day on TV and newspaper advertising to promote a

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position identical to corporate sponsors like AT&T, has this to say about defining network neutrality:

There is no established definition for the concept of “net neutrality.” In general, however, proposals before Congress would grant the FCC and the courts regulatory and adjudicatory power over a wide range of issues relating to the construction, management and delivery of high-speed Internet services. Such government control over the evolution of the Internet is unprecedented. -- Christopher Wolf, HandsOff.org Co-Chair

Leaving aside the fact that the federal government actively regulates and subsidizes and actually developed, funded, and directly managed the Internet for over a quarter of a century (until NSFnet was sold to private interests in the mid-1990s), the main concern raised by HandsOff seems to be that governmental Internet regulations would exist at all.

Public interest advocates, on the other hand, tend to stress openness and freedom as their main concerns. Josh Breitbart (2006) makes the important point that net neutrality is actually a retreat from earlier ideas such as open access and common carriage, which were the law in the U.S. prior to “Brand X”:

Net neutrality is actually a retreat from “open access,” which is what we had before the Supreme Court’s Brand X decision. Open access applied to the Internet when we were using dial-up and it was classified as a “telecommunications service” like the telephone. With the telephone, that means owners of the lines can’t prioritize their customers’ calls over those of their competitors’ (net neutrality or, as it’s known in the phone world, “common carrier”), but it also means they have to lease their lines to other phone service providers (open access). Open access is how you can have real competition without

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having a dozen different wires running under your street, through your backyard, and into your house.

Harold Feld and Michael Weisman parse out the finer details of network neutrality nuances and bluntly refute many of the myths surrounding the concept. Feld (2006) stresses the legacy of common carriage and the myth of deregulation:

The Internet managed to evolve quite nicely over the last 30 years because, contrary to popular myth, the Federal Communications Commission (FCC) regulated the sh#@ out of it. Specifically, until the Bush administration took over, the FCC required the companies that owned the lines over which the bits traveled (the phone companies) to leave the traffic alone — no getting in the way of customers and the information they want to download, the applications they want to run, or the devices they want to attach to the network.

Weisman (2006) emphasizes U.S. backwardness compared to other developed countries:

The thousands of startup visionaries living in the Northwest might want to find their passports, because creating new business models in the U.S. will become much more complicated, and expensive. In the rest of the developed world, it won't be a problem, because every developed country has a strong network-neutrality law in place, extending not just to the Internet, but also to mobile networks, cable TV and television. Stevens' bill puts the U.S. out of step with the rest of world, a world that is fast passing us in productivity, the knowledge economy and broadband connectivity.

Making sense of the current debate requires looking at some of the preceding events in telecommunications history. In the following section we will examine the historical context and

the current parameters of the debate. Then we will explicate what we are calling the “new network neutrality.”

Historical Overview

Network neutrality is inextricably linked to principles of “common carriage,” a bedrock principle of telecommunications policy for nearly 100 years that mandated non-discriminatory service (Noam, 1994). Prior to common carriage laws during the Civil War, Western Union began controlling telegraph trunk lines across the country and gradually achieved near monopolistic dominance by buying up competing companies and actively undercutting Congressional and popular support for constructing a rival postal telegraph system. While it expanded its network into the 20th century, Western Union focused on serving business clients while pricing potential competitors out of specific geographic markets and ignoring social obligations, such as universal service. Based on Western Union’s business model and the larger political and regulatory environment, there was little incentive to create innovations that could have made access affordable for average citizens.

Given the consistent failure to maximize public benefits of telegraph technologies, with the rise of telephony during the early 20th century, public service protections were introduced into the telecommunications regulatory structure and common carriage was established with the early build out of telephone networks. For decades, telephone network operators were considered “natural monopolies.” The biggest monopoly (and largest corporation in the world) was the American Telegraph and Telephone Company, which, until the 1984 Divestiture, dominated the telecommunications industry. Given its monopoly privileges, it was mandated as a basic public service that AT&T could not discriminate against other carriers utilizing its lines.

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Leading up to the Modified Final Judgment that broke up the Bell system in 1982, Judge Harold Green maintained that phone companies should not sell information. At the time, former FCC commissioner Nicholas Johnson argued that allowing phone companies to provide both conduit and content would hurt both businesses and consumers instead of providing the “channels of communication for a democratic society.” Johnson argued that the phone companies’ drive to get into the information selling business was the “No. 1 public policy issue confronting our nation.” Arguing that they already profit from both ends of the process, he worried that telecom providers “charge us for getting information out of the system and they charge the supplier for putting it in” (Caruso, 1991). The 1984 Cable Act, which allowed cable to remain a closed system and the 1996 Telecom Act, which allowed cable to enter Internet service provision, allowed Commissioner Johnson’s fears to become reality.

The U.S. Telecommunications Act of 1996 was the first major overhaul of the landmark 1934 Communications Act and the first comprehensive attempt to reform U.S. media policy for the digital era. This complex and far-reaching legislation replaced structural regulation with market incentives for telephony, radio, broadcast television, cable television, and satellite communications. Hailed as an effort to unshackle market forces and sold with the promise that deregulation leads to enhanced competition, the bill has instead led to unprecedented telecommunications conglomerization and a lessening of consumer protections and ownership diversity. However, taking for granted the historical importance of common carriage in curbing market excesses, even the deregulatory thrust of the 1996 Telecom Act left the principles of non-discrimination intact.

This changed with the June 27, 2005 Supreme Court “Brand X” decision and subsequent August 5, 2005 FCC decision to “deregulate” carriage. Culminating after a long legal fight

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between cable companies (like Comcast and Time Warner) and independent ISPs (like Earthlink and Brand X) over whether cable operators should be required to sell access to their networks to potential broadband service provision competitors, the Brand X decision was significant for essentially deregulating broadband. The Supreme Court's 6-3 decision favored the National Cable and Telecommunications Association (NCTA), the principal trade association of the cable television industry, by overturning an earlier appellate court decision and affirming the FCC classification that cable broadband was an "information service" instead of a "telecommunications service," thus exempting cable companies from common carriage laws.

This seemingly minor turn-of-phrase meant that cable providers did not have to share their infrastructure with competitors. Together with the subsequent FCC decision to extend this exemption to phone companies (ostensibly to provide a level playing field among market players) this court decision removed safeguards and created the potential for access restrictions to non-preferred content. Many public interest advocates pointed out how this decision countered a hundred years of telecom policy and risked changing the open and non-discriminatory nature of the Internet while creating a new class of potential gatekeepers.

Content Discrimination

The history of content control goes back centuries, but two relatively recent events bear mentioning due to their parallels to the outcomes that network neutrality advocates fear today. The Royal Post was a British system characterized by its refusal to carry packets for society's elite. The U.S. Postal system was formed in response to this discriminatory system. Alexis de Tocqueville, who credited the newspapers and other information delivered via the post as greatly responsible for the America's thriving democratic culture, praised the U.S. system. The opportunity for anyone to send anything anywhere without constraint or discrimination was a

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fundamental assumption of this early U.S. communications system. However, this principle was challenged by the telegraph industry, particularly the Associated Press Newswire. Telecom historian, Paul Starr, sees a direct parallel with contemporary telecommunications marketplaces in which incumbents dominate networks to exploit their existing position rather than innovate. Starr points to historical precedent to argue that telecommunications incumbents tend to spend little money on research and development, often investing more in politics than in technology.

Today, we have recreated market conditions that existed earlier in the Twentieth Century. Once again first-mile telecommunications is heading toward near-monopoly status. Except this time, the Internet is no longer classified as a telecom service and may be transformed to follow more of a cable TV business model. AT&T (and other telecommunications companies with monopoly power over local communities) is also no longer under a 7.5% profit margin cap, thus lifting a crucial consumer protection.

Several warning signs of what a non-neutral network might look like have already appeared. In 2004, North Carolina ISP Madison River blocked DSL customers from using its rival's (Vonage) VOIP telephony services. In 2005, the Canadian telecom corporation, Telus, blocked users from accessing a pro-union website during a labor dispute. In 2006, AOL Time Warner blocked a mass email campaign from its customers that opposed AOL's proposed tiered email system. These are just a few recent examples where telecommunications corporations have worked against the best interests of the general public and discriminated against content and services they dislike.

Limitations of the Current Debate

In our view, the ways in which network neutrality has been defined in normative discourse, with an emphasis on non-discriminating wires and common carriage, are too limited

in their scope. Network neutrality advocates have been reacting to the actions of incumbents and their lobbyists instead of formulating more proactive next steps. Using the current national conversation as a springboard, we propose a far more encompassing perspective to help ensure network neutrality, one that we believe will better enable the Internet to reach its democratic and participatory potentials. Our new formulation of network neutrality goes beyond questions of open access to consider the broader contours of Internet architecture, including software, hardware, wireless/broadband infrastructure, ownership, economics, and open protocols and standards. This approach adds significant new ideas to the debate over how to create a more democratic Internet.

Previous Literature

It may be premature to offer grand syntheses on the sparse academic literature on network neutrality, but several existing studies provide useful conceptual tools for understanding the current debate. Christian Sandvig's (2006) "Network neutrality is the New Common Carriage" is quick to discount some of the arguments posed by network neutrality advocates. Sandvig suggests that this is an old debate, exemplified by the principles laid out by Ithiel de Sola Pool. Further, he holds that network neutrality has never been the norm since all Internet providers have discriminated against types of content to some extent. Another recent paper by Bill Herman (forthcoming) provides a comprehensive overview and takes on Professor Yoo's (2005) argument that net neutrality provisions are unnecessary. Noam (2006) recently suggested a "Third Way" for net neutrality limited to "Last Mile" concerns.

Much of the existing scholarship and commentary fails to sufficiently emphasize a central aspect for network neutrality, ignoring the import of normative principles—principles regarding the role of the Internet in a democratic society and the debt Internet providers owe to the public.

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The four Bell companies earn roughly fourteen billion dollars every year from access to Internet content and applications in addition to 20 billion dollars a year in direct access fees from broadband Internet subscribers. When taken in the context of the enormous tax subsidies and other benefits that telecom corporations receive from public entities, this debate should be about the social contract between telecom network operators and the public. These kinds of social contract debates often present themselves during critical junctures and periods of media crisis (Pickard, 2006). The fact that network neutrality *is* a normative principle is far too often overlooked.

Industry attempts to reframe the debate, growing technological complexity, and shifting allegiances among competing actors artificially sunder democratic Internet principles that should be considered together (Feld, 2006; Benkler, 2000). Addressing more normative concerns, scholarship addresses network neutrality directly (Wu, 2003) and related issues like open architecture, open access, and online ethics (Cooper, 2003; Comstock & Butler, 2000; Hamelink, 2000). Wu offers a short list of network neutrality rules that would prohibit carriers from discriminating content. Similarly, Benkler's (2006) *Wealth of Networks* advocates for a commons based policy orientation. Taken together with Lessig (2001) and others, this approach is aligned with the notion of Cooper's "open architecture."

Drawing from the research of Yochai Benkler, Mark Cooper, Lawrence Lessig, Tim Wu, and others, we envision a more open and participatory Internet. Frequently referred to as a commons-based approach to the management of communications systems, this model emphasizes cooperation and innovation as opposed to privatization and enclosure. Given that all technology is inscribed with social values that foreclose certain possibilities while encouraging others, emphasizing these linkages illuminates what is at stake with "network neutrality" and

situates this debate within a larger vision of Internet openness. We sit at a critical juncture for Internet policy; opportunities now abound that will soon be gone.

Current State of Affairs

Network neutrality alone is not a silver bullet. While it helps prevent many of the worst market excesses, network neutrality does little to ameliorate some of the systemic problems that necessitate it. Media conglomerization and the attendant lack of diversity of ownership and perspectives (Bagdikian, 2000; Bennett, 2003; McChesney, 1999) provide one focal point for discussing network neutrality. From the reemergence of telecommunications giant AT&T to current efforts by FCC Chairman Kevin Martin to re-open media ownership proceedings, fewer players are gaining massive market share, creating increasingly vertically and horizontally integrated corporations with the potential to dominate entire market sectors (Kushnick, 1999; McChesney, 1999). The current Federal Communications Commission (FCC) regulatory environment fails to spur technological innovation and has retarded expansion of digital inclusion efforts (Cooper, 2004). Instead, the FCC has fostered a decades-long market environment fraught with pricing and geographical discrimination as well as overpriced, substandard telecommunications services (Slotten, 2000). The importance of the current regulatory regime is illustrated by two case studies: spectrum licensure policies and broadband measures of competition and penetration.

Exacerbating difficulties in these crucial media policy areas are state and national telecommunications laws that slow innovation and competition in broadband services to further an environment of digital exclusion. To date, over a dozen states have passed laws that in some way limit competition and prevent innovation in business models, public investment, and public-private partnerships (c.f., APPA's "State Barriers to Community Broadband Services. "). At the

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national level, everything from local control over local rights-of-way to consumer protections would be undermined by pending legislation. This section focuses on two particular facets of this problem: the numerous state laws preventing competition, and the COPE Act, a pending national telecommunications law that would seriously undermine many of the principles incorporated into our redefined network neutrality.

While yesteryear's newspapers and today's Internet are quite different media, their social functionality within civil society is remarkably similar. Whereas the unrestricted transport of newspapers via the Postal Service has long been protected and subsidized, today, ISPs are proposing to have discriminatory power over social networking applications that utilize their networks. Utilizing the postal service, anyone can send packets first-class, second-class, third-class, parcel post, overnight, etc. However, when one sends a packet, it will be handled in a first-in-first-out manner within the chosen service without regard to the type of packet being sent. Likewise, network neutrality incorporates strong civil rights protections simply by mandating a neutral and non-reactive transport medium. Recent endeavors to surveil network traffic encroach upon users' rights to privacy, creating a panoptic environment that undermines civil society, creativity, and public dialogue. Current law enforcement efforts should err on the side of maintaining network neutrality, yet often mandate data collection of user information that demonstrates both a lack of understanding of the current state of technology and, in actuality, undermines long-term law-enforcement goals (as discussed below). The Communications Aid to Law Enforcement Act (CALEA) is just one example of significant risks posed to Internet freedom and, ironically, long-term law enforcement.

Until the turn of the millennium, the United States led the world in both broadband access and broadband penetration rates. Yet, in the past half-decade, the US has rapidly fallen behind

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other industrial nations, dropping in broadband penetration from first to 16th in just a few years. This meteoric fall comes at the same time that definitions of what constitutes “broadband,” and how broadband penetration rates are even measured in the US, have obfuscated the extent of the problem, creating a false sense of progress while, at the same time, undermining America's global standing.

(re)Conglomerization

The past several decades have seen the unprecedented conglomerization of the media (Bagdikian, 2000). The impacts of these media conglomerates on our national telecommunications infrastructure are only now beginning to be understood (Breitbart, 2006). With statements like “Authority as we have known it will change dramatically... The Internet seems to discourage the endowment of individuals with inflated status” Poster (2001, p.188)) and others envision a more democratic society facilitated by digital communications free from discrimination that might privilege some individuals and content over others.

The telecommunications companies’ political-economic combine has earlier precedents in the robber-baron era of the industrial revolution and Western Union and Bell Labs/AT&T domination of telecommunications during the late 19th and 20th centuries. Yet, today’s reach of these entities into almost every medium and locale is unprecedented, and represents an entirely new phenomenon with potentially profound implications for democracy. While some scholars have focused on the effects of corporate marketing and consumerist culture (Cohen, 2003; Saltman, 2000), others have delved more deeply into the underlying communications infrastructure at the heart of modern political structures (Dyer-Witheford, 1999; Garnham, 2000; Schiller, 2000).

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The rise of the telephone 100 years ago suggests the path we are currently following has been tried before. As Paul Starr writes in *The Creation of the Media*, “From 1894 until 1907... the market broke open with a surge of independent commercial and nonprofit cooperative telephone enterprises” (pg. 193). AT&T and the Bell system, however, as the main owner of telephone long-distance service, often refused to interconnect these “independent commercial and nonprofit cooperative enterprises” wherever they were in competition for local phone customers. Instead, AT&T used its long-distance monopoly to open 3,500 new exchanges in smaller communities of less than 10,000 people) between 1894 and 1907. As Starr sums up, “The Bell-independent rivalry at the turn of the century led to the same breakneck extension of networks that had characterized the early telegraph industry around 1850... prices for telephone service fell sharply. Independent phone companies generally offered lower rates than Bell, and though Bell cut its rates everywhere, they were lower where it faced a rival” (201-202). At least until the 1913 “Kingsbury Agreement,” AT&T interconnected with “Independents” when it suited its needs; however, it preferred to buy out or quash these competitors and did so with surprising speed. Today, in the wake of Brand X, a market and regulatory environment has been recreated that eliminates independent companies and allows backhaul owners to engage in these same anti-competitive practices.

In 1907, AT&T's new president, Theodore Vail publicly declared that telephone service, “should be universal, interdependent and intercommunicating, affording opportunity for any subscriber of any exchange to communicate with any other subscriber of any other exchange”—in essence, that telephone systems be a unified, interoperable, neutral network. AT&T, through the judicious use of governmental regulation, often directly lobbied for by AT&T itself (Green, 2001), was able to create a national interconnected telephone network and grow its market share

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dramatically during the first three decades of the 20th century (to 66% in 1920 and 81% in 1932), crushing the “home rule” telephone movement to ensure decades of market dominance until the 1984 divestiture.

Though some hold that Vail was simply engaging in an early form of “rhetorical jujitsu” (Anderson, 2006), the public statements of today's telecommunications leaders are explicitly interested in devising ways to close off their networks, maximize their billable moments, and create new avenues for extracting additional fees for service quality, non-interference, and non-discrimination. This sensibility is best exemplified by AT&T and statements made by their CEO, Ed Whitacre:

I think the content providers should be paying for the use of the network – obviously not the piece from the customer to the network, which has already been paid for by the customer in Internet access fees – but for accessing the so-called Internet cloud...If someone wants to transmit a high quality service with no interruptions and ‘guaranteed this, guaranteed that’, they should be willing to pay for that...They shouldn't get on and expect a free ride.

The important lesson is that AT&T gained its prominence, not by superior business model alone, but through governmental regulation, predatory pricing, buying up the competition, centralizing network control, and a dedication to creating and controlling a nationally interconnected network. Today, AT&T, in much the same way it destroyed the “home rule” telephone movement 100 years ago, is again attempting to leverage its network ownership—this time not only targeting telephone services, but all Internet-mediated communications, including data services, streaming audio and video, and television.

FCC Regulatory Environment

Network neutrality sees *access* as a critical element in determining whether a network is being operated in an open and free manner. Bottlenecks to network access undermine the types of services offered, create artificial scarcity, and lead to increased pricing and lowered quality of service (Kushnick, 1999), as exemplified by current national policy around licensure of the public airwaves. Well over 99% of the public airwaves are either reserved for governmental use or licensed to private companies (Slotten, 2000). Even though the tiny sliver of so-called “unlicensed” frequencies has generated enormous economic activity and innovation (New America Foundation, 2003), everything from WiFi devices to baby monitors, radio phones, garage-door openers, and microwave ovens co-exist within these rare frequencies.

The FCC has continued to privilege a model for licensure that allows only a single entity to broadcast, often at a specific power level and geographic location. While, digital technologies have radically transformed almost every aspect of current society, our licensure regime is predicated on use of the public airwaves as if we were still utilizing 1920s and 30s technologies. Whether one looks at the debate over low-power FM radio licensure, interference temperature, or unlicensed devices in unused television broadcast bands, the story is invariably the same: interests that have already invested in licensed frequencies seek to prevent competition, innovation, and evolution of licensure, dramatically slowing down change or stopping it altogether.

Given the accumulating evidence for broadband connectivity’s importance for economic development (Lehr, Osorio, Gillett, & Sirbu, 2005; Gillett, 2006), purposefully limiting access to the necessary tools to build data communications networks is a disservice to the general populace. Today, most wireless broadband providers are forced to utilize only a handful of

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unlicensed frequencies, creating a scarcity of capacity in dense urban areas. Meanwhile, rural areas are often left completely unserved by broadband providers. Opening up large swaths of unlicensed frequencies would not only help meet current demand, but also that future technologies such as cognitive and software defined radios will have ample spectrum. Yet proceedings to open up additional bands such as 3650-3700MHz, or to open up bands to more users such as allowing unlicensed devices in unused 700MHz television broadcast frequencies, continue to stagnate.

These same problems exist with other telecommunications media. Classic economics would dictate that a glut of supply should lower pricing; however, US broadband pricing remains exceptionally high even though it is an open secret that a majority of fiber infrastructure in the United States is “dark” and remains underutilized. Information on both where this dark fiber exists and how much is available is considered a “trade secret.” In his book *Broadbandits: Inside the \$750 Billion Telecom Heist*, Om Malik discusses the enormous infrastructure overbuild of the late 1990s. The reverberating effects from this \$750,000,000,000 market failure are still hindering US broadband development today. Meanwhile, the FCC, rather than protecting US residents from market excesses that are actively contrary to the public good, has systematically removed the few remaining checks and balances on corporate malfeasance.

State & National Laws

Across the US, numerous states have passed laws restricting municipal entry into broadband service provision. Prior to 2005, 14 states created barriers to municipal broadband service provision, which ranged from outright bans on public utility districts providing retail telecommunications services to taxes on telecommunications services provided by public entities (but not private providers) to increase their prices (Baller, 2006). In response to direct lobbying

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by telecommunications incumbents, over a dozen states have passed regulations restricting competition in this market sector. (Ironically, these are often the same companies, such as AT&T, who are lobbying against similar regulations at the national level). Tragically, as the city of New Orleans is now discovering, these state laws often force municipal entities to spend crucial resources on making their networks worse.

U.S. Broadband Penetration Rates

Stagnation of US broadband penetration rates, as compared to a growing number of other industrialized nations (the OECD puts the US in 12th place among its 31 members as of December 2005; the 2005 statistics from the ITU places the US in 16th place), is due to the combination of the aforementioned factors. While the nation continues to lag further behind, this remarkably bad state of affairs is continually worsened by official comments, reports, and protocols that purposefully confuse the issue and hide the extent of the problem. For example, on July 26, 2006, the Federal Communications Commission released its most recent figures on “high-speed services for Internet access.” In previous years, the FCC had been lambasted for stating that 99% of the population had access to broadband services. Numerous experts provided feedback on how the data collected by the FCC could be improved so that their report would provide more useful information, such as collect information based on census track, disaggregate satellite and other services, and make explicit the speeds of the services provided (Turner, 2005). Yet, the 2006 report does almost nothing to address the fundamental concerns raised. Instead, the FCC chose to wordsmith a “solution” that ignored the requested feedback, leaving many issues without redress: the inadequacy of the official definition for “broadband” as 200kbps in a single direction; the severe limitations of satellite as a medium for broadband service provision (in particular, speed limitations and latency, which severely limit its utility for streaming, VoIP and

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other live services); and, the lack of usefully disaggregated data. By systematically suppressing competition and erecting numerous barriers to entry, the FCC and telecom incumbents have created an environment whereby substandard and exorbitantly priced broadband service provision has become the norm.

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We synthesize existing commons-based models (e.g., Cooper, 2004; Lessig, 2001) to create a more expansive standard of network neutrality conducive to Internet openness—a model that runs counter to U.S. phone and cable companies’ plans and challenges the overly narrow parameters of current public interest arguments. Often, discussion among pro-and anti-network neutrality camps centers on the debate over quality of services, bundling of services, and interconnection of networks. At its core, the question is whether the Internet should utilize an “end-to-end” infrastructure (Saltzer, Reed, & Clark, 1984) consisting of a “dumb network” (Isenberg, 1997), or whether a centralized infrastructure should be utilized to inspect and shape network traffic based upon its content, origin, and/or destination—thus, supporters of smart networks are often aligned with the anti-network neutrality camp.

Fundamental to “smart networks” is the idea that higher latency is not conducive to some services and applications. Thus, for example, VoIP (Voice over Internet Protocol is packet-based telephony, a replacement phone service) or streaming HDTV (High Definition TV) both require low-latency and low-jitter throughput to be useful, whereas file transfers like web surfing and e-mail tend to be relatively latency-agnostic and jitter-insensitive. An ideal “smart network” would be able to distinguish services and applications requiring low-latency and prioritize these network uses. The flip side is that low-priority network uses would find their latency increasing once low-latency prioritization took place. A corollary of this phenomenon is that latency is

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mainly an issue of network capacity; with adequate capacity, packet prioritization becomes a moot point. Thus, “smart networks” have the potential to create a *disincentive* for system-wide capacity upgrades.

For example, within Ethernet systems, network neutrality might be circumvented through the use of the 3-bit-wide “Precedence” section of the 8-bit “Type of Service” field along with the existing 3-bit delay, throughput, and reliability quality of service parameters. Precedence is, for the most part, rarely utilized across most public network infrastructure (though it is more prevalent within private networks). While originally conceptualized as a mechanism for determining the prioritization of traffic based on its import to network control (e.g., routine, priority, immediate, flash, flash override, CRITIC/ECP, internetwork control, network control), it could also be utilized to discriminate content based upon purchase of premium, high-speed, or tiered services.

Additional complexity arises in the administration of a packet-prioritizing network since this would necessarily involve some form of packet inspection (i.e., to identify what type of packet is being sent and its prioritization level). Unfortunately, once system-wide prioritization levels are in place, a huge incentive exists to create software to “disguise” data as a higher priority form in order to speed up its delivery. Thus, a user might “hide” instant messaging data by utilizing a program that makes it appear to the network routers that these data are VoIP packets; someone downloading MP3 files might utilize an application that makes these data appear to be a streaming audio file. Network providers, knowing that this outcome is inevitable, would, in turn, need to do a deeper packet inspection, further slowing down network capacity as router CPU time is utilized to ensure that each packet is, in fact, what it says it is.

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Postal history provides an exemplar of this phenomenon. When newspaper postage was lower than letters, many customers began writing their letters in the columns of newspapers. This led to the Post Office outlawing this practice. In turn, customers began circling words (and even individual letters) to form their messages, leading to deeper inspections by postal employees (John Nerone, personal correspondence, October 10, 2006). Likewise, a non-neutral network would create incentives for non high-speed content providers to utilize high-speed content provision proxies to deliver content, creating an entire market dedicated to concealment of data-location and counter-measures to prevent these initiatives by network owners and those paying premium rates to avoid content discrimination. Thus, without network neutrality, a data-obfuscation arms race would certainly develop spanning all aspects of the network's infrastructure.

Our more expansive conception of network neutrality contains ten facets necessary to ensure an interoperable, interconnected, non-discriminatory, global Internet. This new network neutrality is predicated upon the notion that competition is vital at all layers of the network infrastructure, and that without this competition, market capture through path dependency—a situation inherently detrimental to innovation and the best interests of network participants—tends to arise. While aspects of the new network neutrality map onto the Open Systems Interconnection (OSI) Reference Model, it also incorporates factors that help ensure a socially and politically neutral infrastructure as well. “Neutrality” is not just a technical specification, but also facilitates a social contract that supports equity and justice through data communications. Given the shortcomings of traditional neutral networking conceptualizations, the new network neutrality envisions a more democratic network infrastructure that:

1. Requires Common Carriage.
2. Is Open Architecture and Supports Open Source Driver Development.

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3. Is Open Protocol and Open Standard.
4. Supports an End-to-End Architecture (i.e., is based upon a “dumb network”).
5. Is Private (e.g., no back doors, deep packet inspection, etc.).
6. Is Application-Neutral.
7. Is Low-Latency and First-In/First-Out (i.e., requires adequate capacity).
8. Is Interoperable.
9. Is Business Model Neutral.
10. Is Run by its Users (i.e., is internationally representative and non-Amerocentric).

It should be noted that this paper provides an initial skeleton for what these ten facets would entail; however, this is only a first step toward achieving full implementation. Substantial work is still required to flesh out these ideas.

1. Requires Common Carriage.

Ensures that network operators lease their lines to all potential market players, including municipalities, at market (wholesale) rates. Ideally, this would include universal service provisions. As has been seen again and again throughout the history of transportation and telecommunications, common carriage protects the general public against price and geographic discrimination and other anti-competitive business practices.

2. Is Open Architecture and Supports Open Source Driver Development.

Encourages a digital commons by keeping both the hardware itself and any hardware access layer(s) open. At the same time that the Open Source movement gains ground (especially internationally) and hardware prices have plummeted, new business models have arisen to promulgate market capture and path dependence (see Sandvig, Young, & Meinrath, 2004) creating potentials for secondary network closure. Open architectures help prevent this problem.

3. Is Open Protocol and Open Standard.

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Maintains free-flowing, non-enclosed Internet services. This, in turn, facilitates innovation and widespread adoption of technologies. With the growing pull towards proprietary networking (especially within the wireless medium), it is vitally important to prevent the so-called “Balkanization” of the Internet.

4. Supports an End-to-End Architecture.

Removes vulnerabilities for bottlenecks, gate-keeping, etc. Speeds up network throughput and increases network capacity while lowering network equipment costs. An end-to-end architecture helps prevent governmental and corporate interference in network traffic. An outcome that is especially important at a time when surveillance and digital rights management concerns are so prevalent in political rhetoric and action.

5. Is Private.

Private networks do not privilege state security imperatives that compromise individual privacy and help ensure a non-discriminatory environment for content. Private networking is essential since back doors and other devices introduce both enormous security holes as well as increased impetus for development and widespread adoption of privacy software that hampers, over the long-term, legitimate law enforcement efforts. Privacy is also essential for ensuring the continued expansion of online business (Brock, 2003; Huws, 2003).

6. Is Application-Neutral.

VOIP, Internet television, and diverse operating systems and services run unimpeded. Expected convergences in digital communications will make this principle increasingly crucial. Digital Rights Management (DRM) considerations such as copyright also make this a critical facet of the new network neutrality.

7. Is Low-Latency and First-In/First-Out.

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Low-latency and first-in/first-out helps remove the impetus for data packet discrimination by requiring that a service provider's profit margins adhere to a basic social responsibility to provide adequate services to its customers. Lowers over-subscription rates, artificial scarcity and the continuance of dark fiber by mandating adequate capacity and provides incentives for network and capacity upgrades.

8. Is Interoperable.

Interoperability harmonizes different systems and integrates foreign attachments. This is especially important to for the continued global expansion of broadband service provision. As Cooper (2004) points out, interoperability lowers costs while increasing the collaborative potential of the Internet.

9. Is Business Model Neutral.

Allows for public players such as municipalities and non-profits, as well as public-private partnerships and private corporations, to provide Internet services. Too often, competition is lessened, and the options for consumers to receive broadband services artificially limited, by shortsighted rules, regulations, and laws. A neutral network cannot exist when one requires its existence only under specific business models.

10. Is Run by its Users.

Replaces and/or dramatically expands control over important governance institutions like ICANN. Internationalizes control over this vital global resource and brings governance more to the user level. The current U.S.-controlled ICANN model is unsustainable over the long term (Pickard, 2007). This would help remove artificial scarcity of IP addresses and, as Mueller (2002) and others (Mattelart, 1994; Preston, 2001; Schiller, H. I. 2000) have documented, control

over global communications networks and the Internet, in particular, has remained far too Amerocentric.

Conclusions

The implementation of these principles will create a more truly neutral and participatory Internet that is both more efficient and more democratic than the one we have now. On a fundamental level, an open system is the key to network growth and innovation. We acknowledge that our model does not address all material inequities (e.g. digital divide, lack of universal service, etc.), which, to be sufficiently remedied, would essentially require the redistribution of critical resources. Nor do we tackle some issues related to copyright, surveillance, and other contemporary political battles. However, the new network neutrality model would improve the global deficit in Internet connectivity and help propel the U.S. towards its goals of universal, affordable broadband. The new network neutrality establishes normative parameters to guide policy makers, both national and global, in their quest to create a better Internet.

Critical to the implementation of “next steps” is that the FCC and other key decision-making bodies address the points encompassed by the new network neutrality. The new network neutrality should be presented to members of congress, state legislatures and candidates for their endorsement as a broadband democracy manifesto and public interest groups have the capacity to put these criteria in front of these policy makers. Congress might pass them initially as a resolution, and the United Nations could address them in its ongoing post-WSIS deliberations, but these are only first steps in what must be far more encompassing reforms. Although piecemeal efforts are better than no movement whatsoever, only taken together will these points comprise a larger model that is simultaneously neutral, democratic and efficient.

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