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Transcending Net Neutrality: Ten Steps Toward an Open Internet

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The past few years have witnessed a once-obscure issue known as "net neutrality" blow up into arguably the most publicized policy debate in US telecommunications history. An untold story is how this relatively technical debate spilled outside the rarefied airs of Congressional Committees and the Federal Communications Commission's (FCC's) eighth floor to rage across the blogosphere, major newspapers, YouTube clips, and episodes of *The Daily Show* to become, if not a household phrase, a topic of popular debate involving millions of Americans. One explanation is that, at its root, the net neutrality debate is far more significant than a squabble among technocrats. Rather, it is first and foremost a normative debate, one that will determine the role of the Internet in a democratic society, with profound implications for the daily welfare of millions of citizens who rely on the Internet as a critical resource. Unfortunately, it is such normative concerns, along with related political and historical contexts, that have been least explored in much of the net neutrality scholarship to date. This article aims to address these gaps while expanding the parameters of the existing debate.

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"Network neutrality," defined broadly, is nondiscriminatory interconnectedness among data communication networks that allows users to access the content and to run the services, applications, and devices of their choice. In essence, network neutrality forbids preferential treatment of specific content, services, applications, and devices that can be integrated into the network infrastructure. This principle has been the foundation for rapid innovation and the Internet's relative openness. As Congress debates whether network neutrality protections should be written into current legislation, the battle lines have been drawn between large telecommunications companies that own the pipes, on one side, and Internet content companies and public interest groups on the other. Although scholarship has begun to catch up with the net neutrality debate, the majority of this work has failed to connect this issue with larger

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ramifications that arise while striving toward a democratic Internet.

In this article, we attempt to broaden the net neutrality debate while briefly taking stock of recent scholarship. 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 open Internet.[1] 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: the struggle for a democratic Internet. We conclude with an exploration of the social and political impacts of this broader conception of network neutrality. These recommendations, we argue, provide a proactive foundation for creating a more open and participatory Internet. This project builds upon an earlier formulation that we referred to as the "New Network Neutrality."

WHY NET NEUTRALITY MATTERS

Network neutrality helps ensure 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 a framework of network neutrality, network operators do not decide what content users can access and cannot impede the flow of or give preferential treatment to particular kinds of content. The loss of network neutrality provisions, in effect, removes a crucial safeguard and increases the likelihood of a discriminatory telecommunications system.

A largely straightforward question of how the network will be operated has been rendered unnecessarily opaque by some of the actors in these debates. In particular, public relations representatives of the phone and cable companies who stand to gain the most from an Internet stripped of net neutrality protections devoted considerable resources toward averting consensus while maintaining a façade of a debate over democratic requirements for an open Internet. Some industry-funded "astro turf" groups have recast the debate as one over government regulation. Christopher Wolf, Co-Chair of HandsOff.org, claimed that "There is no established definition for the concept of 'net neutrality'" and that "Such government control over the evolution of the Internet is unprecedented."[2] Similarly, former Congressman Dick Armey's organization FreedomWorks advocates for such a *laissez faire* regulatory approach.[3] Many of these claims against regulation ignore the fact that the federal government developed, funded, and directly managed the Internet for more than a quarter of a century (until US officials handed over network control to the private sector in the mid-1990s), and continues to actively regulate and subsidize the Internet. Moreover, many of these self-defined anti-regulation organizations appear oddly complacent toward heavy-handed private control over the Internet.

While groups like HandsOff seem driven by a categorical opposition against all governmental interventions, public interest advocates, on the other hand, tend to stress openness as their main concerns. Many groups and individuals within the "Internet freedom" coalition have sought net neutrality as an end in itself, while others have cautioned that net neutrality does not fully restore common carriage and should not be seen as a silver bullet. Josh Breitbart makes the important point that net neutrality is actually a retreat from earlier ideas such as open access and common carriage, which were US law 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 having a dozen different wires running under your street, through your backyard, and into your house.[4]

As Breitbart suggests, 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.[5]

Making sense of what is at stake in current net neutrality debates requires examining key antecedents in telecommunications history. In the following section, we examine the historical context and the current parameters of the debate. This historical context, we argue, is necessary to begin imagining alternative trajectories for internet policy.

HISTORICAL OVERVIEW

Prior to common carriage laws, telecommunication operators were able to abuse their market position. During the Civil War, Western Union controlled 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. As its network expanded in 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. With the rise of telephony and early build out of telephone networks during the early 20th century, public service protections were introduced into the telecommunications regulatory structure, including common carriage.

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 its forced 1984 breakup into the "baby bells," 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 using its lines. Leading up to the Modified Final Judgment that broke up the Bell system, Judge Harold Green in 1982 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."[6] Commissioner Johnson's fears became even more warranted after the 1984 Cable Act and the 1996 Telecommunications Act, which, respectively, allowed cable to remain a closed system and to become an Internet service provider.

The Telecommunications Act of 1996 was the first major overhaul of the landmark 1934 Communications Act and the first comprehensive attempt to reform US 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 conglomeration, lessened consumer protections, and decreased 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 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 100 years of telecom policy and risked changing the open and non-discriminatory nature of the Internet while creating a new class of potential gatekeepers.

MONOPOLY POWER AND CONTENT DISCRIMINATION

The history of content control goes back centuries and bears mentioning given parallels to the outcomes that network neutrality advocates fear today, particularly when looking at the history of the US postal system. For example, analogies can be seen with the abortive attempt in the early 1790s to admit only certain newspapers into the mail. Congress rejected this policy when it enacted the Post Office Act of 1792, which put into law principles of non-discrimination. However, content restrictions persisted, such as postal administrators blocking the dissemination of books via mail, which they argued were too bulky, and southerners after 1835 blocking the circulation of information on slavery.[7] Although varying degrees of content discrimination have persisted, in general the opportunity

for anyone to send anything anywhere without constraint or discrimination was a fundamental assumption of this early US communications system. Alexis de Tocqueville, who credited newspapers and other information delivered via the post as greatly responsible for America's thriving democratic culture, praised the US system.[8]

This openness was periodically challenged, particularly by the monopolistic telegraph industry, which abused its market power. Paul Starr notes historical parallels with contemporary telecommunications marketplaces in which incumbents dominate networks to exploit their existing position rather than innovate and spend little money on research and development, often investing more in politics than in technology. Similar market conditions exist today. Once again, first-mile telecommunications are heading toward near-monopoly status. This time, however, a crucial safeguard is missing; the Internet is no longer classified as a telecom service and is at risk in being transformed into a cable television business model.[9]

Despite network operators assurances to the contrary, over the past several years there have been ominous glimpses of what a non-neutral network might look like. 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 Web site 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. In 2007, AT&T apparently censored a Webcast of the rock band Pearl Jam's anti-Bush political commentary. Also in 2007, Verizon was found blocking the pro-choice organization NARAL's text messages. In 2008, Bell Canada was caught throttling third-party DSL providers' P2P traffic. Perhaps best exemplifying the potential for abusing net neutrality has been Comcast, whose practices of blocking traffic associated with Bit Torrent, a peer-to-peer file-sharing system, were exposed in 2007. These are just a few of the more egregious infractions against net neutrality.

PREVIOUS LITERATURE

Three waves of scholarship addressing the net neutrality debate can be discerned thus far. Although anticipated by earlier debates, the first phase was marked by Timothy Wu's initial formulation of "network neutrality" in his seminal 2003 work, *Network Neutrality, Broadband Discrimination*, where he forwarded the idea that network architectures should be neutral purveyors of data.[10] The debate simmered among a relatively small group of commentators until the Supreme Court's pivotal *Brand X* decision, which catapulted net neutrality to a new level of urgency as the prospects of tiered Internet services paralleling a cable television business model became a distinct reality.[11]

The *Brand X* decision ushered in a second wave of scholarship that was remarkably cautious given the stakes involved. For example, Eli Noam has suggested a "Third Way" for net neutrality limited to "Last Mile" concerns.[12] Christian Sandvig was quick to discount some arguments posed by network neutrality advocates, suggesting that many aspects of net neutrality smacks of an old debate, evidenced by principles laid out by Ithiel de Sola Pool decades earlier. Noting that network neutrality has never been the norm given that all Internet providers have discriminated against certain types of content to some extent, Sandvig called for establishing a set of normative guidelines to distinguish acceptable types of traffic shaping.[13] Less common in this second wave were articles that staked out a position boldly calling for mandated net neutrality.[14]

Currently, we have reached a new phase of the debate, one that places net neutrality provisions in a state of uncertainty. Although prospects seem less dire than when we began working on this issue in 2005-2006, net neutrality protections are still not codified into law. However, even as scholarship has become less complacent toward the loss of net neutrality, we submit that now is precisely the moment that we should be aiming beyond mandated net neutrality for more encompassing safeguards to ensure an open Internet. Much of the existing scholarship and commentary fails to sufficiently emphasize the import of normative principles—principles regarding the role of the Internet in a democratic society and the debt that Internet providers owe to the public. When considering the fact that the four Bell companies earn roughly $14 billion every year from access to Internet content and applications in addition to $20 billion a year in direct access fees from broadband Internet subscribers and when taken in the context of the enormous tax subsidies and other benefits that telecom corporations receive from public entities, this debate should focus more on 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.[15] 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.[16]

Contrary to these general trends lies a neglected tradition located in scholarship that addresses more normative concerns like open architecture, open access, and online

ethics.[17] Wu offers a short list of network neutrality rules that would prohibit carriers from discriminating content. Similarly, Benkler's *Wealth of Networks* advocates for a commons-based policy orientation. Along with Lessig and others, this approach is aligned with the notion of Cooper's "open architecture."[18] 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 soon will disappear.

CURRENT STATE OF AFFAIRS

While net neutrality helps prevent many of the worst market excesses, it does little to ameliorate some of the systemic problems that necessitate it. Media conglomeration and the attendant lack of diversity of ownership and perspectives provide one focal point for discussing network neutrality.[19] From the reemergence of telecommunications giant AT&T to current efforts by FCC Chairman Kevin Martin to relax media ownership restrictions, fewer players are gaining massive market share, creating increasingly vertically and horizontally integrated corporations with the potential to dominate entire market sectors.[20] By many measures, the current FCC regulatory environment fails to spur technological innovation and has retarded expansion of digital inclusion efforts.[21] Instead, the FCC has fostered a decades-long market environment fraught with pricing and geographical discrimination as well as overpriced, substandard telecommunications services.[22]

Exacerbating difficulties in these crucial media policy areas are state and national telecommunications laws that slow innovation and competition in broadband services, thus creating an environment of digital exclusion. To date, more than a dozen states have passed laws that in some way limit competition and prevent innovation in business models, public investment, and public-private partnerships.[23] At the national level, everything from local control over local rights-of-way to consumer protections would be undermined by pending legislation.

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 use their networks. Using 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.

A related issue underlies concerns over surveillance. 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 later in this article). 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.

ABUSE OF MONOPOLY MARKET POWER

The rise of telephony over the past century suggests that our current path 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."[24] AT&T and the Bell system, however, as the primary 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.[25]

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. 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 similar anti-competitive practices.

In 1907, AT&T's new president, Theodore Vail, publicly declared that telephone service should be, in essence, a unified, interoperable, neutral network. AT&T, through the judicious use of governmental regulation—for which AT&T often directly lobbied—was able to create a national interconnected telephone network and grow its market share dramatically during the first three decades of the 20th century (to 66 percent in 1920 and 81 percent in 1932), crushing the "home rule" telephone movement, thus ensuring decades of market dominance until the 1984 divestiture. The public statements of today's telecommunications leaders are explicitly interested in devising ways to close off their networks, maximize their billable minutes, 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 its 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.[26]

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

FCC REGULATORY ENVIRONMENT

Network neutrality protections treat the question of access as a critical element in determining whether a network is being operated in an open manner. Bottlenecks to network access undermine the types of services offered, create artificial scarcity, and lead to increased pricing and lowered quality of service. This is exemplified by current national policy surrounding the licensure of the public airwaves.[27] Well more than 99 percent of the public airwaves are either reserved for governmental use or licensed to private companies.[28] Even though the tiny sliver of so-called unlicensed frequencies has generated enormous economic activity and innovation, everything from WiFi devices to baby monitors, radio phones, garage-door openers, and microwave ovens coexist within these rare frequencies.[29]

The FCC has continued to privilege a model for licensure that allows only a single entity to broadcast on a given swath of spectrum, 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 using 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: Incumbent interests already invested in licensed frequencies seek to prevent competition by maintaining the licensure status quo and thereby dramatically slowing down change or stopping it altogether.

Given the accumulating evidence for broadband connectivity's importance for economic development, purposefully limiting access to the necessary tools to build data communications networks is a disservice to the general populace.[30] Today, most wireless broadband providers are forced to use only a handful of unlicensed frequencies, creating a scarcity of capacity in dense urban areas. Meanwhile, rural areas are often completely neglected by broadband providers. Opening up large swaths of unlicensed frequencies would not only help meet current demand but also provide ample spectrum for future technologies such as cognitive and software defined radios. Yet proceedings to open up additional bands such as 3650-3700MHz or to open up bands to more users and unlicensed devices in unused 700MHz television broadcast frequencies continue to stagnate.

These same problems exist with other telecommunications media. Classical economics dictate that a glut of supply should lower pricing. However, US broadband pricing remains exceptionally high despite the open secret that a majority of fiber infrastructure in the United States is "dark" and remains underused. Information on 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.[31] The reverberating effects from this $750 billion market failure are still hindering US broadband development today. Meanwhile, the FCC has in many cases systematically removed the few remaining checks and balances protecting US residents from corporate malfeasance and market excesses.

US BROADBAND PENETRATION RATES

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.[32] In response to direct lobbying by telecommunications incumbents, more than a dozen states have passed regulations restricting competition in this market sector.[33] As the city of New Orleans discovered during Hurricane Katrina, these state laws often force municipal entities to spend crucial resources on making their networks worse.

Stagnation of US broadband penetration rates relative to a growing number of industrialized nations is due to the combination of the aforementioned factors. While the nation continues to lag further behind, this suboptimal state of affairs is continually worsened by official comments, reports, and protocols that purposefully confuse the issue and hide the extent of the problem.[34] For example, on July 26, 2006, the FCC released its most recent figures on "high-speed services for Internet access." In previous years, the FCC had been lambasted for stating that 99 percent 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 its 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.[35] 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 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.

TOWARD AN OPEN INTERNET

We synthesize existing commons-based models to create a more expansive standard of network neutrality conducive to Internet openness—a model that runs counter to US phone and cable companies' plans and challenges the overly narrow parameters of current public interest arguments. Discussion among pro-and anti-network neutrality camps often 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 use an end-to-end infrastructure consisting of a dumb network or whether a centralized infrastructure should be used 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.[36]

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 email 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 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 used 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

used 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). Once system-wide prioritization levels are in place, an incentive exists to create software to "disguise" data as a higher priority form in order to speed its delivery. Thus, a user might "hide" instant messaging data by using a program that makes it appear to the network routers that these data are VoIP packets; someone downloading MP3 files might use 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 network capacity as router CPU time is used to ensure that each packet is correctly identified. A non-neutral network would create incentives for non-high-speed content providers to use 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.

EXPANDING THE DEBATE

In our view, the ways in which network neutrality has been defined, 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 recommendations go 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.

Our model for an open Internet contains 10 facets that are necessary to ensure an interoperable, interconnected, non-discriminatory, global Internet. We assume that competition is vital at all layers of Internet operations. 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 this analysis map onto the Open Systems Interconnection (OSI) Reference Model, we also incorporate factors that help ensure a politically neutral transport medium as well. In other words, "neutrality" is not just a technical specification; it also facilitates a social contract that supports equity and justice through data communications. Given the shortcomings of traditional neutral networking conceptualizations, this approach envisions a more democratic network infrastructure that:

1. Requires common carriage
2. Supports open architecture and open source driver development
3. Maintains open protocols and open standards
4. Facilitates an end-to-end architecture (*i.e.*, is based upon a "dumb network")
5. Safeguards privacy (*e.g.*, no back doors, deep packet inspection, etc.)
6. Fosters application-neutrality
7. Mandates low-latency and first-in/first-out (*i.e.*, requires adequate capacity)
8. Ensures interoperability
9. Remains business-model neutral.
10. Is governed by its users (*i.e.*, is internationally representative and non-Amerocentric)

The following provides an initial skeleton for what these 10 facets would entail; however, this is only a first step toward achieving full implementation. Substantial work is still required to flesh out these ideas.

RECOMMENDATION 1: REQUIRES COMMON CARRIAGE

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 and service level agreements. As has been seen repeatedly throughout the history of transportation and telecommunications, common carriage protects the general public against price and geographic discrimination and other anti-competitive business practices. Since 2000, the number of Internet service providers has nearly halved (from 8,450 in 2001 to 4,417 in 2005). With the demise of common carriage provisions resulting from the *Brand X* Supreme Court decision, this number will continue to decrease.

RECOMMENDATION 2: SUPPORTS OPEN ARCHITECTURE AND OPEN SOURCE DRIVER DEVELOPMENT

Open architecture and open source driver development encourage a digital commons by keeping both the

hardware itself and any hardware access layer(s) open. As 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, creating potentials for secondary network closure.[37] Open architectures and access layers help promote competition by creating opportunities for new market entrants and rapid innovation of features and functionality.

RECOMMENDATION 3: MAINTAINS OPEN PROTOCOLS AND OPEN STANDARDS

Maintaining open protocols and standards helps ensure free-flowing, non-enclosed Internet services. This, in turn, facilitates innovation and widespread adoption of technologies. With the growing pull toward proprietary networking (especially within the wireless medium), it is vitally important to prevent the so-called Balkanization of the Internet. Protocols and standards are the building blocks for everything from interoperability to end-to-end connectivity.

RECOMMENDATION 4: SUPPORTS AN END-TO-END ARCHITECTURE

End-to-end architectures (E2E) help remove vulnerabilities to bottlenecks, gate-keeping, illegal surveillance by telcos, etc. E2E helps speed network throughput and increases network capacity while lowering network equipment costs and supporting peer-to-peer communications. An end-to-end architecture helps prevent both governmental and corporate interference in network traffic, an outcome that is especially important at a time when surveillance and digital rights management concerns are increasingly prevalent.

RECOMMENDATION 5: SAFEGUARDS PRIVACY

Private networks do not privilege state security imperatives that compromise individual privacy rights and help ensure a non-discriminatory environment for content access and information dissemination. 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.[38]

RECOMMENDATION 6: FOSTERS APPLICATION-NEUTRALITY

With application neutrality, Internet television, VoIP, and diverse operating systems and services run unimpeded. Expected convergences in digital communications make this principle increasingly crucial to the long-term growth and health of the Internet. Digital Rights Management (DRM) considerations such as copyright also make this a critical facet for a more open Internet. In much the same way that telephone systems are neutral transport mediums for voice communications, the Internet must remain free from discriminatory practices that privilege some applications, services, or features over others.

RECOMMENDATION 7: MANDATES LOW-LATENCY AND FIRST-IN/FIRST-OUT

Low-latency and first-in/first-out helps remove the impetus for data packet and application discrimination by requiring that a service provider's profit margins adhere to the fundamental basic corporate responsibility to provide adequate services to its customers. These mandates help lower over-subscription rates, artificial scarcity, and the hoarding of dark fiber assets by mandating adequate capacity and providing incentive for network and capacity upgrades.

RECOMMENDATION 8: ENSURES INTEROPERABILITY

Interoperability harmonizes different systems and integrates foreign attachments. This is especially important to the continued global expansion of broadband service provision. As Cooper points out, interoperability lowers costs while increasing the collaborative potential of the Internet. Interoperability is critical to ensuring that the 80 percent of humanity who are not currently online will be able to interconnect with next generation telecommunications infrastructures.

RECOMMENDATION 9: REMAINS BUSINESS-MODEL NEUTRAL

A business-model-neutral infrastructure 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 limited to specific business models.

RECOMMENDATION 10: IS GOVERNED BY ITS USERS

We recommend replacing and/or dramatically expanding control over important governance institutions like ICANN in a way that internationalizes control over such a vital global resource. The current US-controlled ICANN model is unsustainable over the long term.[39] Expanding governance would also help remove artificial scarcity and hoarding of IPv4 addresses. As Milton Mueller and others have documented, control over global communications networks and the Internet, in particular, has remained Amerocentric.[40] Moreover, purportedly representative bodies like ICANN and the Regional Internet Registries (RIRs) often appear to privilege industry interests.

CONCLUSION

We submit that the implementation of these 10 principles will create a more participatory Internet. On a fundamental level, an open system is key to network growth and innovation. We acknowledge that our model does not address all material inequities, such as digital divide and lack of universal service issues, which, to be sufficiently remedied, require a redistribution of critical resources. Nor do we tackle some issues related to copyright, surveillance, and other contemporary political battles. However, our recommendations, if enacted, could improve the global deficit in Internet connectivity and help propel the United States toward its goals of universal, affordable broadband. These principles could help establish normative parameters to guide policy makers, both national and global, in their quest to create a better Internet. Ideally, these principles will be presented as a broadband democracy manifesto to be endorsed by members of Congress, state legislatures, and political candidates. Although piecemeal efforts are better than no movement at all, only if approached in tandem will these steps constitute a model for the Internet that is simultaneously open, democratic, and efficient.

NOTES

1. This article builds on an earlier version written in fall 2008 published as Sascha D. Meinrath and Victor W. Pickard, "The New Network Neutrality: Criteria for Internet Freedom," *International Journal of Communication Law and Policy*, 12, 225-243 (2008).
2. *See http://www.handsoff.org/blog/* "Hands Off the Internet" at one point was spending roughly $400,000 a day on TV and newspaper advertising to promote a position identical to corporate sponsors like AT&T.
3. *See http://freedomworks.org/*.
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7. Richard John, Spreading the News: The American Postal System from Franklin to Morse (Cambridge: Harvard University Press 1998). We are also indebted to Richard John's personal communications regarding these points.
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9. Paul Starr, The Creation of the Media: Political Origins of Modern Communications (Basic Books: New York, NY, 2004).
10. Timothy Wu, "Network neutrality, Broadband Discrimination," *Journal of Telecommunications and High Technology Law* (2), 141-179 (2003).
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23. *See* APPA's "State Barriers to Community Broadband Services."
24. Paul Starr, *supra* n.9, at p.193.
25. *Id.* at 201-202.
26. Paul Taylor, "AT&T chief warns on internet costs," *http://www.ft.com/cms/s/2/3ced445e-91c5-11da-bab9-0000779e2340.html*.
27. *Supra* n.20.
28. Slotten, 2000.

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31. Om Malik, Broadbandits: Inside the $750 Billion Telecom Heist (John Wiley & Sons, Inc: Hoboken, NJ).
32. James Baller, *http://www.baller.com/pdfs/Baller_Proposed_State_Barriers.pdf* (accessed June 30, 2007).
33. Ironically, these are often the same companies, such as AT&T, which are lobbying against similar regulations at the national level.
34. 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. In 2008, the OECD still ranked the 15th for overall nationwide broadband penetration. This report runs contrary to recent governmental assurances regarding the rosy outlook on the state of broadband in the United States. *See* National Telecommunications and Information Administration, "Networked Nation: Broadband in America," Jan. 30, 2008. This report concludes that "a reasonable assessment of the available data indicates" that President Bush's 2004 objective of affordable access to broadband for all by 2007 has been realized "to a very great degree."
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