Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

	)	
In the Matter of	)	
	)	
Preserving the Open Internet	)	GN Docket No. 09-191
	)	
Broadband Industry Practices	)	WC Docket No. 07-52
	)	

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INTRODUCTION AND EXECUTIVE SUMMARY

At the dawn of the broadband Internet era in the late 1990s, then-FCC Chairman William Kennard explained the fundamental challenge facing policymakers that seek to promote broadband deployment and adoption:

> We sometimes get so caught up in the policy debates about broadband . . . that we forget what we need to do to serve the American public. . . . *We have to get these pipes built*. But how do we do it? We let the marketplace do it. . . . [T]he best decision government ever made with respect to the Internet was the decision that the FCC made . . . NOT to impose regulation on it. This was not a dodge; it was a decision NOT to act. It was *intentional restraint born of humility*. *Humility that we can't predict where this market is going*.[1]

Chairman Kennard thus vowed to "follow a piece of advice as old as Western Civilization itself: *first, do no harm*. Call it a high-tech Hippocratic Oath."[2] He (and the Commission) accordingly rejected calls for "open access" regulation of cable modem service, then the dominant form of broadband Internet access.[3]

This "high-tech Hippocratic Oath" remains as critical as ever to sound broadband policy. By any measure, the Commission's decision *not* to regulate the Internet in general or broadband Internet access in particular is still, in Chairman Kennard's words, "the best decision government ever made with respect to the Internet." It is a decision that successive bipartisan majorities of this Commission have reaffirmed since the 1990s. And it is validated every day by the spectacular growth of the Internet and its remarkable contribution to our culture, our political discourse, and our economy. That success is reason enough to stick with what has worked under the status quo: continued application of the four principles of the *Internet Policy Statement* to

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[1] William Kennard, *The Road Not Taken: Building a Broadband Future for America*, FCC (June 15, 1999), http://www.fcc.gov/Speeches/Kennard/spwek921.html (emphasis added).

[2] *Id.*

[3] *See* Discussion § I.A, *infra* (describing Commission's multiple decisions between 1999 and 2007 to reject proposals for regulating broadband Internet access services).

the wired broadband Internet and, perhaps, adoption of a new, fifth principle to encourage greater consumer-oriented transparency about network-management practices. AT&T supports that approach because it strikes the right balance. It preserves the openness of the Internet, while maintaining incentives for broadband providers to make the massive investments necessary to achieve this country's ambitious broadband deployment goals. It also encourages those providers to invest in the next-generation "smart" networks that are needed to support the innumerable new applications that will not only enrich our daily lives, but make us healthier, safer, more energy efficient, and more prosperous.

Unfortunately, the Commission's NPRM[4] charts an unwise, unwarranted, and unprecedented reversal in course. It proposes sweeping new regulations that would convert the consumer-focused principles in the *Internet Policy Statement* into provider-specific prescriptive "rules," add two more to the mix, and extend them to one of the most dynamic, albeit bandwidth-constrained, sectors in the Internet ecosystem: wireless broadband services. It would impose all this regulation even though, with the proliferation of 3G wireless services, the broadband marketplace is more competitive than ever. It is more competitive than in 2005, when the Commission freed wireline providers from the last vestiges of legacy telephone-monopoly regulation (*see* Discussion § I.A, *infra*). And it is certainly more competitive than in 1999 and 2000, when the Kennard Commission refused to regulate then-dominant cable modem services. Indeed, far from being a "cozy duopoly" as some pundits claim, wired broadband Internet access services are robustly competitive, as evidenced by increased speeds, rapidly growing usage, significantly declining prices on a per-bits-consumed basis, and very substantial customer

[4] Notice of Proposed Rulemaking, *Preserving the Open Internet*, GN Docket No. 09-191, WD Docket No. 07-52, FCC No. 09-93 (rel. Oct. 22, 2009) ("NPRM").

"churn" rates for both cable and telco broadband providers.[5] This intermodal competition will only further intensify as wireless broadband providers invest billions of dollars to upgrade their existing 3G networks to faster iterations of 3G and to 4G technologies.

The NPRM proposes all this new regulation, moreover, without any credible data-driven evidence of any market failure amid this robust competition. Instead, it bases its hyper-regulatory proposals solely on the basis of speculation that a market failure *might* arise someday in the future. This speculation rests on three deeply flawed premises: (1) that the Internet has always been a collection of "dumb pipes" that cannot distinguish among packets based on their associated applications or content; (2) that "[a]s a platform for commerce," the Internet therefore "does not distinguish between a budding entrepreneur in a dorm room and a Fortune 500 company" (NPRM ¶ 4); and (3) that only recently have new "[t]ools" emerged "that enable network operators to prioritize" particular data (NPRM ¶ 8) and that somehow threaten the Internet's historic openness and "neutrality." This threat, the NPRM posits, demands immediate, preemptive intervention.

Each of these premises is wrong. The Internet has never been merely a collection of "dumb pipes." And it has never been "neutral" in its treatment of different applications and content. Rather, content providers with capital resources have long purchased specialized network services in order to distinguish their traffic from other Internet traffic and to offer their

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[5] *See* Craig Moffett *et al.*, Bernstein Research, *Broadband: Are We Reaching Saturation?*, at 4, Exhibit 2 (Aug. 14, 2007) (estimating monthly churn rates for cable broadband at between 2.4 and 3 percent, equating to annual churn rates of between 28.8 and 36 percent annually); Mike Farrell, *Broadband Pickup Seen Next Quarter*, Multichannel News, Aug. 19, 2007 (quoting Moffett), http://www.multichannel.com/article/130156-Broadband_Pickup_Seen_Next_Quarter.php; Confidential Declaration of John Rieth on Behalf of AT&T, WC Docket Nos. 09-191, 07-52 (Jan. 14, 2010) ("Rieth Declaration") (Exh. 4 to this filing). We have separately filed the Rieth Declaration with a request for confidential treatment pursuant to the Commission's rules. *See* 47 C.F.R. §§ 0.457, 0.459.

end users far better Internet experiences than would be possible without those quality-of-service enhancements. And, finally, the "new tools" to which the NPRM refers are not new at all. Specifically:

- Nearly three decades ago, the Internet Engineering Task Force (IETF)—the Internet's standard-setting organization—first included a "type of service" field within the Internet Protocol to enable prioritization of real-time and other performance-sensitive applications. It expanded upon that capability in 1994 and 1998 by creating the "differentiated service code point" field ("DSCP" or "DiffServ"), and it has now incorporated an even more advanced version of this capability into IPv6.

- Broadband providers have long sold "enhanced or prioritized" capabilities (*cf.* NPRM ¶ 106) to enterprise customers—including content providers—to ensure proper handling of performance-sensitive Internet content through a broadband provider's network. Such services can make use of packet-prioritization techniques on several protocol layers, including DiffServ on the IP layer and analogous mechanisms on other layers, such as the ATM, Ethernet, and MPLS protocols. Broadband providers have offered customers such prioritization capability through both commercial arrangements and tariffs deemed lawful by this Commission.

- AT&T and other broadband providers use the same types of service-differentiation technologies in the residential market as well to enable quality of service for performance-sensitive IP applications and content, such as IPTV and VoIP, that are offered to consumers over the same physical infrastructure as best-effort Internet access.

- In addition to these prioritization techniques, application and content providers with the financial resources to purchase services from third-party content-delivery networks ("CDNs") such as Akamai or Limelight—or to build CDNs of their own, as Google and other large content providers have done—enjoy huge performance advantages over rivals without those resources.

- Content providers are exploring even more advanced, cost-efficient new ways to distribute bandwidth-intensive, performance-sensitive content, including *CDN collocation*, where a content provider stores content on cache servers located within (not merely near) access/aggregation networks, and *multicasting*, where an access network's routers instantaneously replicate and route multiple copies of packets to many different points within an access/aggregation network.

The NPRM barely mentions any of these pro-consumer practices, and it overlooks most of them altogether—even while proposing rules, and in particular a strict "nondiscrimination" rule, that would cast doubt on their continued lawfulness.

Just as there is nothing new about network practices that ensure quality of service for particular Internet applications and content, neither is there is any basis for concern that such practices pose some new threat to the Internet's openness. To the contrary, although such practices have proliferated for years without controversy, and have been incorporated into services offered to content and application providers, the Internet has never been healthier or more open. Since the advent of broadband nearly fifteen years ago, pro-regulation advocates have insisted that, without regulatory intervention, "broadband [providers] . . . . will destroy, once and for all, the egalitarian vision of the Internet."[6] These predictions have always proven wrong, and they have no greater credibility now.

Indeed, the Internet has evolved in dramatically pro-consumer ways just in the five years since the Commission removed the last vestiges of economic regulation from wireline broadband providers in 2005:

- New social networking applications (*e.g.*, Facebook, Twitter) and multimedia sites (*e.g.*, YouTube, Hulu) have exploded in popularity and reshaped American life.
- Wired broadband providers have invested tens of billions of dollars, and created tens of thousands of jobs, to upgrade their networks (*e.g.*, U-verse, FiOS, DOCSIS 3.0) in order to provide the triple play of voice, video, and Internet access. In 2009 alone, AT&T devoted approximately two-thirds of its *roughly 18 billion dollar* capital expenditure budget to extending and enhancing its wireline and wireless broadband networks.
- Internet access speeds have increased dramatically, even as the price of Internet access has plummeted in real terms (by units of bandwidth consumed). Indeed, despite using service differentiation functionality to ensure IPTV and VoIP service quality on the U-Verse platform, AT&T nonetheless offers residential customers *far faster* Internet access services over this shared infrastructure (up to 24 Mbps) than it offered over its prior Internet-only DSL facilities (which *topped out* at 6 Mbps). Such innovation has garnered AT&T awards for offering "great value and a cutting edge experience to millions of consumers." *See* pp. 53-54, *infra.*

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[6] Lawrence Lessig, *The Future of Ideas: The Fate of the Commons in a Connected World* 176 (2001) (emphasis in original; quoting with approval Charles Platt, *The Future Will Be Fast But Not Free*, Wired, May 2001, http://www.wired.com/wired/archive/9.05/broadband.html).

- 3G wireless broadband services have surged, supplying not only the "third pipe" to consumers, but also, in many areas, the fourth, fifth, and sixth pipes.

- Today, despite dire predictions just three years ago that wireless providers would "cripple" the Wi-Fi capabilities of their handsets to protect their 3G services from competition,[7] *every* major wireless provider sells a Wi-Fi-enabled handset (AT&T currently sells sixteen) as well as handsets that support VoIP over Wi-Fi and 3G connections.

- The wireless marketplace also boasts a range of platforms that have spawned literally hundreds of thousands of wireless applications from third-party developers. This trend—kick-started by the iPhone and embraced by network operators, handset manufacturers, and operating system providers—continues its rapid expansion. Just last week, AT&T announced five new Android handsets that will soon join the many other Android-based devices on the market today, including Google's own Nexus One "super phone."

Consumer demand, not regulation, produced all these pro-consumer breakthroughs. And contrary to the dystopian commentary the NPRM appears to credit, consumer demand will continue preserving the open Internet for years to come. Indeed, the Internet has become the most powerful engine of economic growth in our time precisely *because* the government has allowed market forces to shape its evolution without regulatory preconceptions about what form that evolution should take.

In short, each of the core premises underlying the NPRM's pro-regulatory proposals is flawed. Because the NPRM's premises cannot withstand analysis, neither can the regulatory proposals that the NPRM bases on those flawed premises. Here we briefly summarize six of the most significant flaws in the proposed rules.

First, the proposed definitions of "broadband Internet access" and its component terms—and thus the scope of any "net neutrality" rules—are grossly overbroad and would have severe unintended consequences. As formulated in the NPRM (Appendix A, § 8.3), these

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[7] *See* Tim Wu, *Wireless Net Neutrality: Cellular Carterfone and Consumer Choice in Mobile Broadband*, New America Foundation Wireless Future Program, at 24 (Feb. 2007), http://www.newamerica.net/files/WorkingPaper17_WirelessNetNeutrality_Wu.pdf.

proposed definitions would cover any service that includes data transmission and the ability to reach an Internet address. The definition would therefore extend the scope of the proposed rules to a far greater range of existing and future pro-consumer services than the Commission appears to intend, including VPNs, IPTV, facilities-based VoIP, Telepresence, e-Readers, and machine-to-machine ("M2M") services such as smart meters, other "green initiative" mechanisms, vehicle telemetry, remote health monitoring, and many others. In so doing, the NPRM's restrictions could delay or prevent the development of the very technological innovations that this Administration has identified as core priorities, including Smart Grid, telecommuting, e-learning, remote healthcare, and other broadband Internet-based initiatives that could promote economic growth, improve education, protect the environment, and conserve critical resources and infrastructure.

The Commission should thus narrow these definitions to address the services that have been the focus of the Commission's Internet policies since the dawn of the broadband age. It should define "broadband Internet access service" as a service that offers to the public the capability to transmit data to, and receive data from, *all* or *substantially all* endpoints that have a unique IANA-assigned Internet address that is publicly announced and globally reachable, either directly or through a proxy. And it should focus its analysis in this proceeding on those services and on the Internet applications and content provided via those services.

Adopting this more precise and workable definition of broadband Internet access service will obviate the need to create any ad hoc category of "managed or specialized" services, which the Commission could neither coherently define nor reasonably regulate. And it will help avert a new generation of indeterminate, lawyer-driven debates about the proper regulatory classification of countless emerging IP-based services that do not involve Internet access service.

Of course, choosing a proper definition for "broadband Internet access service" does not resolve any substantive question about whether the services within that category should be regulated. As discussed below, we do not believe the Commission should adopt prescriptive "net neutrality" rules governing *any* of these services, particularly wireless broadband Internet access services.

Second, the proposed strict "nondiscrimination" rule would inflict a range of unintended harms on American consumers and content/application providers with no corresponding benefits. Despite its name, the "nondiscrimination" rule is not needed to keep broadband Internet access providers from blocking, degrading, or otherwise "discriminating" against disfavored applications or content. As the Commission has made clear, the existing four principles already address such conduct. The rule is likewise unnecessary to keep broadband providers from imposing unilateral "tolls" on any content provider for access to end users over their increasingly robust "best-effort" Internet access platforms, because, again, the existing principles already address any blocking or degradation of traffic and thus eliminate any theoretical leverage providers may have to impose such unilateral charges. Instead, the proposed strict nondiscrimination rule would (among other things) ban any broadband provider from entering into voluntary remunerative agreements with content providers to provide special quality-of-service ("QoS") enhancements over some undefined portion of its network for performance-sensitive applications.

This is not a "nondiscrimination" rule in any conventional sense, and it bears no resemblance to the much more flexible "unreasonable discrimination" standard of 47 U.S.C. § 202(a), which was first applied to *telephone monopolists* in 1934 and has governed the provision of telephone service ever since. The NPRM could have provided a more rational, consumer-focused framework for discussion had it proposed something more akin to that

approach: a rule that would permit broadband providers to enter into commercial QoS agreements with application and content providers but would prohibit them from unreasonably and anticompetitively discriminating *among* such providers in ways that would harm Internet users' experience or choice.[8] Instead, the misnamed "nondiscrimination" rule proposed in the NPRM would be a full-blown line-of-business restriction in that it would flatly ban such agreements altogether, whether discriminatory or not. That proposed ban is badly misconceived, as discussed in these comments, in the attached analysis of Professors Gerald Faulhaber and David Farber (Exh. 1), and in the separate declaration of Professor Marius Schwartz (Exh. 3).

To begin with, the proposed ban on business-to-business QoS agreements would cast doubt on the lawfulness of many *existing* traffic-management practices that are central to today's Internet—a problem that the NPRM does not appear to acknowledge. Just as important, it would thwart the promise of IP convergence. The only affordable way to support all electronic communications on a converged IP platform—what Congress described in the Recovery Act as "maximum utilization of broadband infrastructure"[9]—is to build smart networks that use capacity *efficiently*, not to keep networks "dumb" and compensate for the ensuing inefficiency by massively overbuilding capacity and passing through the unnecessary costs to consumers. In particular, broadband networks must be smart enough to accommodate arrangements for the

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[8] *See* Letter from Sen. Olympia J. Snowe to Chairman Julius Genachowski, FCC, at 1 (Oct. 22, 2009) (raising "unreasonable and anticompetitive discrimination" standard); Letter from James W. Cicconi, AT&T, to Chairman Julius Genachowski, FCC, GN Docket No. 09-191, at 1-2 (Dec. 15, 2009) (same); Letter from James W. Cicconi, AT&T, to Chairman Julius Genachowski, FCC, GN Docket No. 09-191 (Jan. 12, 2010); Eric Schmidt, Google, & Lowell McAdam, Verizon Wireless, *Finding common ground on an open Internet*, Google Public Policy Blog, Oct. 21, 2009, http://googlepublicpolicy.blogspot.com/2009/10/finding-common-ground-on-open-internet.html (joint blog post arguing that broadband providers should not "unreasonably discriminate in ways that either harm users or are anti-competitive").

[9] American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115, div. B, tit. VI, § 6001(k)(2)(B) (Feb. 17, 2009) ("Recovery Act").

special handling of performance-sensitive applications that need service enhancements to function well. And voluntary business-to-business agreements between network operators and application/content providers are by far the most efficient means for delivering such enhancements to the services that need them in the manner that consumers most value. Such arrangements benefit *all* parties: Application/content providers obtain the performance they need and want; network operators gain the proper incentives to expand their deployment of "smarter" networks capable of supporting innovative new applications and content; and consumers receive the high-quality service experiences they desire.

By forbidding such agreements, the proposed strict "nondiscrimination" rule would deny consumers the benefit of many performance-sensitive IP applications in that it would ban the technologies needed to provide those applications in a cost-efficient manner. And it would likewise deprive content providers—particularly small providers seeking inexpensive alternatives to traditional content-distribution networks—of efficient new means for distributing performance-sensitive content. For example, the rule could foreclose emerging multicast arrangements for the efficient distribution of real-time, high-definition video to many different viewers simultaneously over the Internet. It could destroy ongoing efforts to develop a means of preserving high-quality treatment of voice signals as they travel across different 4G LTE wireless networks, where voice will ultimately be just one IP application among many.

More generally, the rule would suppress investment in countless next-generation business models, because no company will invest millions of dollars in business plans that an unpredictable regulator might outlaw several years later. The casualties could include a range of ventures and socially valuable technologies that would benefit not just individual consumers, but also society at large, by compromising the development of technological initiatives needed to

serve this Administration's policy goals, including critical environmental and healthcare objectives. Last but not least, restricting broadband Internet access providers from entering into remunerative QoS agreements with application and content providers would push end-user rates up, force ordinary users to subsidize the bandwidth-intensive activities of a comparative few users, and exacerbate the digital divide.

Third, while there is no basis for imposing the proposed rules on <u>any</u> broadband platform, the NPRM compounds the problem by proposing to extend those rules for the first time to <u>wireless</u> broadband services. To begin with, there is a glaring *lack of need* for regulatory intervention in the provision of wireless broadband services. Wireless broadband providers have been expanding, investing, and innovating at an astounding pace, all without regulatory intervention or any identified market failure. Indeed, wireless providers offer consumers even more choices, on even more levels, than do their wired counterparts. Those choices continue to expand almost daily, as illustrated most recently by AT&T's announcement of five new Android handsets and Google's introduction of the Nexus One. It would make no sense for regulators to step into this well-functioning marketplace for the purpose of *narrowing* those consumer options.

To the contrary, the Commission would stunt the growth of this key segment of the broadband marketplace if it were to subject wireless broadband providers to strict nondiscrimination and vague network-management restrictions, coupled with after-the-fact liability for any provider that guesses wrong about how to manage its spectrum in the best collective interests of its diverse customer classes. Wireless services present unique network-management challenges, reflecting not only severe spectrum limitations but also tremendous flux in the platform itself, as the industry transitions to 3G and 4G. As the wireless ecosystem evolves, providers will need wide latitude to experiment and reach consensus on what is needed,

what works, and what does not. All of these points are discussed in detail below and in the attached analysis of Professor Jeffrey Reed and Dr. Nishith Tripathi (Exh. 2).

In addition, the Commission cannot responsibly saddle wireless broadband providers with new regulations that restrict their ability to manage limited capacity in the face of what Chairman Genachowski has aptly described as a "looming spectrum crisis."[10] As both the Department of Justice and NTIA have recognized, the Administration has made it a key priority to avert that crisis by freeing up more spectrum for broadband. That initiative will go much further than any regulation could to ensure the vibrancy and openness of wireless broadband services. The Commission should defer any consideration of regulatory intervention until after it has fully met that objective and has allowed the wireless broadband marketplace to continue building, investing, and innovating.

Finally, the Commission could not sensibly or lawfully impose "openness" requirements on wireless providers after announcing in 2007 that it would conduct an "open platform" experiment exclusively on the 700 MHz C Block spectrum. That experiment, which has not yet begun, will add yet another distinct option to the diverse wireless marketplace, making it both unnecessary and inappropriate for the Commission to impose new net neutrality obligations on the rest of the wireless industry. Indeed, extending those obligations to non-C-Block licensees, after inducing them to pay *billions of dollars more* for their spectrum precisely to avoid such obligations, would constitute an unlawful regulatory bait-and-switch.

Fourth, "reasonable network management" should be defined more broadly for all platforms. In the dynamic Internet marketplace, characterized by rapidly changing technology,

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[10] Prepared Remarks of Chairman Julius Genachowski to the Int'l CTIA Wireless IT & Entm't Show, *America's Mobile Broadband Future*, at 4 (del. Oct. 7, 2009), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-293891A1.pdf ("*Oct. 2009 Genachowski Remarks*").

all providers must have flexibility to address their innumerable different network-management challenges with a commensurately broad range of network-management tools. The NPRM appears to recognize this crucial need for flexibility by rejecting a "strict scrutiny" standard for "reasonable network management." But the new standard it now proposes—under which "reasonable network management" would be defined as "reasonable practices" to address congestion, quality of service, and other concerns—is hopelessly circular and vague. And it would therefore provide no meaningful guidance to network operators facing new network-management challenges every day. The Commission should take the next logical step by replacing that standard with a *rebuttable presumption* of reasonableness for any network-management practice adopted to safeguard networks or protect consumers from harm, mitigate congestion, or otherwise further a legitimate interest of the network operator.

Fifth, any transparency requirement should apply only to customer-usage-related limitations. While AT&T supports a principle favoring increased transparency about network-management practices, disclosures geared to consumers should be sufficient. It would be unnecessary, wasteful, counterproductive, and potentially harmful to network security to require providers to make additional disclosures to non-customer content and application providers (as well as hackers and terrorists), as the NPRM currently proposes. In particular, broadband providers should not be required to divulge the technical and often highly proprietary details of their network-management techniques either to their broadband competitors or to those who may seek to evade those techniques to the detriment of the network and consumers.

Sixth, any rules adopted in this proceeding must be applied evenhandedly to all information service providers that have market power and serve a "gatekeeper" role for how consumers experience the Internet or whether content providers succeed or fail. If, despite the

foregoing, the Commission were nonetheless to adopt the rules proposed in this proceeding, those rules would fail to protect the "open Internet" unless they were extended to all Internet-based information service providers that (unlike broadband Internet access providers) actually exercise market power and play a gatekeeper role that substantially influences consumers' Internet experiences. For example, Google—with an entrenched market share of greater than 70 percent of the search market—shapes how consumers actually experience the Internet more than any given broadband provider possibly could. Google's control over search and the Internet is enhanced by its control over search advertising, the "lifeblood of the digital economy."[11] And there is concrete evidence that Google has repeatedly exploited that gatekeeping power to the detriment of consumers, content providers, and Internet "openness." Thus, while AT&T continues to believe that no rules are necessary, the Commission cannot rationally impose rules on one set of providers based on *hypothetical* concerns while exempting other providers that act as Internet gatekeepers and have engaged in *actual* misconduct.

All of these flaws in the proposed rules underscore the dangers of regulating this evolving and almost unfathomably complex ecosystem. And since the inception of broadband services in the 1990s, this Commission—through Democratic and Republican administrations alike—has kept the broadband marketplace free from precisely the types of economic regulation and government micromanagement proposed here by faithfully following Chairman Kennard's "high-tech Hippocratic Oath." The Commission should reaffirm that oath now.

* * *

These comments are divided into two major parts: a detailed Engineering Background, followed by a Discussion section. We urge the Commission to read the Engineering Background

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[11] Susan Wojcicki, *Making Ads More Interesting*, The Official Google Blog, Mar. 11, 2009, http://googleblog.blogspot.com/2009/03/making-ads-more-interesting.html.

section with particular care. The modern Internet, shaped by millions of individual market transactions over two decades, is one of mankind's most complicated inventions. The Commission cannot responsibly contemplate the merits of its proposed interventionist rules without a clear understanding of the technological complexities involved and the scope and gravity of the unintended consequences that such regulation would inflict on American consumers.

The ensuing Discussion is broken into eight main sections. Section I explains why, ever since the Clinton Administration rejected the initial calls to regulate the Internet, the broadband market has responded with unparalleled investment and innovation and remains one of the few job-producing bright spots in the American economy today. It also surveys how foreign and international regulatory authorities have analyzed the "net neutrality" debate and why the rules proposed here could make the United States a regulatory outlier. Section II turns to the threshold definitional issues noted above. Section III then demonstrates why the proposed strict "nondiscrimination" rule (1) is irrationally more rigid than the corresponding rule imposed on the telephone monopolists of 1934; (2) would cast doubt on the continued legality of many efficient market arrangements and innovative, pro-consumer services that no one had previously questioned; (3) would nip in the bud the innovative techniques needed to bring new Internet applications and content to consumers; and (4) is completely unjustified by any real or potential market failure.

Section IV discusses why it would be particularly irrational to apply these proposed new rules to *wireless* broadband Internet access services, given their acute network-management challenges and the absence of any demonstrable need to regulate that highly dynamic category of services. Section V explains why the Commission should not issue a list of "preapproved"

network-management techniques or narrow the definition of "reasonable network management," but should instead create a rebuttable presumption that a network management practice that is intended to address a legitimate provider interest—such as safeguarding consumers or networks or mitigating congestion—is reasonable, unless and until a complainant demonstrates otherwise.

Section VI addresses why the Commission should adopt a "transparency" principle but orient it to the information relevant to *consumers* so that *they* can make informed choices. Section VII then discusses why, if the Commission adopts any new rules in this proceeding, it must apply them not only to broadband Internet access providers, but also to any real or potential "gatekeepers" that have market power and can significantly influence the Internet experiences of consumers.

Finally, Section VIII explains why adoption of the proposed rules would be not merely unwise, but also unlawful. First, the Commission lacks authority, "ancillary" or otherwise, to impose common-carrier-type rules on broadband Internet access providers. Indeed, the Communications Act expressly bars the Commission from "treat[ing]" any information service provider "as a common carrier,"[12] as these rules would do. Second, adoption of the rules would constitute an unjustifiable break with prior Commission precedent, which has held for over a decade that the broadband market is healthy and competitive and that any form of common-carrier or economic regulation would be both unnecessary and harmful. The Commission cannot lawfully reverse course now and conclude, in the teeth of all available market data, that the Internet is somehow imperiled. Even the deference normally accorded to the Commission's "predictive judgments" does not stretch so far as to support prophylactic rules designed to prevent entirely speculative harms. Such rules are particularly indefensible when they implicate

[12] 47 U.S.C. § 153(44).

First Amendment concerns, as these would, by precluding market actors from enhancing particular messages to communicate more effectively with the public. The rules also would create an uncompensated taking of broadband networks in the service of dubious social objectives. Finally, as discussed above, extending the rules to wireless broadband services would be completely unjustified and would unlawfully violate the Commission's regulatory commitments in the *700 MHz Order*, on which AT&T and others relied when bidding billions of extra dollars on non-C-Block spectrum.

ENGINEERING BACKGROUND

A. The Development of the Internet.

Because this proceeding concerns "the Internet," we first address what that term signifies. The "Internet" is not a single network, much less a public utility. It is instead a loose confederation of thousands upon thousands of networks, most of them built and operated with private risk capital, with no guaranteed returns. Without government compulsion or intervention, each of these constituent networks has voluntarily adopted a common protocol and addressing scheme—the Internet Protocol ("IP")—that enables its customers to communicate with customers connected to other networks for purposes of exchanging higher-layer applications and content.[13] "The Internet," as that term is commonly used, is a *conceptual aggregation* of these mostly private IP-based networks spread across the world.

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[13] *See* Resolution of the Federal Networking Council, Oct. 24, 1995 (quoted in Barry M. Leiner *et al.*, *A Brief History of the Internet*, ISOC, http://www.isoc.org/internet/history/brief.shtml) ("'Internet' refers to the global information system that—(i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons; (ii) is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; and (iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein.").

The Internet Protocol and its predecessors were first formulated several decades ago by academics and consultants funded by the Advanced Research Projects Agency ("ARPA"), a subagency within the Department of Defense. But the government does not own, license, or control IP.[14] In particular, this Commission has long steered clear of "standard-setting issues for the Internet Protocol language itself, which are more appropriately addressed in other fora, or other items outside this Commission's jurisdiction, such as Internet governance."[15] Instead, the development of the Internet Protocol is overseen by the Internet Engineering Task Force ("IETF"), a private entity that aptly describes itself as "a loosely self-organized group of people who contribute to the engineering and evolution of Internet technologies."[16]

For many years after its inception, the Internet operated as a closed "walled garden": Entry was restricted to academic and governmental institutions and their consultants, and commercial transactions were strictly prohibited. In the early 1990s, the federal government fully "privatized" the Internet by selling key infrastructure assets, including an integral backbone network known as NSFNET, to private network operators. Traditionalists protested, arguing that the profit motive would corrupt the medium.[17] In particular, "the research and education community[]" was "concern[ed] that 'commercialization' . . . would affect the price and quality

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[14] Jason Oxman, *The FCC and the Unregulation of the Internet*, FCC, Office of Plans and Policy, OPP Working Paper No. 31, at 5 (July 1999), http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp31.pdf ("No one owns the Internet protocol, no one licenses its use, and no one restricts access to it.").

[15] Notice of Proposed Rulemaking, *IP-Enabled Services*, 19 FCC Rcd 4863, 4864 ¶ 1 n.1 (2004).

[16] *See* IETF, *The Tao of IETF: A Novice's Guide to the Internet Engineering Task Force* (Nov. 30, 2009), http://www.ietf.org/tao.html.

[17] *See* Richard Bennett, Information Tech. & Innovation Found., *Designed for Change: End-to-End Arguments, Internet Innovation, and the Net Neutrality Debate* (Sept. 2009) ("*Designed for Change*"), http://www.itif.org/files/2009-designed-for-change.pdf.

of their connection to the NSFNET and, by extension, the Internet."[18] As discussed below, the same fear of change, and the same instinct to stop any further evolution of the Internet, persists today, with similar emotional fervor.

Fortunately, under the leadership of the Clinton-Gore administration, the federal government permitted the free market to develop the Internet to its current advanced state. Unlike some foreign nations, the United States has not superintended the facilities build-out needed to make the modern Internet work for its citizens, nor has it treated broadband Internet access as a regulated monopoly. Instead, it has treated all aspects of the Internet ecosystem, including broadband access, as competitive markets and has allowed market forces to drive consumer value. Congress itself has enacted that principle into federal law, declaring in 1996 that "the policy of the United States" is "to preserve the vibrant and competitive free market that presently exists for the Internet and other interactive computer services, *unfettered by Federal or State regulation*."[19]

The Commission has so fully embraced that policy of unregulation that, in 1999, under a program initiated by former Chairman William Kennard, it urged regulators in *all nations* to exercise similar regulatory restraint:

> The Internet has evolved at an unprecedented pace, in large part due to the absence of government regulation. Consistent with the tradition of promoting innovation in new communications services, *regulatory agencies should refrain from taking actions that could stifle the growth of the Internet*. During this time of rapid telecommunications liberalization and technology innovation, unnecessary regulation can inhibit the global development and expansion of Internet infrastructure and services. To ensure that the Internet is available to as many persons as possible, *the FCC has adopted a "hands-off" Internet policy*. We are in the early stages of global Internet development, and policymakers

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[18] NSFNET, *A Partnership for High-Speed Networking: Final Report, 1987-1995*, at 31 (1995), http://www.merit.edu/documents/pdf/nsfnet/nsfnet_report.pdf.

[19] 47 U.S.C. § 230(b)(2) (emphasis added).

> *should avoid actions that may limit the tremendous potential of Internet delivery*.[20]

This basic policy choice—to allow market forces to serve consumers without regulatory intervention—has allowed the Internet to flourish into one of the greatest engines of economic, social, educational, and cultural development in history.

B. Overview of the Internet's Constituent IP Networks and the Blurring Distinction Among Backbone, Access, and Edge Functionalities.

The intertwined private networks of the Internet are all part of an evolving global ecosystem. A given network's role in that ecosystem is complex and dynamic, and the network may play several roles at once. Nonetheless, popular discussions of the Internet tend to classify its constituent networks into three basic categories:

- *Backbone* networks, including the current so-called "Tier 1" networks (such as, in the United States, AT&T, Verizon, Sprint, Level 3, Qwest, Global Crossing, SAVVIS, and Cogent)[21] and hundreds of backbone networks of smaller size and reach, known as "Tier 2" and "Tier 3" networks;

- *Access/aggregation* networks, such as Comcast, Time Warner, Cox, Cablevision, AT&T, Verizon, Qwest, Sprint-Nextel, T-Mobile, Clearwire, HughesNet, WildBlue, EarthLink, and many others; and

- *Edge/overlay* networks, ranging from the very small (*e.g.*, a home Wi-Fi network) to the very large (Google, Akamai, Limelight, eBay, Amazon.com, and others).

As we will discuss, these are somewhat artificial distinctions, because networks in each category increasingly perform tasks that are traditionally associated with networks in the other categories. For example, while much of the net neutrality debate has focused on

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[20] Federal Communications Commission, *Connecting the Globe: A Regulator's Guide to Building a Global Information Community*, at Section IX (1999), http://www.fcc.gov/connectglobe/sec9.html (emphasis added); *see also* p. 1, *supra* (discussing Chairman Kennard's application of these principles to broadband Internet access).

[21] Mem. Op. & Order, *AT&T Inc. and BellSouth Corp. Application for Transfer of Control*, 22 FCC Rcd 5662, 5730 ¶ 127 (2007) ("*AT&T-BellSouth Merger Order*"); *see also* Mem. Op. & Order, *SBC Communications Inc. and AT&T Corp. Applications for Approval of Transfer of Control*, 20 FCC Rcd 18290, 18356 ¶ 123 (2005) ("*SBC-AT&T Merger Order*").

access/aggregation and backbone networks, edge networks now rival these other networks for importance in the Internet ecosystem, and they often bear little resemblance to the server-in-the-garage stereotype of small "edge" innovators popularized in the 1990s. Some of the largest edge networks, known as "content-delivery" (or "overlay") networks, span the globe with dedicated fiber-optic transmission capacity, perform packet-distribution functions similar to those of backbone networks, and use much the same equipment and architecture as backbone networks. As discussed below, the services provided by these overlay networks play a critical role in the performance of particular applications and content, and they can affect a customer's Internet experience as much as, or more than, performance-enhancement techniques used by providers of access or backbone networks. In addition, peer-to-peer technology has spawned a range of *virtual* overlay networks that have, among other things, blurred traditional distinctions between "access" and "backbone" networks.

In short, as the proliferation of edge technologies reveals, the Internet is not some homogenous "cloud" surrounded by hermetically isolated users at the edge, nor do those users rely passively on forces within the cloud to connect them with other users. The Internet is more aptly depicted as a growing, ever-shifting spaghetti tangle of thousands upon thousands of networks that interconnect in unpredictable ways, through efficient commercial arrangements, to forge better connections among their respective users.[22] And, despite their name, the "edge" networks within that spaghetti tangle play as central a role as conventional access and backbone networks in ensuring that application and content providers can reach end users quickly and

[22] For graphic illustrations of the immensely complex physical architecture on which the Internet rides, *see, e.g.*, AT&T Labs, World Internet Topology (Aug. 2007), http://www2.research.att.com/areas/visualization/projects_software/img/ATT_Labs_InternetMap_0730_10.pdf.

reliably. With those caveats, we discuss the evolution of these IP networks by reference to the traditional trichotomy among backbone, access/aggregation, and "edge" networks.

1. Backbone Networks.

In this context, the term "backbone network" denotes the highest-capacity portion of a network operator's facilities, typically consisting of very-high-speed routers and fiber-optic links stretching across large geographic areas. That backbone network serves two main functions. First, it connects the various access/aggregation networks that the provider has deployed to reach its end-user customers, which may range from residential households to large enterprise businesses, including Internet content and application providers. Second, each provider's backbone network interconnects with *other* providers' backbone networks. The conceptual accumulation of all network operators' individual backbones is sometimes referred to collectively (and somewhat misleadingly) in the singular as "the Internet backbone."

The bilateral agreements that enable traffic to travel between two different backbone networks commonly follow one of two general business models: *peering* and *transit*. The choice between these two models turns in part on the relative value that each of the two networks brings to the interconnection arrangement.

Under *peering* agreements, each network interconnects for the purpose of terminating packets sent from the other peer to *end points served by the terminating peer's network*. Such arrangements typically anticipate, among other things, that the traffic exchanged between the two networks will be roughly equal in volume, such that each backbone network will incur roughly the same costs in handling the traffic originated by the other network. To avoid administrative overhead, parties to these bilateral peering agreements typically forgo the mutual exchange of compensation and peer on a *settlement-free* basis. But in some cases, where the traffic volumes exchanged are unequal, or where one network otherwise falls short of the other's peering criteria,

the parties may enter into a *paid peering* arrangement. Under paid peering, the networks still exchange traffic through high-capacity peering links, but the "non-compliant" network makes payments to the other network.

Under *transit* arrangements, Network X pays Network Y to arrange delivery of Network X's packets *to any destination on the Internet* and to accept delivery of packets destined for Network X's customers *from any location on the Internet*.[23] Rather than exchanging traffic through peering links with Network Y, Network X typically buys a robust, enterprise-class Internet access service from Network Y, which supplies the interconnection facilities.

From their inception, these peering and transit relationships have been unregulated, and the Commission does not set or even monitor transit rates. In this unregulated environment, the market for peering and transit has functioned with great efficiency. A key reason is that the larger backbones "compete for the transit business of smaller backbones in order to increase their revenues," and this competition has driven transit prices down significantly over the last decade, from approximately $1200/Mbps in 1998 to less than $12/Mbps in 2008.[24] The Commission recently reaffirmed that the Internet backbone market remains competitive and efficient, and that any given backbone has little incentive or ability to engage in anticompetitive conduct.[25] At the same time, the growing volume of traffic on the Internet, which we discuss below, will require

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[23] *See* Michael Kende, *The Digital Handshake: Connecting Internet Backbones*, FCC, Office of Plans and Policy, OPP Working Paper No. 32, at 7 (Sept. 2000), http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp32.pdf ("Transit and peering are differentiated in two main ways. First, in a transit arrangement, one backbone pays another backbone for interconnection, and therefore becomes a wholesale customer of the other backbone. Second, unlike in a peering relationship, with transit, the backbone selling the transit services will route traffic from the transit customer to its peering partners.").

[24] *See id.* at 20; DrPeering, Why care about Transit Pricing?, http://drpeering.net/a/Peering_vs_Transit___The_Business_Case_for_Peering.html.

[25] *AT&T-BellSouth Merger Order*, 22 FCC Rcd at 5736-38 ¶¶ 144-49; *SBC-AT&T Merger Order*, 20 FCC Rcd at 18354-66 ¶¶ 116-39.

content and backbone providers alike to explore new technologies and business models for the cost-effective delivery of high-bandwidth and performance-sensitive content.

2. Access/Aggregation Networks.

End users—from residential subscribers to enterprise customers, including content providers—connect to the Internet through the "access" portion of an ISP's network.[26] Broadband access networks perform two key functions within the Internet ecosystem. First, they provide the last mile (or last several miles) of connectivity to end-user locations through a variety of technologies, ranging from DSL or coaxial cable links to wireless spectrum to OCn-level fiber-optic cables.[27] Second, at one or more points along the way to the ISP's backbone network, they *aggregate* the traffic of progressively larger sets of different users and transmit this aggregated traffic over increasingly higher-capacity facilities. This portion of an access network—the bridge between the "last mile" and a backbone network—is sometimes known as an "aggregation" network. While the boundaries between access facilities, aggregation facilities, and backbone facilities vary from network to network and are not always easy to identify with precision, the following diagram provides a general approximation of the three network segments:

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[26] An ISP ("Internet service provider") may also operate a Tier 1 backbone, as described previously, or may operate a Tier 2 or 3 backbone that connects to a Tier 1 backbone. These comments use the terms "broadband Internet access provider" and "ISP" interchangeably.

[27] In Section IV of the Discussion below, we address the special engineering challenges posed by the emergence of mobile broadband services offered over a "radio access network" ("RAN"): the wireless portion of the access/aggregation network of a wireless broadband provider.

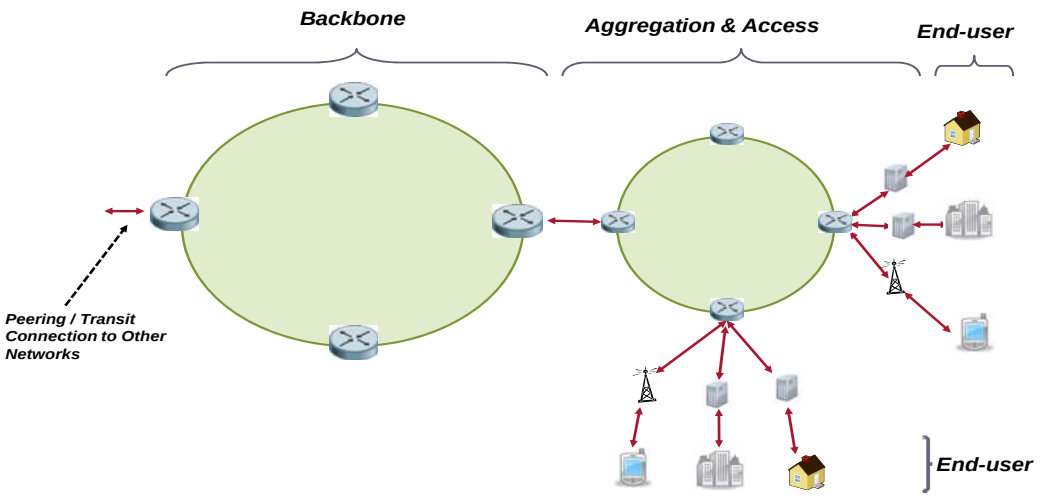

Figure 1: Schematic diagram of ISP network segments

Because this proceeding focuses on the role of access/aggregation networks within the broadband ecosystem, we discuss them in detail below. The following points, however, warrant emphasis at the outset. *First*, as the Commission has explained since the late 1990s, the broadband marketplace is dynamic and competitive, as illustrated by the high rate of churn among wired broadband providers (*see* Discussion § I.A, *infra*) and the recent proliferation of 3G wireless broadband services. Wireless broadband is now not only the "third pipe" into the home; it is also the fourth, fifth, and sixth in many areas. *Second*, different broadband networks require different degrees of network management to function properly for consumers. Wireless broadband, in particular, poses formidable and ever-changing network-management challenges. These arise from, among other things, the unique nature of radio spectrum, such as hard limits on available spectrum and the physics of radio propagation, and the revolutionary transformation of wireless broadband technology itself as network engineers complete their conversions from 2G to 3G—and then begin converting today's 3G networks into tomorrow's 4G LTE networks. *Third*, with few exceptions, all these networks—wired and wireless—will get built and operated

only if private broadband providers continue investing billions of dollars in private risk capital on top of the scores of billions of dollars they have already sunk. No one is guaranteeing that broadband providers will earn a profit on those investments, and investment analysts have expressed concern that they will suffer substantial losses instead. As those analysts add, moreover, new "net neutrality" regulation would sow uncertainty, artificially commoditize broadband networks, and damage the business case for broadband investment.[28]

Finally, for many years, broadband providers have offered quality-of-service ("QoS") enhancements to enterprise customers, including application and content providers. For example, broadband providers have long allowed content providers and other enterprise customers to designate certain packets for priority handling during periods of congestion, depending on (among other variables) whether those packets are associated with real-time or other unusually delay-sensitive applications.[29] A broadband provider will then ensure special handling for those packets throughout the QoS-enabled portions of its network. Those network facilities also typically carry non-QoS-enhanced ("best effort") Internet traffic from both enterprise and residential customers. These networks are engineered to meet the performance

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[28] For example, industry analyst Anna-Maria Kovacs recently warned that "[n]et neutrality would . . . affect wireline, wireless and cable companies' cash flows and capital requirements, by creating a need for additional capital expenditures while potentially limiting revenue sources." Anna-Maria Kovacs, Regulatory Source Assocs., *Telecom Regulatory Note*, at 2 (Dec. 17, 2009). And in an examination of the open network rules imposed on Recovery Act stimulus grants, Stratecast concluded that "net neutrality could have as high as a 75% negative impact on access line growth." Stratecast, *Broadband Stimulus and Net Neutrality: Impact on Access*, Consumer Commc'n Serv. 3-9, at 18 (Sept. 2009), *available for purchase at* http://www.frost.com/prod/servlet/segment-toc.pag?segid=D543-00-69-00-00. *See generally* Comments of AT&T Inc., WC Docket No. 07-52, at 71-74 (filed June 15, 2007) ("*AT&T 2007 Net Neutrality Comments*").

[29] *See, e.g.*, Verizon Business, *Internet Dedicated Access Fact Sheet* (2008), http://mediumbusiness.verizon.com/documents/resource_library/Internet_Dedicated_Access_Customer_Fact.pdf.

requirements of each class of traffic while allowing the network operator and its customers to reap the tremendous cost efficiencies of shared packet-switched facilities.

These characteristics of modern broadband Internet access networks, particularly their shared nature, have deep but generally overlooked significance for this proceeding. As the Commission recognizes, it would be pointless in such an environment to "adopt a specific definition of 'content, application, or service provider,' because *any user of the Internet can be such a provider*." NPRM ¶ 99 (emphasis added). For example, "anyone who creates a family website for sharing photographs could be reasonably classified as a 'content provider.'" *Id.* More ambitiously, many residential end users now generate bandwidth-intensive content through video-intensive blogs or through peer-to-peer ("P2P") technologies, which allow each end user's hard drive to serve as a content cache for other end users throughout the Internet. *See* Engineering Background § E.4, *infra*. As more and more residential consumers become content providers in their own right, it will be increasingly arbitrary to maintain any regulatory regime that implicitly rests on placing end users into "content" and "eyeball" silos on a shared network. Again, the Commission appears to recognize that fact. What it overlooks, however, is that the strict "nondiscrimination" rule described in paragraphs 106 and 107 of the NPRM *is such a regime*. And, as discussed below, that regime would stunt the Internet's evolution for the sake of obsolescent classifications of end users into artificial silos. *See* Discussion § III.A, *infra*.

3. "Edge"/Overlay Networks, CDNs, and the Rise of the Content "Hyper Giants."

In the Internet's early years, the stereotypical "edge" network used by an application or content provider consisted of a server or two operated by a small entrepreneur working in a garage or in low-rent office space. Although that stereotype persists among some net neutrality pundits, today's leading edge networks have evolved into something radically different:

transnational facilities-based networks with an unprecedented combination of transmission capacity, processing power, and data storage. Among the largest are the massive "server farms" and caching networks developed by companies as diverse as service providers Akamai and Level 3, online retailers Amazon.com and eBay, Internet portals Yahoo! and MSN, and—largest of them all—Google. These "overlay" or "content-delivery networks" ("CDNs") use much the same technology and perform many of the same routing and long-haul transmission functions as Internet backbones and allow application and content providers to direct customer requests to the closest cache server that has both the requested content and the capacity to serve the request at the instant it is received.

Google, for example, maintains a sprawling network consisting of hundreds of thousands of servers, many of them clumped in massive data centers or server farms, connected by high-capacity fiber-optic cable.[30] Building and maintaining this network is enormously capital-intensive, and it is transforming the manipulation and routing of data on the Internet. As Google CEO Eric Schmidt explained in 2007, "It's pretty clear that there's an architectural shift going on," of a magnitude that "occur[s] every 10 or 20 years," and Google can claim much of the

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[30] *See* George Gilder, *The Information Factories*, Wired, Oct. 2006, http://www.wired.com/wired/archive/14.10/cloudware.html. In addition to Google, other major Internet companies, including Microsoft and Yahoo!, are likewise constructing enormous networks of their own and, like Google, are revolutionizing the role of these ostensible "edge" networks within the Internet. *See, e.g.*, Blaine Harden, *Tech Firms Go Mining for Megawatts: Companies Rush to Exploit Region's Cheap Electricity*, Wash. Post, July 9, 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/07/08/AR2006070800973_pf.html; Rich Miller, *Microsoft Plans $500M Dublin Data Center*, Data Center Knowledge, May 16, 2007, http://www.datacenterknowledge.com/archives/2007/May/16/microsoft_plans_500m_dublin_ data_center.html; Rich Miller, *Yahoo Eyes Washington State for Data Center*, Data Center Knowledge, Nov. 29, 2005, http://www.datacenterknowledge.com/archives/2005/11/29/yahoo-eyes-washington-state-for-data-center/.

credit.[31] Schmidt notes that Google has "dozens" of data centers in undisclosed locations, some of which are "very large," and "in a year or two the very large ones will be the small ones because the growth rate is such that we keep building even larger ones, and that's where a lot of the capital spending in the company is going."[32] In addition, "we have not only data centers, but we have fiber that interconnect[s] those data centers, and connect[s] to the ISPs. At Google, speed is critical. And part of the way we get that speed is with that fiber."[33] Combined with Google's multi-billion-dollar investment in data storage and processing power, this "overlay" CDN enables Google to outperform its rivals in the delivery of (for example) split-second search results and paid advertisements to end users throughout the world.

Google's success exemplifies the growing power of CDNs on the Internet. Traditionally known as "caching" networks, CDNs distribute and store copies of content on servers at multiple locations across the Internet (typically located near ISP backbone networks) and thus enable end users to gain access to that content more quickly and reliably than in a conventional "unicast" arrangement, where each end user must communicate directly with a single centralized server. Figure 2 illustrates this function:

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[31] Fred Vogelstein, *Text of Wired's Interview with Google CEO Eric Schmidt*, Wired, Apr. 9, 2007, http://www.wired.com/print/techbiz/people/news/2007/04/mag_schmidt_trans.

[32] *Id.*

[33] *Id.*

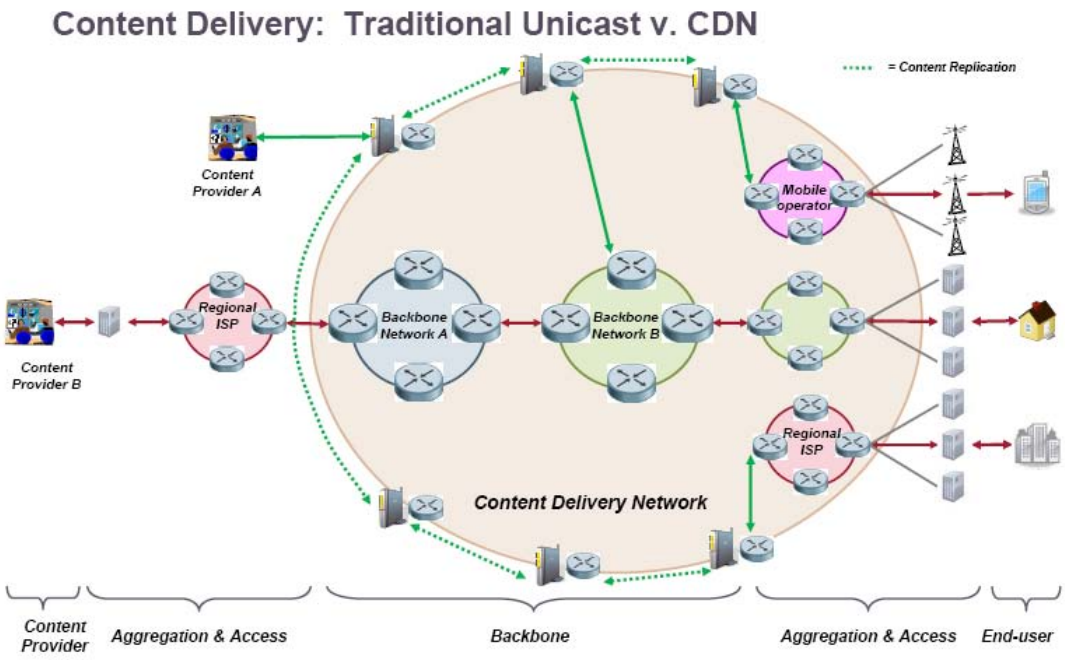

Figure 2: The role of CDNs in Internet content distribution

In this diagram, Content Provider B, which does not make use of a CDN, must transmit its packets from a centralized server using a long and unpredictable path. The content provider does not know in advance how many router-to-router "hops" each packet will make or whether any of the intermediate points will be congested. Each of these variables is relevant to performance. Every hop requires processing time, and thus the more hops the traffic makes, the more delay ("*latency*")—and packet-to-packet variability in delay ("*jitter*")—the traffic will encounter. And any congestion (or failure) at intermediate points could cause further delay and sometimes outright *packet loss*. These variables, discussed in greater detail in Engineering Background § D.1 below, could preclude Content Provider B from offering high-quality, performance-sensitive applications altogether (*e.g.*, streaming video).

In contrast, Content Provider A uses CDN technology to distribute its content to multiple cache (or "proxy") servers throughout the Internet, thus pre-positioning content close to

customers and reducing the distance it must travel when a given customer requests it. For example, when a typical end user types "www.apple.com," "www.facebook.com," or "news.google.com" into an Internet browser, the data request is redirected to a nearby CDN cache server, where the content of those websites has been stored, thus enabling the end user and the cache server to exchange data far more quickly and efficiently than if the data were stored on a single, centrally located server far from the end user.

Although Google and a number of other large Internet companies self-provision their own CDNs, many application and content providers outsource this functionality by hiring third-party CDN providers such as Akamai, Limelight, Level 3, and AT&T. As Akamai explains: "Edge delivery solves the peering bottleneck problem by making it unnecessary for web requests and data to traverse multiple networks and thus encounter peering points."[34] The bottom line is that, all else held equal, end users have better experiences in their interactions with CDN-equipped content providers (Content Provider A in our diagram) than with content providers that do not use CDN functionality (Content Provider B). This in turn means that well-funded content and application providers that can afford to purchase (or self-provision) CDN services have a substantial advantage over less-well-funded rivals in the battle to bring end users top-quality Internet experiences. *See* Engineering Background § C, *infra.*

The success of Google, Limelight, and other overlay networks also marks an unprecedented shift of power within the Internet ecosystem. Even four years ago, analysts recognized that Google had begun "building a network so massive that several service provider specialists believe it could end up with one of the world's largest core transport networks, effectively building its own private Internet" and "controlling distribution of much of the world's

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[34] Akamai, *Internet Bottlenecks: The Case for Edge Delivery Services*, at 7 (2000), http://www.cse.cuhk.edu.hk/~cslui/CSC5480/akamai-bottlenecks.pdf.

Internet traffic."[35] Today, that process is nearing completion. A recent study conducted by the University of Michigan and Arbor Networks cites the rise of Google and other content "hyper giants" as evidence of a fundamental shift in power relationships within the Internet ecosystem:

> Five years ago, Internet traffic was proportionally distributed across tens of thousands of enterprise managed web sites and servers around the world. Today, most content has increasingly migrated to a small number of very large hosting, cloud and content providers. Out of the 40,000 routed end sites in the Internet, 30 large companies—"hyper giants" like Limelight, Facebook, Google, Microsoft and YouTube—now generate and consume a disproportionate 30% of all Internet traffic.[36]

This development has upended Internet business models. Rather than relying upon conventional Internet backbone networks to deliver their content to "eyeball" networks, these hyper giants have grown so large and powerful that they can "cut out the middle man" and obtain settlement-free peering directly with some end-user broadband networks.

A related harbinger of change within the Internet ecosystem is the emergence of so-called *reverse-blocking:* the practice by certain content providers of withholding their must-have Web content from end users unless the *broadband providers* for those end users agree to pay extra for it. For example, Disney currently blocks access to its premium sports programming site, ESPN360, from consumers whose broadband providers do not pay fees to Disney, and it explicitly steers those disappointed consumers to rival providers that have paid up, as illustrated in this screen shot:[37]

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[35] R. Scott Raynovich, *Google's Own Private Internet*, Light Reading, Sept. 20, 2005, http://www.lightreading.com/document.asp?doc_id=80968.

[36] Arbor Networks, *Two-Year Study of Global Internet Traffic Will be Presented at NANOG47*, Oct. 13, 2009, http://www.arbornetworks.com/en/arbor-networks-the-university-of-michigan-and-merit-network-to-present-two-year-study-of-global-int-2.html.

[37] As Disney explains on the ESPN360 website: "ESPN360.com is available nationwide, but you must subscribe to a participating high speed internet service provider. . . . Click here to find out more on how you can request access to ESPN360.com or switch your service to a

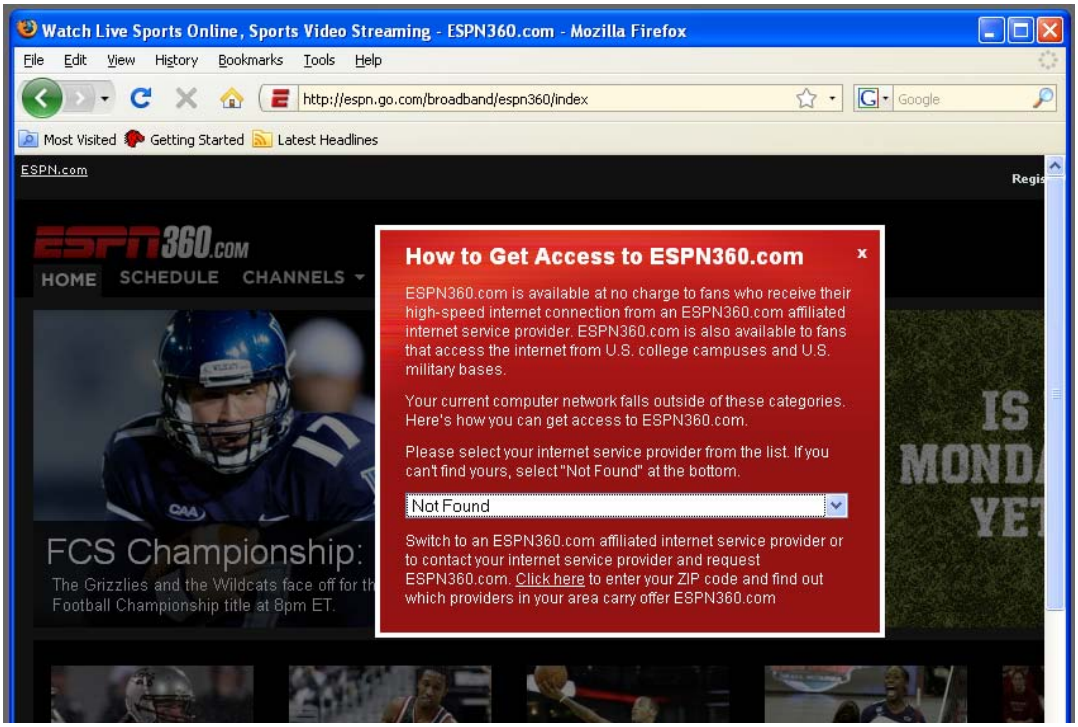

Figure 3: Screenshot of ESPN360.com

Google similarly blocks access to YouTube from Internet-enabled set top boxes sold by vendors that do not enter into high-priced advertising arrangements with Google.[38] There is no reason to suppose that these will be isolated incidents. As shown by recent cable retransmission-consent deals, content providers often have more market clout than distribution networks and can now successfully charge those networks substantial fees for the privilege of carrying their content.[39]

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participating high speed internet service provider." ESPN360.com, Help/FAQ, http://espn.go.com/broadband/espn360/faq#4.

[38] *See* Eliot Van Buskirk, *YouTube Blocks Non-Partner Device Syabas as Allegations Fly*, Wired, Nov. 20, 2009, http://www.wired.com/epicenter/2009/11/youtube-blocks-non-partner-device-syabas-as-allegations-fly/.

[39] For example, "News Corp. sought as much as $1 a month per Time Warner Cable subscriber for rights to Fox, home of 'The Simpsons' and 'American Idol'. . . . If other networks seek similar terms, cable operators may have to fork out as much as $5 billion a year—and would probably pass the cost on to subscribers, said Craig Moffett, an analyst at Sanford C. Bernstein in New York." Kelly Riddell, *Fox-Time Warner Cable deal could mean billions for broadcasters*, Wash. Post, Jan. 4, 2010, http://www.washingtonpost.com/wp-dyn/content/

Over time, the reverse-blocking phenomenon may force ISPs to pass through charges to the specific subscribers who use the content in question—rather than to all subscribers indiscriminately—by establishing different content-based tiers of Internet access service: those for end users who order various combinations of premium applications and content, and those who do not.

There is no clear reason why such overt "balkanization" of the Internet from new Internet gatekeepers should bother policymakers less than the much more benign prospect that money will sometimes flow in the opposite direction as well, when a content provider voluntarily pays a broadband provider for QoS enhancements for unusually performance-sensitive content (see below). Certainly considerations of market power cannot support this disparity in regulatory treatment, because broadband providers are often the less powerful parties in the relevant (national or global) market than the application/content providers they must deal with. *See* Discussion § III.B.1, *infra.*

C. The Internet Is Not Now, Nor Has It Ever Been, a "Neutral" Place, and Proposals to Convert Broadband Networks into a Collection of "Dumb Pipes" Would Make It *Less* Neutral in Its Treatment of Competing Applications and Content.

The rise of CDNs and the content hyper-giants is one of several phenomena that explode a popular myth underlying much net neutrality advocacy and even some passages of the NPRM: the notion that "[a]s a platform for commerce, [the Internet] does not distinguish between a budding entrepreneur in a dorm room and a Fortune 500 company." NPRM ¶ 4. Others have similarly claimed that the Internet serves as a radically egalitarian leveler of wealth disparities, that it ensures consumer access to "any Web site . . . , at the fastest speed, whether it's a

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article/2010/01/03/AR2010010301751.html. *See generally* Comments of American Cable Ass'n, MB Docket No. 07-198, at 5-8 (Jan. 3, 2008) (addressing bargaining clout of content providers).

corporate or mom-and-pop site,"[40] and that the only threat to the Internet's solicitude for small business comes from the plans of Internet access providers to offer customers the option of differentiated service handling.

This simplistic and inaccurate articulation of "net neutrality" must come as a surprise to Akamai, Limelight, and other CDNs, all of which have built their highly successful businesses on the fact that the Internet is not neutral. Quite apart from anything access or backbone networks might do, application and content providers with the financial resources needed to buy CDN services—or to build out their own global networks, as Google has done—will provide consumers with far better performance than can any "mom-and-pop site" or "budding entrepreneur in a dorm room" that lacks such resources and cannot obtain capital financing. As Akamai explains in a 2002 white paper, the competitive advantage that well-funded application and content providers gain from CDN services has long justified the price of purchasing them:[41]

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[40] SavetheInternet.com Coalition, *Frequently Asked Questions*, *What is this about?*, http://www.savetheinternet.com/faq.

[41] This excerpt is taken from Akamai White Paper, *Why Performance Matters*, at 1 (2002), http://www.akamai.com/dl/whitepapers/Akamai_Why_Performance_Matters_Whitepaper.pdf. Akamai's website contains an interactive illustration of how much its CDN can improve an application provider's performance along specified routes. *See* Akamai, Network Performance Comparison, http://www.akamai.com/html/technology/dataviz2.html.

AKAMAI® WHITE PAPER | Why Performance Matters

TOWER RECORDS.COM

"...It's performance, performance, performance. The speed of your site can be directly equated to sales."

—Kevin Ertell, Tower Records

Akamai helps Tower Records improve the performance and quality of user experience for its mission-critical e-commerce applications. Tower Records saw 400% faster page downloads immediately upon using Akamai's distributed Web applications infrastructure. The improved quality of the customer experience translated into 6% increased revenue. At the same time, an optimized application infrastructure allows $2,000,000 of savings in data center build-out costs.

Web Site Performance Matters

Let's assume someone has ten minutes to spend at your Web site: some are able to access 10+ pages, while some can't stand the wait and give up after two requests. If page speed were to be increased by as little as five times, these visitors would have the ability to view 50+ pages during the same short session, ensuring a better user experience—critical to your efforts to acquire and retain customers and partners.

Increasing page performance reduces the likelihood of bailout, boosts the likelihood of multiple page views and purchases, increases cross-sell conversion opportunities and leaves impressions that are worthy of return visits. On the Web, the experience is the brand, and you want to offer the best one possible.

There is ample reason to care about Web site performance. Consider the following:

Online revenues and conversion rates have the potential to rise, but Web site performance is a critical factor.

- A 50% degradation in performance leads to a 25% reduction in conversions —*Jupiter Research*
- U.S. business-to-consumer (B2C) sales over the Internet will grow to $152 billion in 2002 and $233 billion in 2004 —*Giga Information Group*
- Of online shoppers surveyed, 51% percent stated site performance/speed as having an influence on their buying behavior —*Vividence*

Figure 4: Screenshot of Akamai Whitepaper (irrelevant portions omitted)

In contrast, application and content providers (including those in "dorm room[s]") that cannot afford to buy CDN services must rely on traditional access/aggregation and backbone services to send their traffic through many potentially congested routers and links en route to other Internet users, with accompanying increases in the potential for latency, jitter, and packet loss. No one claims that the government should intervene to neutralize this disparity in the way the Internet treats the haves and have-nots, because no one who understands the Internet ecosystem believes the populist "equality" rhetoric underlying much of the advocacy for net neutrality regulation. That rhetoric nonetheless continues to warp this debate by cropping up in such unlikely places as this Commission's own NPRM—which does not mention the role of independent CDNs in the Internet ecosystem.[42]

[42] In its only apparent reference to CDN functionality, the NPRM notes: "A broadband Internet access service provider can also favor certain parties by providing access to information

In other respects as well, it is wrong to suggest, as pro-regulation advocates do, that the Internet would be "neutral" in its treatment of different applications and content if only broadband networks were turned into a collection of dumb pipes. For several independent reasons, many of the outcomes that pro-regulation advocates would impose on the Internet would make it, if anything, *less* neutral under any meaningful definition of that term.

One reason relates to a content or application provider's choice of a transport protocol for its outgoing traffic.[43] The Internet is often described as using the "TCP-IP protocol suite," with IP at Layer 3 (the "network" layer) and the transport control protocol ("TCP") at Layer 4 (the "transport" layer). While most Internet traffic is currently transported by TCP, there are other transport-layer protocols as well,[44] the most prominent of which is the "user datagram protocol" ("UDP"). UDP is a simpler protocol than TCP, and when used appropriately, its attributes can be beneficial for a range of purposes, including Domain Name System (DNS) queries. But the choice between these transport-layer protocols has significant implications for how finite bandwidth is allocated among competing uses during periods of congestion. TCP is considered a "polite" transport protocol because it can sense congestion and "throttles back" transmission

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cached at the provider's facility, allowing consumers quicker access to websites using the caching services." NPRM ¶ 57. The NPRM displays no awareness that, in addition to broadband Internet access providers, many independent CDN providers such as Akamai, Limelight, and Level 3 provide this same functionality to content providers. And it certainly does not explain why the same functionality might be problematic when offered by one set of providers, but not another.

[43] *See generally* James F. Kurose & Keith W. Ross, *Computer Networking: A Top-Down Approach* 50-54 (5th ed. 2010) ("*Kurose & Ross*") (discussing Internet protocol layering). As discussed below, providers also use, in addition to the Layer 3 and Layer 4 mechanisms discussed in the text, a variety of prioritization techniques on other, non-IP layers of data communications, including Layer 2 (*e.g.*, Ethernet, ATM), Layer 2.5 (MPLS), and even Layer 7 (SPDY), all of which affect how end users experience the Internet. *See* Engineering Background §§ D.2, D.3, E.2, *infra*. The NPRM nowhere mentions these non-IP-layer forms of prioritization.

[44] *See* Wikipedia, Transmission Control Protocol (discussing UDP, SCTP, FCP, VTP, and MTP), http://en.wikipedia.org/wiki/Transmission_Control_Protocol.

rates until after the congestion lifts. In contrast, UDP by design omits the error-correction functions of TCP and, unlike TCP, does not employ congestion-avoidance algorithms. And precisely because UDP applications may "send out data as fast as [they] can," even when they encounter congestion, "while [conventional] TCP-friendly applications deliberately send fewer and fewer packets," the latter applications may end up "starved of network resources."[45]

Even if an application uses TCP, it may use one of many variants of that protocol that alter the standard congestion-avoidance mechanisms in order to claim more bandwidth.[46] Moreover, even if application designers use the original version of TCP (TCP Tahoe), they can structure their applications to elbow other applications aside in a quest for a greater share of the limited bandwidth across congested links. Indeed, "BitTorrent" sessions are so named precisely because they aggressively consume disproportionate amounts of upstream subscriber bandwidth by opening up multiple TCP connection streams to seize a greater proportion of shared capacity for themselves.[47] As one academic study has shown, "as few as 15 BitTorrent users" on a cable

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[45] Jon M. Peha, *The Benefits and Risks of Mandating Network Neutrality, and the Quest for a Balanced Policy*, at 7 (2006), http://web.si.umich.edu/tprc/papers/2006/574/Peha_balanced_net_neutrality_policy.pdf ("*Benefits and Risks*").

[46] *See* S. Floyd, *Congestion Control Principles*, RFC 2914 ¶ 3.2 (Sept. 2000), http://www.rfc-editor.org/rfc/rfc2914.txt; *see also* Wikipedia, Transmission Control Protocol, http://en.wikipedia.org/wiki/Transmission_Control_Protocol. These variants include TCP Reno, TCP New Reno, TCP Vegas, FAST TCP, TCP Hybla, and others.

[47] *See, e.g.*, Bob Briscoe, *Flow Rate Fairness: Dismantling a Religion*, 37 Computer Commc'n Rev. 63 (2007), http://ccr.sigcomm.org/online/files/fair_ccro.pdf. "Jacobson's algorithm," designed to preserve roughly equal quality for different traffic streams, cuts flow rates in the presence of packet loss until congestion eases. By the late 1990s, however, some P2P applications began exploiting a loophole in this approach by opening up to 100 simultaneous streams. *See* George Ou, *Fixing the unfairness of TCP congestion control*, ZDNet, Mar. 24, 2008, http://blogs.zdnet.com/Ou/?p=1078; Bob Briscoe, *A Fairer, Faster Internet Protocol*, IEEE Spectrum, Dec. 2008, http://spectrum.ieee.org/telecom/standards/a-fairer-faster-internet-protocol; Steven Bauer, David Clark, & William Lehr, *The Evolution of Internet Congestion*, 37th Research Conference on Communication, Information, and Internet Policy (Sept. 2009), http://people.csail.mit.edu/wlehr/Lehr-Papers_files/Bauer_Clark_Lehr_2009.pdf.

modem network "can significantly reduce the service quality experienced by other subscribers."[48] As the inventor of BitTorrent has explained, this was intentional: "My whole idea was, 'Let's use up a lot of bandwidth' . . . . I had a friend who said, 'Well, ISPs won't like that.' And I said, 'Why should I care?'"[49] In fact, everyone interested in the Internet's future should care, because "BitTorrent's basic approach to bandwidth consumption actually conflicts quite strongly with a key assumption of the internet's architects, that the relationship between users and traffic flows is essentially a constant."[50] BitTorrent Inc. recently acknowledged the need to be more network-friendly and, to that end, launched a new implementation of the BitTorrent protocol: uTorrent 2.0. According to recent tests, however, the efficacy of this solution is still in doubt.[51]

In short, *passive* management of the IP platform would produce *non*-neutral outcomes among the packets associated with different applications, because it would allow applications with "selfish" protocols to trump those with "polite" protocols in the contest for finite bandwidth. And all but the most sophisticated of Internet users would have no idea that their traffic is being edged aside by differences in the protocols they and their neighbors are using.

Second, even if all transport-layer protocols were equally polite, passive management of the IP platform *still* would not produce "neutral" results in any meaningful sense, because it can hardly be "neutral" for network engineers to ignore the vast disparities in the QoS needs of

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[48] James J. Martin & James M. Westall, *Assessing the Impact of BitTorrent on DOCSIS Networks*, at 1 (Sept. 2007), http://www.cs.clemson.edu/~jmarty/papers/bittorrentBroadnets.pdf.

[49] David Downs, *BitTorrent, Comcast, EFF Antipathetic to FCC Regulation of P2P Traffic*, SFWeekly.com, Jan. 22, 2008, http://www.sfweekly.com/2008-01-23/news/bittorrent-comcast-eff-antipathetic-to-fcc-regulation-of-p2p-traffic.

[50] Richard Bennett, *Dismantling a Religion: The EFF's Faith-Based Internet*, The Register, Dec. 13, 2007, http://www.theregister.co.uk/2007/12/13/bennett_eff_neutrality_analysis/.

[51] George Ou, *Analysis of BitTorrent uTP congestion avoidance*, Nov. 2, 2009, http://www.digitalsociety.org/2009/11/analysis-of-bittorrent-utp-congestion-avoidance.

emerging Internet applications. Although the Internet Protocol was designed from the beginning to be capable of providing enhanced service quality (see below), many Internet access networks designed for residential users were initially optimized to process the traditionally most prevalent type of communication: non-latency-sensitive data applications, such as the delivery of email or the downloading of ordinary webpages. One of the most important and pro-consumer developments of the past five years has been the rapid convergence of *all* electronic communications around the IP platform, including applications—such as real-time, high-definition video—that will not function properly during periods of congestion unless network providers accompany them with quality-of-service enhancements that non-performance-sensitive applications do not need in order to function well.

Any requirement that networks treat all packets exactly the same, irrespective of the QoS needs of their associated applications—a policy that some passages of the NPRM seem to favor (*see, e.g.*, NPRM ¶ 57)—would flatly discriminate against QoS-sensitive applications like real-time video and VoIP. If required to treat all packets identically, a broadband network "might at times transmit 100 P2P packets before it transmits a single VoIP packet," causing "many of the VoIP packets . . . to wait so long that they expire and cause dropped audio," an outcome that "is blatantly unfair and destructive to the VoIP application."[52] Even some proponents of net neutrality regulation therefore agree that any sensible view of "neutrality" must account for these application-specific disparities in QoS needs. Tim Wu observes that "the Internet's greatest deviation from network neutrality" has consisted of its traditional "favoritism of data

[52] George Ou, *Debunking the Myth that Prioritized Networks Are Harmful*, Digital Society, Nov. 12, 2009, http://www.digitalsociety.org/2009/11/debunking-the-myth-that-prioritized-networks-are-harmful/; *see also* Bennett, *Designed for Change*, *supra*.

applications, as a class, over latency-sensitive applications involving voice or video."[53] If anything, therefore, network-management techniques designed to allocate finite network resources to the latency-sensitive applications that actually need them are *pro*-neutrality. And they are unquestionably pro-*consumer*—the topic of the next section.

D. The Rapid Convergence of All Electronic Communications Around the IP Platform Poses Critical Engineering Challenges.

The rapid convergence of multiple services onto a single IP platform carries many advantages beyond the obvious economies of scale and scope derived from building one network rather than several. It also allows for the integration of voice, video, and text into feature-rich multimedia applications. And it facilitates greater competition among service providers. For example, cable and telephone companies, once siloed from mutual competition because of their single-purpose networks, now compete fiercely to offer the "triple play" of voice, video, and Internet access services. IP convergence also creates opportunities for independent application and content providers to offer a variety of innovative services to a wide range of customers, including residential, small/medium business, and enterprise customers. Such services would be economically infeasible if individual services required separate networks.

But the many advantages of IP convergence come with a critical engineering challenge: how to make all of these applications, with their quite different QoS needs, function as well as possible over a shared and sometimes congested network infrastructure.

1. Managing the Phenomenon of Convergence Requires Not Just Higher-Capacity Pipes, but Smarter Networks.

Virtually all commercial IP networks are "shared" among different users and also different *uses*—indeed, that is the definition of "convergence." This sharing is one of the

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[53] Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. Telecomm. & High Tech. L. 141, 142 (2003).

greatest advantages of IP networks as compared to traditional circuit-switched networks. It lowers costs for users as compared to dedicated networks, and it permits "maximum utilization" of broadband infrastructure—an objective that Congress embraced in the Recovery Act.[54] But sharing presents trade-offs, and those trade-offs—long the exclusive province of network engineers—is the basic subject matter of this regulatory proceeding.

The benefits of sharing are best understood by contrasting IP networks with traditional circuit-switched networks. In a conventional telephone network, a fixed amount of bandwidth must be dedicated to a continuous path (the "circuit") between the two end points to the call, and that circuit must be kept open for the entire call. While this approach ensures highly predictable performance, it "wastes" capacity. For example, even during pauses in a voice conversation or data transmission, the reserved capacity on the circuit is unavailable for any other use.

In contrast, the Internet's constituent IP networks use packet-switched rather than circuit-switched technology, do not typically establish fixed end-to-end paths between two points, and do not reserve capacity for a particular communication stream. Rather, IP networks break the stream into data packets, each of which contains a "header" (an initial series of bits) that identifies, among other things, the packet's ultimate destination. Each router examines the address in the packet's header and directs it to the next router, selected on the basis of predictions about the most efficient route to the packet's ultimate destination. A conventional "best-effort" IP network makes such routing decisions on a packet-by-packet basis without "knowing" what higher-layer application any packet is associated with or whether that application is performance-sensitive.

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[54] Recovery Act, § 6001(k)(2)(B).

Modern Internet access networks are typically engineered to high standards that accommodate sharing among a wide range of applications even on such a "best-effort" basis. This has enabled companies like Vonage, Skype, and Vuze to use such networks to offer highly competitive voice and video services that hundreds of millions of consumers have embraced. Indeed, Skype alone has more than 520 million registered users worldwide.[55] But all packet-switched, shared networks are inherently susceptible to several forms of service degradation during peak periods of congestion, which affect some applications far more than others.

First, the packets associated with any given application are subject to *latency:* the delays that result from, among other things, "the accumulation of transmission, processing, and queuing delays in [the multiple] routers" between two end users in an Internet data session.[56] Second, Internet applications can suffer from *jitter:* variations in delays among associated packets, such that different packets arrive unpredictably and sometimes out of order. Third, applications can suffer from outright *packet loss*, which—as its name implies—occurs when the buffers in congested routers fill to capacity and the network "loses" the additional incoming packets. For example, "[i]f one of the links is congested because other packets need to be transmitted over the link at the same time, then [a given] packet will have to wait in a buffer at the sending side of the transmission link, and suffer a delay. If the wait time is too long, the buffer overflows and the packet is 'lost.' The Internet makes its *best effort* to deliver packets in a timely manner, but it does not make any guarantees."[57]

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[55] eBay Inc., Form 10-Q, at 25 (filed Oct. 27, 2009), http://files.shareholder.com/downloads/ebay/797758946x0xS1193125-09-214947/1065088/filing.pdf (noting that there were 520.8 million Skype users as of September 30, 2009).

[56] *Kurose & Ross, supra*, at 618.

[57] *Id.* at 27. Wireless broadband networks (and applications designed for them) must accommodate the unusually high levels of packet loss encountered in wireless transmissions, and are also severely constrained in the bandwidth they may deploy for end users in particular

Applications differ enormously in their relative sensitivity to latency, jitter, and packet loss and their ability to compensate for them. For example, "in many multimedia applications" such as real-time video streaming, "packets that incur a sender-to-receiver delay of more than a few hundred milliseconds are essentially useless to the receiver. On the other hand, networked multimedia applications are for the most part *loss-tolerant*—occasional loss only causes occasional glitches in the audio-video playback, and these losses can often be partially or fully concealed. These delay-sensitive but loss-tolerant characteristics are clearly different from those of elastic applications such as the Web, e-mail, FTP, and Telnet," for which delays are tolerable but packet loss is not.[58]

While the best-effort Internet has sufficed to support VoIP and some other performance-sensitive services so far, the growing popularity of such services, together with escalating consumer demand for real-time high-definition video and other premium services, poses a fundamental engineering challenge. How can engineers structure a unified IP platform to maintain the cost-reducing *efficiency* of packet-switched IP networks while also assuring the *quality of service* consumers demand for real-time services, such as voice and video, now that the signals for those services no longer travel on service-specific transmission networks? The answer cannot be that IP networks must blindly treat all packets alike by subjecting them equally to the best-effort delivery principles used today for downloading ordinary webpages or delivering e-mails. As discussed, that approach would produce unacceptably poor quality for real-time applications like voice and video and would thwart the promise of convergence.

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transmission cells. This is one of many respects in which network engineers in the wireless context face network-management challenges more severe than their wireline counterparts. Those wireless-specific challenges are discussed in Section IV of the Discussion below.

[58] *Id.* at 598 (emphasis in original). In these comments, we use the term "latency-sensitive" as a shorthand to denote sensitivity to latency, jitter, or both.

Indeed, the Commission's staff acknowledged as much at the September 29 open meeting, explaining that "different applications require different performance parameters," "speed is not the only critical characteristic," and "both speed *and quality* determine user experience[s]" with "real-time" applications such as "streamed video and music" and "2-way video gaming."[59]

The answer likewise cannot be that network providers, on top of the tens of billions of dollars they have already invested in next-generation networks, *see* p. 82-83, *infra*, must so radically enlarge the capacity of their IP networks as to give *all* packets—including those associated with *non*-real-time applications that are reasonably tolerant of latency and jitter—the same guarantees of nearly instantaneous delivery needed for high-quality video services.[60] Network engineers keep usage affordable by scaling the network's routers and transmission links to meet desired performance levels for different classes of traffic under foreseeable conditions. Raw bandwidth, in the form of extremely-high-capacity routers and other data-processing and transport infrastructure, remains very costly.[61] Network engineers therefore do not—and could not economically—oversupply capacity to ensure instantaneous delivery of all packets at all times, particularly since random events can trigger unpredictable spikes in usage.

Indeed, forcing them to take that approach would rob IP networks of the efficiency characteristics that make Internet usage affordable in the first place.[62] Economic studies have thus shown that, as IP video services escalate in popularity, any single-minded reliance on "fat,

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[59] *See* FCC Staff Presentation for the National Broadband Plan, at 19, 24 (Sept. 29, 2009) (capitalization and emphasis altered), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-293742A1.pdf.

[60] *Cf.* NPRM ¶ 71; Nicholas Economides, *"Net Neutrality," Non-discrimination and Digital Distribution of Content Through the Internet*, 4 I/S: J. of L. & Pol. for the Info. Soc'y 209, 224-25 (2008).

[61] *See, e.g.*, Gerald Faulhaber & David Farber, *The Open Internet: A Customer-Centric Framework* 25-26 (2010) (attached as Exh. 1).

[62] *See* p. 61-62, *infra* (discussing RPI and Cisco studies).

dumb pipes" as a solution to QoS requirements in this environment of rapidly escalating Internet usage would dramatically raise network costs and cause end-user rates to skyrocket.[63] As explained in the attached paper of Internet pioneer (and former FCC Chief Technologist) David Farber and Wharton professor (and former FCC Chief Economist) Gerald Faulhaber:

> One possible solution to the network management issue [posed by advocates of net neutrality regulation] is that ISPs should simply expand capacity, so that congestion never occurs. . . . If demand for Internet traffic capacity were relatively level and the variance of traffic were low, then this might well be an attractive option, as the amount of capacity required to avoid congestion altogether might be some small multiple (say 1.5) of *average* demand. But the reality is that Internet traffic varies by time of day and is highly variable, or "bursty." Installing capacity sufficient to carry all demand all the time could well involve providing capacity *dozens of times* larger than average demand, with a concomitant increase in costs to customers to pay for capacity that sits idle for all but an hour a year. It is the nature of stochastic "bursty" traffic that peak demand will be much larger than average demand, so providing for the peak would be very expensive, and certainly against good engineering economic principles.[64]

As the authors conclude, the "[j]ust add capacity" mantra emphasized by advocates of net neutrality regulation "is a recipe for a very expensive Internet, primarily because of the bursty nature of Internet traffic."[65]

Moreover, this overcapacity approach might well be futile even if money were no object for broadband networks and their customers. Experience has shown that as networks increase the capacity of given links on the Internet, usage on that link—particularly in the form of peer-

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[63] *See, e.g.*, George S. Ford *et al.*, *The Efficiency Risk of Network Neutrality Rules*, Phoenix Center Policy Bulletin No. 16 (2006), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=925347; Richard N. Clarke, *Costs of Neutral/Unmanaged IP Networks*, 8 Rev. Network Econ. 61, 80-81 (Mar. 2009), http://www.bepress.com/cgi/viewcontent.cgi?article=1170&context=rne; Steven Pociask, *Net Neutrality and the Effects on Consumers*, American Consumer Institute (May 9, 2007), http://www.theamericanconsumer.org/2007/05/09/net-neutrality-and-the-effects-on-consumers/.

[64] Exh. 1, Faulhaber & Farber, at 25-26.

[65] *Id.*

to-peer file-transfer applications (see below)—rapidly expands to fill the new capacity.[66] For example, Japan, "with widely marketed 100 Mbps connections, still has concerns with congestion and has adopted multiple strategies to cope with problems related to network neutrality. This indicates that, contrary to the views of some proponents of national broadband policies, greater investment in broadband infrastructure alone is unlikely to eliminate the role of traffic management by network operators."[67]

In short, the solution to the engineering challenges posed by IP convergence lies not only in more networks and higher-capacity pipes, but in greater network intelligence as well, including an ability to identify and provide the appropriate level of performance required by different applications traversing the network so that users can receive the service quality they want and need. Fortunately, the designers of the Internet Protocol perceived a need for precisely such differentiation of traffic into latency-sensitive and non-latency-sensitive applications, and they built the capacity for such differentiation into the very DNA of IP. In the following sections, we describe the history and technology of "DiffServ," its common use in the provision of IP services to enterprise customers, and its increasing use within the consumer marketplace as well.

2. The Internet Protocol, and Broadband Networks in General, Have Always Been Designed to Support Differential Treatment of Traffic to Satisfy Quality-of-Service Needs.

Much of the advocacy for net neutrality regulation rests on a creative misreading of a 25-year-old white paper by three highly regarded network engineering experts—Jerome Saltzer,

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66 *See* note 47, *supra* (discussing Jacobson's algorithm and its exploitation).

67 Scott J. Wallsten & Stephanie Hausladen, *Net Neutrality, Unbundling, and Their Effects on International Investment in Next-Generation Networks*, 8 Rev. of Network Econ. 90, at 101-02 (Mar. 2009), http://www.techpolicyinstitute.org/files/wallsten_unbundling_march_2009.pdf; *see also id.* at 110-12 (citing Japanese government reports detailing congestion problems).

David Clark, and David Reed—concerning the so-called "end-to-end" (or "e2e") principle.[68] Many pro-regulation advocates cite this paper as a policy manifesto for reducing every IP network to a collection of "dumb pipes" that should be forever consigned to treating every IP packet exactly the same, oblivious to whether the packet is associated with a performance-sensitive application or not. The paper is nothing of the kind. It is instead an early description of how key error-correction and related functions in communications across different networks can usually, for most data applications, be conducted more efficiently and effectively by end-user devices on each end of a data session than by the routers in between.[69]

The paper makes clear that the authors never intended this now-unremarkable guideline to be an "absolute rule" even as an engineering matter, let alone any sort of normative policy judgment.[70] As network engineer Richard Bennett observes, "the end-to-end arguments of network engineering differ significantly from network neutrality advocates' idiosyncratic end-to-end principle, a demand for a low-function, 'stupid' network."[71] And because those advocates have "failed to stay up-to-date with the engineering community's ongoing discussions about Internet architecture," they "have consistently asked regulators to require network operators to employ engineering solutions within the Internet that are more appropriate to the traditional, single-function telephone network, such as over-provisioning. . . . Applied blindly, [the] end-to-

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68 J.H. Saltzer, D.P. Reed & D.D. Clark, *End-to-End Arguments in System Design* (Nov. 1984), http://web.mit.edu/Saltzer/www/publications/endtoend/endtoend.pdf (originally published in 2 ACM Transactions in Computer Systems 277 (Nov. 1984)).

69 *See generally id.*

70 *See id.* at 7 ("Thus the end-to-end argument is not an absolute rule, but rather a guideline that helps in application and protocol design analysis; one must use some care to identify the end points to which the argument should be applied.").

71 Bennett, *Designed for Change*, *supra*, at 2.

end [guideline] can become a dogma that limits network efficiency, increases costs, and constrains opportunities to innovate."[72]

More fundamentally, this rigidly prescriptive misuse of the end-to-end guideline runs headlong into thirty years of development of the Internet Protocol itself, which has always recognized the need for and utility of IP-layer network intelligence to account for differences in application type. Professors Farber and Faulhaber observe:

> It is a canon of faith among Internet aficionados that the Internet has always been nondiscriminatory in its operations, and that this principle of nondiscrimination has recently come under threat from "gatekeeper" broadband ISPs. Nothing could be further from the truth. The Internet has always used prioritization of traffic, congestion control and other methods of network management since the earliest days, as any technologist familiar with its full history can aver. Imposing any form of nondiscrimination via regulation would be a radical change from past Internet practice.[73]

As early as September 1981, the IETF established a mechanism for marking packets by handling class so that networks could give applications within each class at least the minimum level of performance they need. Known as the "Type of Service" (ToS) field in the packet header, the purpose of this mechanism was, in the words of the operative RFC,[74] designed to help IP networks "offer service precedence" under which a network would "treat[] high precedence traffic as more important than other traffic (generally by accepting only traffic above

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[72] *Id.* at 4.

[73] Exh. 1, Faulhaber & Farber, at 16. The authors add: "[Jon] Peha, now the FCC's Chief Technologist, makes the case for the following principle: 'Network neutrality should not be about banning all discrimination.' We completely agree; we advise the FCC to accept this good advice." *Id.* (internal citations omitted; citing Jon Peha, *The Benefits and Risks of Mandating Network Neutrality and the Quest for a Balanced Policy*, 1 Int'l J. of Communication 644, 657 (2007), http://www.ijoc.org/ojs/index.php/ijoc/article/view/154/90).

[74] An IETF RFC, or "request for comment," is a memorandum published by the IETF "describing methods, behaviors, research, or innovations applicable to the working of the Internet and Internet-connected systems." Wikipedia, *Request for Comments*, http://en.wikipedia.org/wiki/Request_for_Comments (accessed Jan. 13, 2010).

a certain precedence at time of high load)."[75] In the mid-1980s, network engineers relied on this ToS functionality to cope with heavy congestion on the NSFNET backbone, "provid[ing] certain interactive network applications, specifically telnet, preferential treatment over other traffic" and "establish[ing] support for separate queues in the routers according to the IP Precedence value in the IP header field."[76] Thus, "[e]ven three decades ago, the vision of providing different levels of service to different levels of traffic was clear[.]"[77]

That vision started to became a significant commercial reality in the 1990s. In 1994, another RFC noted that, in addition to the "simple priority" described in the 1981 RFC, more work needed to be done to facilitate latency-sensitive Internet applications: "[R]eal-time applications often do not work well across the Internet because of variable queuing delays and congestion losses," and thus "[b]efore real-time applications such as remote video, multimedia conferencing, visualization, and virtual reality can be broadly used, the Internet infrastructure must be modified to support real-time QoS."[78] The 1994 RFC thus endorsed a mechanism that would enable network operators "to divide traffic into a few administrative classes and assign to each a minimum percentage of the link bandwidth under conditions of overload, while allowing 'unused' bandwidth to be available at other times."[79]

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[75] *Internet Protocol – DARPA Internet Program Protocol Specification*, RFC 791, at 11 (Sept. 1981), http://www.ietf.org/rfc/rfc0791.txt?number=791.

[76] Exh. 1, Farber & Faulhaber, at 17 (quoting R. Bohn *et al.*, *Mitigating the coming Internet crunch: Multiple service levels via Precedence*, 3(4) J. of High Speed Networks 1, 2 (1994), http://www.nlanr.net/Papers/precedence.ps).

[77] *Kurose & Ross*, *supra*, at 648.

[78] R. Braden *et al.*, *Integrated Services in the Internet Architecture: an Overview*, RFC 1633, at 1 (June 1994), http://www.ietf.org/rfc/rfc1633.txt?number=1633.

[79] *Id.*

In 1998, building on RFC 791 and other RFCs, RFC 2474 adopted an updated version of ToS, known as Differentiated Services or DiffServ, that uses the Differentiated Services Code Point (DSCP) to mark and prioritize packets at the IP layer.[80] Today, bits 8-15 within an IPv4 packet are devoted to DSCP functionality:

bit offset	0–3	4–7	8–15	16–18	19–31
0	Version	Header length	Differentiated Services	Total Length	
32	Identification			Flags	Fragment Offset
64	Time to Live		Protocol	Header Checksum	
96	Source Address				
128	Destination Address				
160	Options				
160 or 192+	Data				

Figure 5: DiffServ in IPv4 packet

DiffServ operates at the IP layer (Layer 3) and permits differentiated service handling wherever routers are equipped to recognize and act upon the DSCP field.[81]

AT&T and other providers have long used DiffServ in conjunction with analogous mechanisms at other layers, including Ethernet and ATM at Layer 2 and MPLS at Layer 2.5,[82] to

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80 K. Nichols *et al.*, *Definition of the Differentiated Services Field (DS Field) In the IPv4 and IPv6 Headers*, RFC 2474 (Dec. 1998), http://www.ietf.org/rfc/rfc2474.txt?number=2474.

81 A. Retana *et al.*, *Using 31-Bit Prefixes on IPv4 Point-to-Point Links*, RFC 3021 (Dec. 2000), http://www.ietf.org/rfc/rfc3021.txt?number=3021; *see also* RFC 2914, *supra*. Figure 5 is taken from Wikipedia, *IPv4*, http://en.wikipedia.org/wiki/IPv4 (last accessed Dec. 12, 2009).

82 *See generally Kurose & Ross*, *supra*, at 441-511 (discussing link layer protocols). Multiprotocol label switching ("MPLS"), which can ride on top of a variety of Layer 2 protocols, allows fast processing and efficient routing of IP packets among MPLS-enabled routers and permits network engineers to override default IP routing. *See id.* at 502-04.

ensure differentiated service handling across diverse network facilities.[83] For example, AT&T offers an enterprise-grade Internet access service, known as Managed Internet Service ("MIS"),[84] that combines DiffServ and MPLS-based class-of-service mechanisms to ensure enhanced performance for traffic that MIS customers designate for special handling. AT&T and other network providers sell such services to a range of enterprise customers, including content providers that wish to purchase prioritized handling for performance-sensitive content throughout core network facilities.[85] The NPRM displays no awareness that these diverse prioritization services currently exist, even as it draws their continued lawfulness into question (see below).[86]

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[83] *See* Nortel, *Introduction to Quality of Service (QoS)* (2003), http://www.nortel.com/products/02/bstk/switches/bps/collateral/56058.25_022403.pdf; Ralph Santitoro, *Metro Ethernet Services – A Technical Overview*, Metro Ethernet Forum, at 9 (Apr. 2003), http://metroethernetforum.org/PDF_Documents/metro-ethernet-services.pdf ("DiffServ . . . provide[s] more robust QoS capabilities when compared to the simple forwarding-based priority of IP TOS[.]"); Carol Wilson, *TW Telecom Connects With DPI*, Light Reading (Nov. 3, 2009), http://www.lightreading.com/document.asp?doc_id=184068 ("Beginning in 2010, tw telecom will offer its customers a portal, developed in-house, through which enterprises can determine, not just how their networks are performing, but how specific applications within those networks are performing, and whether more or less bandwidth is needed to support those applications[.]").

[84] *See* AT&T Wholesale, Managed Internet Service, http://www.business.att.com/wholesale/Family/ip-solutions-wholesale/managed-internet-service-wholesale/.

[85] AT&T Interstate Access Guidebook, *OPT-E-MAN Ethernet Service*, at Sheets 3, 7-8, http://cpr.bellsouth.com/guidebook/is/0009-0043.pdf (describing "Best Effort," "Bronze," and "Silver" classes of service and associated "packet delivery rate," latency, and jitter performance); Verizon Business, *Internet Dedicated Access Fact Sheet*, *supra*, at 2 ("Verizon Internet Dedicated QoS . . . allows your Internet Dedicated connection to offer multiple grades of service. For example, if you wish to protect high-quality voice or video applications or mission-critical traffic streams, the QoS feature has corresponding traffic priority classes to support these applications. Internet Dedicated QoS ensures that traffic you designate as having a higher priority is served before lower-priority traffic.").

[86] Notably, carriers have often offered such services to the public via tariffs filed with this Commission. *See, e.g.*, SBC Advanced Solutions, Inc. Advanced Services Tariff, F.C.C. Tariff No. 1, Asynchronous Transfer Mode, at 50.13, 50.14, http://www.att.com/Large-Files/RIMS/SBC_Advanced_Solutions_Inc/Interstate/FCC_Tariff_No._1/a_Tariff_FCC_No_1.pdf (describing "Quality of Service parameters" for ATM service; grandfathered for existing

AT&T likewise combines Layer 3 DiffServ functionality with Layer 2 mechanisms to separate its U-verse "triple play" platform into logically discrete voice, video, and Internet access streams and provide each service the network performance it needs to meet customer expectations.[87] The top Internet access speed available over the shared U-verse platform—24 Mbps—is several times the top speed attainable under AT&T's legacy DSL service, even though the copper infrastructure used for the latter service was *not* shared with any managed video service. AT&T's Internet access customers have thus benefited from the extensive fiber deployments that permit such dramatically higher-speed services. But those multi-billion-dollar deployments have made economic sense in the first place precisely because the new infrastructure *is shared*—because it supports voice and video services in addition to Internet access. The success of this model has led Frost and Sullivan to choose AT&T U-verse as its "2009 North American Consumer Communications Service Product of the Year"—and to cite the Internet access portion in particular as "a very compelling component of the product offering," which together with U-verse video and voice delivers "great value and a cutting-edge experience to millions of consumers."[88] And based on a recent survey of 69,000 consumers,

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customers); *see also* AT&T Advanced Solutions, *Advanced Telecommunications Services and Wholesale DSL Transport, Terms and Conditions* at 37, 43-51 (Nov. 4, 2009), http://www.att.com/public_affairs/regulatory_documents/Advanced_Solutions_Version_40.pdf (describing current QoS service offerings and rates).

[87] The U-verse service recently surpassed 2 million subscribers. AT&T, Press Release, *AT&T U-verse TV Marks 2 Million Customer Milestone*, Dec. 9, 2009, http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=30203.

[88] Frost & Sullivan, *2009 North American Consumer Communications Service Product of the Year Award: AT&T*, http://www.att.com/Common/merger/files/pdf/Frost_Sullivan_2009_Consumer_Product_of_the_Year.pdf. JD Power and Associates has likewise found that "AT&T U-verse [video] ranks highest in customer satisfaction" in every region of the country where AT&T offers the service and also "perform[s] particularly well in the offerings and promotion factor, specifically with their bundled pricing options," and it also "perform[s] well in the performance and reliability factor, especially regarding reception clarity." J.D. Power and Associates, Press Release, *AT&T U-verse and Verizon FiOS Lead Regional Customer*

Consumer Reports found that "AT&T U-verse received top scores for Internet and TV service and [is] among the better phone providers, too."[89]

Figure 5, above, illustrates the DSCP field in today's standard version of the Internet Protocol: IPv4. The Internet community has now adopted and is beginning to implement a successor protocol—IPv6—which, among other things, permits many times the number of unique IP addresses and thus accommodates the exploding global demand for such addresses. The designers of IPv6 not only retained IPv4's differentiated-services functionality within the updated protocol, but significantly expanded on it by making provision for differences both in "traffic class" and "flow":

> RFC 1752 and RFC 2460 state that [the flow header] allows "labeling of packets belonging to *particular flows for which the sender requests special handing*, such as a nondefault quality of service or real-time service." For example, *audio and video transmission might likely be treated as a flow*. On the other hand, the more traditional applications, such as file transfer and e-mail, might not be treated as flows. . . . The IPv6 header also has an 8-bit traffic class field. This field, like the TOS field in IPv4, can be used to *give priority to certain datagrams within a flow*, or it can be used to *give priority to datagrams from certain applications . . . over datagrams from other applications*[.][90]

These headers are built into the structure of IPv6 as follows:

Satisfaction Rankings Among Cable, Satellite and Internet Television Service Providers, Oct. 1, 2008, http://www.jdpower.com/corporate/news/releases/pressrelease.aspx?ID=2008204.

[89] *Save a bundle: How to piece together a great deal for TV, phone, and Internet service*, Consumer Reports (Feb. 2010) (available to subscribers); *see also* Consumer Reports, Press Release, *Fiber-Optic Providers Are Leading Choices for Internet, TV, and Telephone Service*, Jan. 5, 2010, http://pressroom.consumerreports.org/pressroom/2010/01/fiberoptic-providers-are-leading-choices-for-internet-tv-and-telephone-service.html. Ironically, Consumer Reports is published by Consumers Union, whose proposals for intrusive "nondiscrimination" rules threaten the very business practices that create this consumer satisfaction.

[90] *Kurose & Ross, supra*, at 367 (emphasis added).

Octet Offset		0								1								2								3							
	Bit Offset	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29		
0	0	Version				Traffic Class								Flow Label																			
4	32	Payload Length																Next Header								Hop Limit							
8	64	Source Address																															
C	96																																
10	128																																
14	160																																
18	192	Destination Address																															
1C	224																																
20	256																																
24	288																																

Figure 6: DiffServ in IPv6 packet[91]

Like other aspects of the Internet Protocol, each of these "service handling" mechanisms (ToS, DiffServ, MPLS, and others) was developed by network engineering experts through the time-tested, consensus-building RFC process. They represent the collective wisdom of the global Internet engineering community, as embodied in IETF, and they are intended to meet the needs of the global user community. The Commission has historically, and very wisely, left the resolution of engineering debates to that community.[92] Until now, it has never proposed to take this evolving and highly nuanced set of engineering judgments about IP architecture, freeze it to suit the policy preferences of particular advocates, and stamp it with the coercive authority of law. That, however, is what the proponents of net neutrality regulation seek in this proceeding—and what the NPRM itself appears to propose. And as discussed in Section I.B of the Discussion

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91 Figure 6 is taken from Wikipedia, *IPv6*, http://en.wikipedia.org/wiki/IPv6 (last accessed Dec. 12, 2009).

92 *See* Notice of Proposed Rulemaking, *IP-Enabled Services*, 19 FCC Rcd 4863, 4863 ¶ 1 n.1 (2004) (disclaiming authority over "standard-setting issues for the Internet Protocol language itself, which are more appropriately addressed in other fora, or other items outside this Commission's jurisdiction, such as Internet governance").

below, that immodest proposal for unprecedented intrusion into the realm of network engineering is out of step with the more measured approaches to "net neutrality" taken by virtually every other country that has addressed the issue.

3. The NPRM Misconceives the Provision of QoS Enhancements in the Market Today.

As discussed, AT&T and many other network providers widely use DiffServ today, together with analogous mechanisms at other protocol layers, to offer enterprise and residential customers alike differential classes of service for different types of IP traffic. As a result, the NPRM's proposed ban on certain vaguely defined types of prioritization agreements would not only foreclose many *future* pro-consumer services, but also draw a range of *existing* welfare-enhancing services into doubt and disrupt current arrangements throughout the Internet.

To illustrate this point, we begin with the diagram accompanying paragraph 106 of the NPRM:

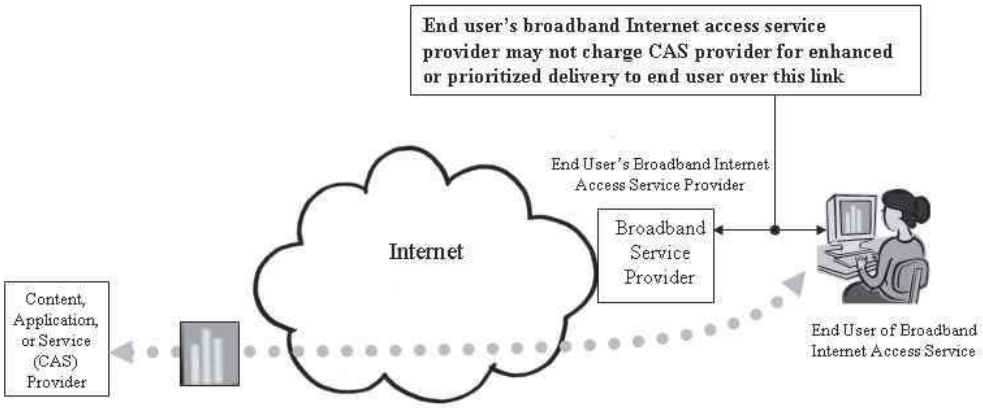

Figure 7: View of Internet represented in NPRM

This diagram is notable for leaving several key questions unanswered about the relationships among the parties to the pictured Internet session. And when those questions are answered, it becomes apparent that the rule proposed in the text box and discussed in paragraph 107—"[e]nd

user's broadband Internet access service provider may not charge CAS provider for enhanced or prioritized delivery to end user over this link"—is both ambiguous and deeply misguided.

It is first important to look behind the "cloud" in the diagram, which, like the "cloud" that appears in many Internet-related diagrams, obfuscates more than it clarifies. Here, the cloud appears intended to represent an IP network, which is most likely privately owned and operated by a provider such as Level 3, AT&T, Sprint, Global Crossing, Google, Verizon, Akamai, Comcast, Limelight, or one of many other providers. That IP network sells services to the content provider in the box at the left. If that IP network sells that content provider the class-of-service capabilities discussed above, it will mark certain packets for prioritized handling within its network. Today, that priority may or may not extend through all network links all the way to the end user pictured at the right of the diagram, depending on two variables, among others: (1) whether she and the content provider are connected to the same network (or group of networks operated by the same entity) and (2) whether she is sitting at home or in her office.

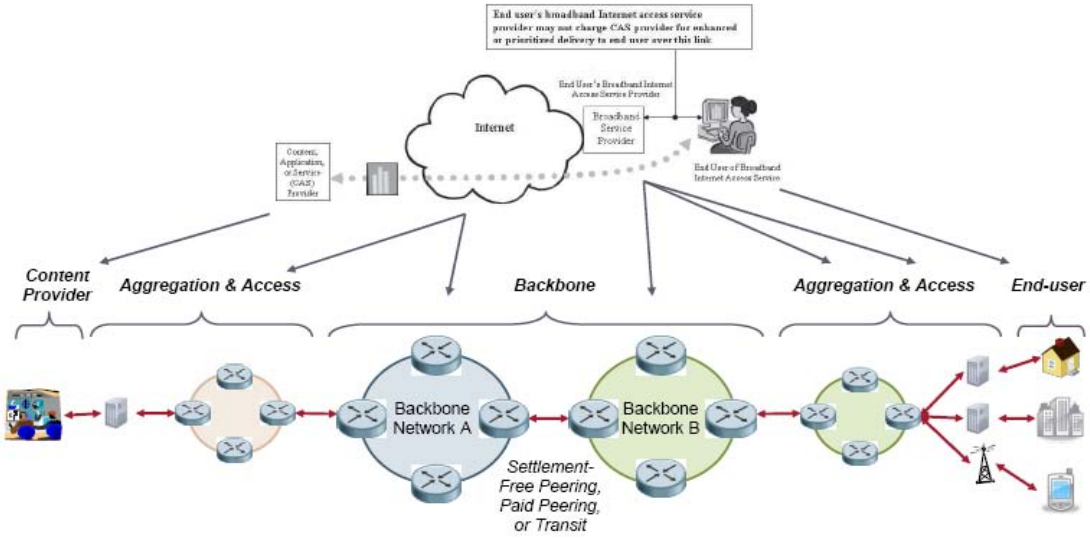

Figure 8: Looking behind the "cloud" (scenario 1: users served by different networks)

Suppose, first, that the content provider at left and the end user at right are connected to different, unaffiliated networks—say, Level 3 ("Network A") on the left and AT&T ("Network B") on the right.[93] In that event, the packets must be exchanged between the two networks, traditionally through a peering or transit arrangement. Suppose that Network A uses DSCP-field markings (and related techniques, such as MPLS) to prioritize the packets of the content provider on the left as those packets move through Network A. At the boundary between Networks A and B, Network B would almost certainly disregard Network A's prioritization markings and treat the packets like all other best-effort Internet traffic from that point forward (unless the networks have a special QoS peering arrangement). That phenomenon reflects a basic collective action problem: When handing off its traffic to another network, each network has an incentive to present *all* of its traffic as "high priority," because any ensuing costs would be incurred only by the other network. The Internet community has not yet worked out any universally recognized, economically sustainable mechanism for "QoS-aware" exchanges of traffic across multiple networks.

That said, the Internet community is actively seeking a solution to this challenge.[94] If and when that initiative succeeds, QoS peering or transit arrangements may appear as private contractual agreements between any two networks (one of which could be a large content provider or CDN), much like standard peering and transit arrangements today. Alternatively, such arrangements could involve intermediaries that coordinate multi-network QoS functionality for many parties. In fact, at least one firm is actively pursuing that goal today, with an eye

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[93] Like similar diagrams elsewhere in these comments, Figure 8 provides a general overview of IP networks for illustrative purposes, and it is not intended as a precise representation of any particular provider's network.

[94] *See, e.g.*, Quality of Service Working Group, *Inter-provider Quality of Service, White paper draft 1.1*, MIT Communications Futures Program (Nov. 17, 2006), http://cfp.mit.edu/publications/CFP_Papers/Interprovider%20QoS%20MIT_CFP_WP_9_14_06.pdf.

toward becoming such an intermediary.[95] Either way, the parties to these arrangements—both the network operators and their customers—will use economically rational mechanisms to allocate QoS enhancements efficiently to the applications and customers that most value them.

Now consider the other possibility: namely, that the network serving the application/content provider (pictured in the diagram below in the lower right) is the *same* network that serves the end users pictured in the upper right:

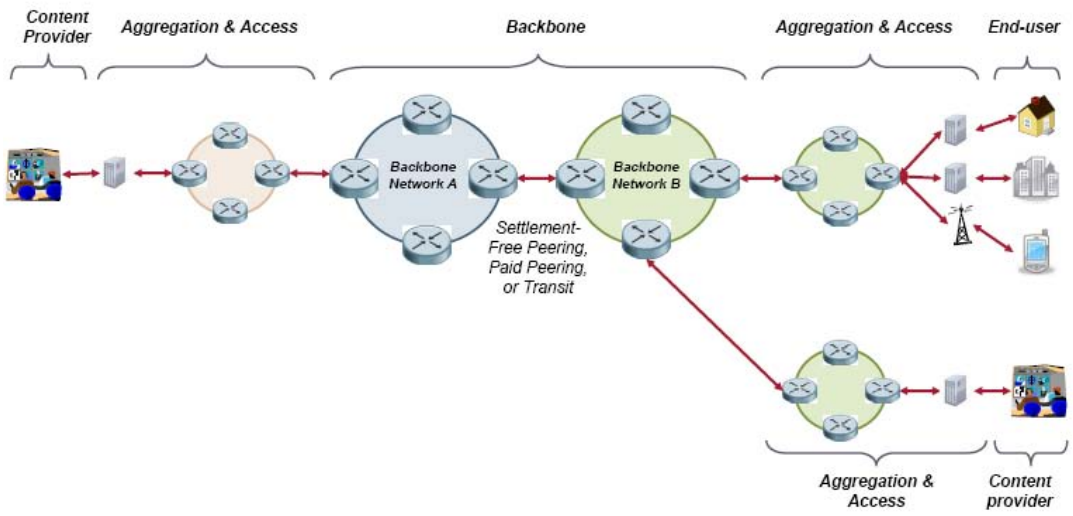

Figure 9: Looking behind the "cloud" (scenario 2: users served by the same network operator)

In that event, the inter-network exchange-related complications just discussed would be a non-issue. And if Network B (*i.e.*, the network pictured both top and bottom at right) has deployed QoS capabilities in the network facilities serving the two customers, the packets exchanged between them could receive end-to-end differentiated service handling, because only one network operator—Network B—is responsible for handling that end-to-end communication.[96]

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95 *See* InterStream, About, http://interstream.com/about.

96 As the complexity of these different scenarios makes clear, the NPRM's vague depiction at paragraph 106 of a single abstract "link" over which network operators may not provide fee-

In fact, IP networks currently honor requests from enterprise customers (including content providers) for prioritized handling of designated content beginning on the access/aggregation links serving those customers across the network's core backbone network links—and, in some cases, all the way through that network for end-to-end QoS-enhanced data sessions between enterprise customers. At present, the network capabilities needed to provide such end-to-end QoS enhancements for Internet traffic are more prevalent in the access/aggregation networks deployed primarily to serve business customers rather than in those deployed in more residential areas.[97] As a result, in the diagram accompanying paragraph 106 of the NPRM, the "end user" sitting at right might today be sending and receiving Internet content enhanced through end-to-end QoS arrangements if, rather than sitting at home, she is sitting in a large office building occupied by an enterprise customer of the same IP network operator that serves the content provider (*see* Figure 7 above).

One type of end-to-end QoS arrangement in the enterprise space involves the use of network-based *virtual private networks*. Such VPNs often make use of MPLS at Layer 2.5 to "encapsulate" traffic from defined customer locations and route it transparently over prescribed paths to other such locations. "[T]he customer experiences direct communication to their sites as though they had their own private network, even though their traffic is traversing a public

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based enhanced or prioritized delivery is insufficient to offer any meaningful guidance to service providers as to precisely what the Commission is attempting to prohibit.

[97] As with many technologies that are first made available to business users, it is reasonable to expect that these QoS capabilities will also become increasingly available to residential consumers. For example, while AT&T's U-verse high-speed Internet access service is offered on a best-effort basis today, AT&T's network is technically capable of supporting multiple classes of service in the future. Similarly, the standards for wireless LTE-based broadband services, which will serve both business and residential users, contain a very robust set of QoS mechanisms. *See* Discussion § IV, *infra*. And it will be essential to use those mechanisms in order to efficiently provide, among other things, the voice quality that consumers demand of their mobile devices, given that voice appears as just one IP application among many in the LTE environment.

network infrastructure and they are sharing that infrastructure with other businesses."[98] Network providers use various QoS techniques to establish priorities among "multiple classes of service within a VPN, as well as priorities *among* VPNs."[99] As Cisco explains:

> For example, a service provider network may implement three service classes: a high-priority, low-latency "premium" class; a guaranteed-delivery "mission critical" class; and a low-priority "best-effort" class. Each class of service is priced appropriately, and subscribers can buy the mix of services that suits their needs. For example, subscribers may wish to buy guaranteed-delivery, low-latency service for their voice and video conferencing applications, and best-effort service for e-mail traffic and bulk file transfers.[100]

Although many network-based VPNs are specific to given enterprise customers, network operators can and do configure them to encompass groups of multiple customers. The engineering community has thus deployed methods for intercommunication among VPNs and for merging "two or several VPNs . . . to a single VPN."[101] Again, the end user pictured in paragraph 106 of the NPRM may well be benefiting today from such end-to-end QoS enhancements if she is using the network-based VPN service sold to an enterprise customer.

To our knowledge, no one has suggested that such enterprise-to-enterprise arrangements might be problematic or harmful to consumers in any way, nor could anyone plausibly make that argument in a marketplace where networks have long provided such QoS enhancements to willing business customers. Instead, the focus has always been on prioritization of Internet traffic in the last mile to "consumers" or, in the industry vernacular, "eyeball" customers. As

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[98] Cisco, *Introduction to Cisco MPLS VPN Technology*, at 1-2 ("*Cisco VPN White Paper*"), http://www.cisco.com/en/US/docs/net_mgmt/vpn_solutions_center/1.1/user/guide/VPN_UG1.pdf; *see generally Kurose & Ross*, *supra*, at 734-41.

[99] *Cisco VPN White Paper*, *supra*, at 1-4 (emphasis added).

[100] *Id.* at 1-13. These QoS controls involve, among other things, translating "the IP precedence" found in the DSCP field at Layer 3 "to the MPLS Class of Service field" at Layer 2.5. *Id.*

[101] *Cisco IP Solution Center, MPLS VPN User Guide, 5.2*, at E-14 (2009), http://www.cisco.com/en/US/docs/net_mgmt/ip_solution_center/5.2/mpls_vpn/user/guide/mpls52.pdf.

discussed in Section III.A.2 of the Discussion below, however, the Commission could not reasonably draw regulatory distinctions between "business" or "content-producing" customers (for whom last-mile prioritization would be permitted) and "eyeball" customers (for whom it presumably would not be). Assigning Internet users to such regulatory silos would be ill-conceived because, among other considerations, every user is potentially *both* a content provider *and* a set of eyeballs, as the NPRM recognizes (at ¶ 99).

Moreover, these innovations are not, and should not be, confined to the business space to begin with. In the residential space as well, providers use the same DSCP-based prioritization (and related mechanisms) to provide QoS to performance-sensitive services, such as IPTV and VoIP, that share a converged IP platform with best-effort Internet access. *See* Engineering Background § D.2, *supra*. As even pro-regulation advocates have conceded, it would make no sense to prohibit such prioritization.[102] Such a ban could only give broadband providers perverse incentives to keep their voice and video networks *physically separate* from the IP networks used for Internet access: that is, to create redundant networks in order to ensure that their consumers retain the service quality they need for applications that must be run on a managed network. That result—if economically achievable at all—would introduce radical inefficiencies into the communications market. It would lead to higher prices for all network customers, including

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[102] *See* Letter from Tim Wu & Lawrence Lessig to Marlene H. Dortch, CS Docket No. 02-52, at 14 (Aug. 22, 2003) (asserting that network providers "should not discriminate in how they treat traffic on their broadband network on the basis of internetwork criteria," but they should be able to "police what they own," such that network providers "generally *may* discriminate in their treatment of traffic on the basis of *local* network criteria," such as "bandwidth, jitter, or other local Quality of Service indicia") (emphasis in original); Testimony of Tim Wu before the House Comm. on the Judiciary, Telecom & Antitrust Task Force, at 51 (Apr. 25, 2006), http://commdocs.house.gov/committees/judiciary/hju27225.000/hju27225_0.htm (asserting that "[t]he best proposals for network neutrality rules . . . leave open legitimate network services that the Bells and Cable operators want to provide, such as offering cable television services and voice services along with a neutral internet offering").

residential consumers, who must ultimately pay for these unnecessary costs. It would defeat the promise of convergence by forcing different services back onto physically distinct, "siloed" platforms. And it would deter the roll-out of video competition for incumbent cable television companies.

More generally, just as it is efficient and pro-consumer to logically (rather than physically) segregate the dedicated IPTV stream from best-effort Internet traffic, so too is it efficient and pro-consumer to permit different classes of service for different types of applications and content *within* the Internet portion of the pipe—as, again, broadband providers have long done for enterprise customers. We return to these themes in Section III of the Discussion below. For now, we stress the following point. The Commission cannot ban applications-specific differential service handling without either (i) seriously disrupting the industry by prohibiting beneficial commercial arrangements that are already common in the enterprise space, such as the sale of QoS enhancements to content providers and other enterprise customers; or (ii) creating new and ill-conceived regulatory silos dividing "content-producing" customers from "eyeball" customers. The first option should be unthinkable. And the second would be unwise, both because there is no valid reason to deprive "residential" customers of the advanced capabilities now available to "enterprise" customers and because every network user is potentially *both* a consumer *and* a producer of Internet content.

E. The Market for Service Enhancements.

As exemplified most prominently by the rise of CDNs, the Internet ecosystem features an entire market for *service enhancements:* methods that allow performance-sensitive applications and content to function well even during periods of congestion. One of the key questions in this proceeding is whether broadband Internet access providers should be barred from fully competing with CDNs and other vendors in that market, which is national and indeed global in

scope. Understanding this point requires some background in the various technologies for managing competing demands on finite bandwidth.

The NPRM appears to focus on one tool in the engineer's toolbox: differentiated service handling or so-called "packet prioritization," discussed above. But there are other tools in the toolbox as well—some of which could likewise be implicated by the Commission's rules. From an engineering perspective, each has different pros and cons depending on the context and objectives. In the discussion that follows, we briefly summarize a number of key methods that network engineers at broadband and content providers alike can use to ensure higher-quality end-user experiences in an environment of increasing bandwidth demand.[103]

1. Bandwidth Provisioning.

Every broadband end user, from a suburban household to the largest global content provider, chooses the bandwidth of the broadband "pipe" or pipes that connect it to the Internet. For example, end users can purchase different tiers of AT&T U-verse broadband Internet access, with download speeds ranging from 1.5 Mbps (the "express" tier) to 24 Mbps (the "max turbo" tier).[104] And enterprise businesses, including application and content providers, choose from a vast range of different enterprise broadband services offered by a variety of providers.[105]

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[103] This discussion is meant to be illustrative rather than comprehensive. For example, content providers also can reduce data-transfer times through digital compression technologies. *See AT&T 2007 Net Neutrality Comments*, at 40-41.

[104] Beginning in February 2010, AT&T will adjust its U-verse broadband Internet access service portfolio to provide a range of competitive service options at prices that represent compelling values in light of ever-growing broadband usage. In particular, for new customers, AT&T will lower the list price of its three highest speed services (12 Mbps, 18 Mbps, 24 Mbps) by $10 per month, while increasing its 3 Mbps and 6 Mbps services by $5 per month. AT&T will discontinue its 1.5 Mbps offering.

[105] *See generally* Mem. Op. & Order, *Petition of AT&T and Bellsouth for Forbearance Under 47 U.S.C. § 160(c) from Title II and Computer Inquiry Rules with Respect to its Broadband Services*, 22 FCC Rcd 18705 (2007), *aff'd, Ad Hoc Telecom. Users Comm. v. FCC*, 572 F.3d 903 (D.C. Cir. 2009).

The bandwidth an end user chooses will depend, of course, on the volume of traffic it expects to exchange with other end points on the Internet, both upstream and downstream. While broadband providers continually upgrade their networks to give customers the bandwidth they desire (consistent with their terms of service), virtually all Internet traffic crosses shared facilities at some point in its end-to-end transmission path. As a result, the access "bandwidth" an end user purchases, no matter how great, cannot insulate it from the service degradation caused by congestion on shared links, ranging from aggregation facilities in the access network to peering points connecting Internet backbones. As discussed, moreover, *network providers* cannot economically serve their customers by radically over-provisioning bandwidth throughout their networks to guarantee the same low-latency, low-jitter, and low-loss performance at all times for all applications, whether those applications are performance-sensitive or not. *See* Engineering Background § D.1, *supra*; Discussion § III.B.6, *infra*.[106]

2. Differentiated Service Handling, Buffering, and Queuing.

As discussed, network engineers manage QoS for applications such as real-time streaming video—which are often highly sensitive to latency and jitter—by configuring routers to provide special handling for packets with particular DSCP-field ("DiffServ") markings.[107] Routers typically implement this task through *buffering* and *queuing* techniques. The costs of a network that employs DiffServ techniques are substantially lower for all users than the costs of a network that addresses performance needs solely through increases in capacity.[108] Indeed, Cisco

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[106] Indeed, even on the circuit-switched PSTN, carriers cannot economically over-provision capacity so that all calls by all callers can be completed at all times, which is why some callers receive a "fast busy" signal during certain peak calling periods (*e.g.*, Mother's Day).

[107] *See generally* Murat Yuksel *et al.*, *Value of Supporting Class-of-Service in IP Backbones* (2007), http://www.cse.unr.edu/~yuksem/my-papers/iwqos07.pdf ("*RPI Study*").

[108] *See* Engineering Background § D.1, *supra*; *RPI Study*, *supra*; *see also* RPI, Press Release, *Undifferentiated Networks Would Require Significant Extra Capacity*, June 29, 2007,

estimates that these techniques, when used to prioritize up to 10 percent of a network's traffic, will more than double the network's bandwidth in real terms.[109]

Although queuing and buffering techniques are complex, the following captures the basics. Routers transfer packets between links in a network in time intervals typically measured in a few milliseconds. It is not uncommon for the packet load on a particular link (*i.e.*, the number of packets attempting to access the link) to spike briefly above the link's capacity. When this happens, more packets may arrive at the link than can be placed immediately on the link. To handle this situation, network engineers equip routers with "buffers," which very briefly store excess packets until capacity on the link becomes available. If enough packets arrive to fill up the buffer, newly arriving packets are dropped and may be resent.

"Queuing" involves deciding the order in which buffers release packets from a router onto a link.[110] If a router supports DiffServ, each service class is assigned to separate buffers. In

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http://news.rpi.edu/update.do?artcenterkey=2204 (quoting RPI professor Shivkumar Kalyanaraman, coauthor of the RPI study, as saying: "The study makes clear that there are substantial additional costs for the extra capacity required to operate networks in which all traffic is treated alike, and carrying traffic that needs to still be assured performance as specified in service level agreements (SLAs).").

[109] Cisco, *A Discussion with the FCC on the Open Internet*, at 17 (Dec. 8, 2009), http://www.openinternet.gov/workshops/docs/ws_tech_advisory_process/Cisco%20FCC%20Network%20Management%20Presentation%20120809.pdf.

[110] *See, e.g.*, Chuck Semeria, *Supporting Differentiated Service Classes: Active Queue Memory Management*, at 5, Juniper Networks (2002); OpenBSD, *PF: Packet Queuing and Prioritization* (Oct. 16, 2009), http://www.openbsd.org/faq/pf/queueing.html. Network engineers have developed a variety of different queuing methodologies. Each is designed to maximize use of the network while minimizing packet loss, and each has its own strengths and weaknesses. Some queuing methodologies—such as "first-in-first-out" (FIFO) and "fair queuing" (FQ)—assign little or no priority to the packets associated with particular types of applications. Because these methodologies subject all applications to latency and jitter during periods of congestion, they are best suited for networks that do not handle real-time applications. In contrast, other techniques, such as "weighted round robin" (WRR) and "class-based queuing" (CBQ), establish different queues for packets associated with different types of applications. Each queue is then assigned sufficient bandwidth to manage latency and jitter, and each may

essence, network engineers assign relatively more but smaller-capacity buffers for latency-sensitive service classes and relatively fewer but larger-capacity buffers for *non*-latency-sensitive service classes. Buffers designed for the latency-sensitive service classes will be "polled" more frequently to release their packets quickly onto the link. If a buffer is empty, the polling process moves to the next buffer. All buffers are polled often enough to give each service class the opportunity to consume at least its prescribed minimum amount of bandwidth.

Because latency and jitter impair real-time applications much more than non-real-time applications, this technique ensures the most efficient and pro-consumer allocation of scarce network resources—the link capacity between two routers or between a router and an end point. Again, this technique assures that every service class may "claim" at least the minimum bandwidth needed to support normal operations for that class, even during periods of network congestion. In addition, when the network is *not* congested, buffers for less performance-sensitive service classes may claim unused capacity that has not been claimed by the buffers for the more performance-sensitive classes. Since congestion tends to be sporadic and momentary, the division of traffic into these classes of service has little or no effect on any class the vast majority of the time.

Choices among queuing techniques—the algorithms that determine the manner in which buffers sequentially deliver traffic to transport links—are inherently provider-specific, and there "are no real industry standards."[111] Moreover, queuing methodologies are highly dynamic: Equipment vendors and network providers are constantly improving existing methodologies and

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"borrow" momentarily unused bandwidth allocated to other queues. Such dynamic bandwidth allocation facilitates the efficient use of finite network capacity.

[111] Semeria, *Supporting Differentiated Service Classes*, *supra*, at 4.

inventing new ones. Thus, each network provider must balance the costs and benefits of the various queuing methodologies to select the one that best meets the needs of its customers.

Significantly, while the NPRM and thus our comments focus on "prioritization" at the IP layer (*i.e.*, DiffServ), many other protocols at other layers also allow network operators, content providers, and others to "enhance" or "prioritize" particular data, including data consisting of Internet access traffic. As discussed, these include differential-handling techniques at Layer 2 (*e.g.*, Ethernet, ATM, and Frame Relay) and Layer 2.5 (MPLS). At Layer 4, the specific TCP variant employed affects how aggressively a user's system will claim bandwidth. *See* Engineering Background § C, *supra*. Likewise, some Layer 7 protocols, such as the new SPDY protocol created and promoted by Google, appear to enable content providers to prioritize some HTTP data streams over others so that some content (perhaps Google-sponsored advertisements) will appear first when a webpage downloads.[112] These and similar practices are widespread; all are "non-neutral" in that they prioritize some traffic over others; and the proposed "nondiscrimination" rule would draw many of them into doubt for the first time. Of course, the Commission may not have intended that result. But that is the whole point. When an agency rushes to regulate based on popular speculation rather than a comprehensive, data-driven understanding of the issues, it will produce many unintended and harmful consequences. Here, to the extent the Commission proposes to regulate or prohibit "prioritization" that affects the Internet, it is wading into a vast ocean of technologies and commercial relationships that the

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[112] *See* SPDY: An experimental protocol for a faster web, http://dev.chromium.org/spdy/spdy-whitepaper; Mike Belshe & Roberto Peon, *SPDY Protocol*, http://dev.chromium.org/spdy/spdy-protocol. While this prioritization apparently occurs in the end points of the communication (servers and clients) rather than in the network, the net result is effectively the same: SPDY "prevents the network channel from being congested with non-critical resources when a high priority request is pending." SPDY: An experimental protocol, *supra*.

NPRM nowhere mentions, let alone grapples with. The risk of harmful unintended consequences is staggering.

3. Congestion Avoidance.

Content-Delivery Networks. As explained in our discussion of CDN services, one effective way a content provider can surpass its rivals in online performance is to minimize the number of hops its packets must make en route to end users, thereby reducing processing- and congestion-related delays. Under the most prevalent such method, a provider caches its data (such as webpages and media files) in multiple locations near the regional ISPs serving its geographically dispersed end users. When an end user requests the data, a cache server can convey the requested packets quickly and reliably from its nearby location, thereby sparing them a long, multiple-hop trip through potential bottlenecks on any of several different networks. As discussed, some companies, such as Akamai and Limelight, provide this CDN service commercially to third parties, whereas others, such as Google, build CDNs of their own.

CDN Collocation. Some content providers and broadband networks have begun exploring content distribution methods that would involve direct interconnection and caching of content not just *close to* the broadband provider's access/aggregation networks, but *within* those networks as well. Such arrangements, known as "CDN collocation," eliminate the need to deliver content through a transit or peering link when the end user requests it. Depending on the context, this approach often allows content providers to reach end users more economically and with superior performance as compared to more conventional CDN peering or transit arrangements. For example, Google is reportedly negotiating a deal under which it would pay British Telecom to store Google's content within BT's (and other ISPs') access networks for

efficient transmission to end users.[113] Such arrangements "enable[] ISPs to store content within *their own* networks," such that "[t]he media companies would pay them, rather than the likes of Akamai, and get a guaranteed service even at peak times."[114]

Paid Peering. Traditionally, large content providers and CDNs have entered into comprehensive transit relationships with large backbone providers to convey their traffic to many different ISPs within the Internet. Backbone providers have often implemented these arrangements by selling these customers enterprise-class Internet access service and interconnecting with them by means of robust, high-capacity facilities. If a content provider wishes to interconnect directly at the peering links of an ISP to obtain closer network proximity to its end users, but does not meet the criteria for settlement-free peering, it may enter into bilateral *paid peering* arrangements with certain ISPs. Under such arrangements, the content provider pays the network operator for such interconnection and on-net origination and termination—but at rates lower than it would pay under the traditional transit model if it had contracted with a backbone provider to deliver its traffic throughout the Internet.[115] Moreover, as explained by the University of Michigan study noted above, Google and other dominant

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[113] Richard Wray, *BT and Google in talks over creating video delivery network for ISPs*, The Guardian, Dec. 7, 2009, http://www.guardian.co.uk/business/2009/dec/07/bt-google-isp-digital-video.

[114] *Id.* (emphasis added). As BT explains: "The average bandwidth consumption of end users is increasing[ly] causing a significant rise in Communication Provider backhaul costs. Content Connect intends to address this issue by making the delivery of video over broadband more cost effective by deploying content storage closer to the end user. Content Connect will also enable Communication Providers to charge Content Providers for content delivery thus allowing the Communication Provider to be part of the value chain." BT Wholesale, Wholesale Content Connect, http://www.btwholesale.com/pages/static/Products/Broadband/Wholesale_Content_Connect.html.

[115] *See* George Ou, *FCC NPRM ban on Paid Peering harms new innovators*, Digital Society, Nov. 10, 2009, http://www.digitalsociety.org/2009/11/fcc-nprm-ban-on-paid-peering-harms-new-innovators/.

content providers have assumed sufficient market clout that they have now begun interconnecting with ISPs on a settlement-free basis. *See* Engineering Background § B.3, *supra*.

IP Multicast. When providing high-definition video streams of popular events in real time, content providers face prohibitive costs if they must arrange for the transport of many redundant streams on an end-to-end *unicast* basis: *i.e.*, as separate simultaneous streams from a centralized source to each of the many end users that wish to receive the content. As discussed, a content provider can reduce those costs by hiring or building CDNs to replicate and disperse its content-transmitting nodes closer to an ISP's end users and thereby reduce the total network resources that each individual stream must consume en route to a given end user. CDNs, however, require substantial investments in cache servers to store all of this content, along with other infrastructure to transport content to all of these cache servers. And from a network-resource perspective, too, CDNs can be suboptimally efficient for the distribution of any content that many users in the same area wish to obtain at the same time, such as streaming real-time video, because each cache server must transmit hundreds or thousands of redundant streams to all geographically proximate users that request it.

One promising solution is IP multicast, "a bandwidth-conserving technology specifically designed to reduce traffic by simultaneously delivering a single stream of information to potentially thousands of corporate recipients or homes," while requiring only a single stream (rather than one per viewer) at the content source.[116] Suppose a content provider wants to stream

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[116] Cisco White Paper, *IP Multicast Technical Overview*, at 1 (Aug. 2007), http://www.cisco.com/en/US/prod/collateral/iosswrel/ps6537/ps6552/prod_white_paper0900aecd804d5fe6.html ("*Cisco Multicast White Paper*"); *see also* Jon Hardwick, Metaswitch Networks, Whitepapers, *IP Multicast Explained*, at 2 (June 2004), http://www.metaswitch.com/download/multicast.pdf ("Multicast allows the source to send a single copy of data, using a single address for the entire group of recipients. Routers between the source and recipients use the group address to route the data. The routers forward duplicate data packets wherever the path to recipients diverges.").

video coverage of a highly popular sports event over the Internet simultaneously to thousands of subscribers in the same geographic area. Under an IP multicast approach, the content provider arranges with the ISP for the routers in the ISP's access/aggregation network to instantaneously replicate copies of the incoming packets and transmit them to multiple local users simultaneously, depending on which users have requested the relevant content. No caching is required, and redundancy is enormously reduced by moving the packet replication as close as possible to the ultimate recipients. Sprint explains: "Instead of setting up separate unicast sessions for each [end user], multicast will replicate packets at router hops where the path to different [end users] diverges. This allows a source to send a single copy of a stream of data, while reaching any number of possible receivers."[117] IP multicast thus dramatically lowers the cost of high-quality distribution by "minimiz[ing] the burden on both sending and receiving hosts and reduc[ing] overall network traffic."[118] And if multicast is used in conjunction with CDN technology (*i.e.*, a CDN cache server transmits content to a multicast-enabled router), even greater bandwidth efficiencies may be possible, which opens up new opportunities for content and application providers to deliver higher-quality services over the Internet. Indeed, multicast already plays a vital role in the efficient delivery of *non*-Internet-based IPTV services, such as AT&T's U-verse video service.

Paid peering, CDN collocation, and multicast arrangements are unambiguously pro-consumer and should be welcomed. CDN collocation and multicast in particular will be increasingly important to the distribution of affordable streaming high-definition video over the

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[117] Sprint, Multicast Basics, https://www.sprint.net/index.php?p=faq_multicasting. Sprint adds: "Many popular streaming applications, such as Microsoft Windows MediaPlayer, Real Networks RealPlayer, and Apple QuickTime have multicast capabilities. Several other multicast-only applications are appearing, such as Cisco's IP/TV and Apple's MacTV." *Id.*

[118] *Cisco Multicast White Paper*, *supra*, at 1.

Internet. These and the similar technologies discussed above illustrate a broader point. By targeting QoS enhancements to QoS-sensitive applications, network operators can facilitate the development of innovative Internet applications that would not be feasible to provide otherwise. The use of such techniques thus expands both the business opportunities available to application and content providers and, in turn, the applications and content available to consumers. This virtuous cycle—smarter networks supporting QoS-sensitive applications and content, thereby increasing consumer welfare—will fuel enormous economic growth *if* policymakers encourage the deployment of shared, multi-purpose broadband platforms that are capable of delivering a range of QoS capabilities to content and application providers.

Unfortunately, the strict "nondiscrimination" rule proposed in this proceeding, at least as described in paragraphs 106 and 107 of the NPRM (discussing "enhanced" access to subscribers), would appear to prohibit such QoS arrangements insofar as they would involve payments by content providers for especially efficient and high-quality distribution of their content within specific access/aggregation networks.[119] Ironically, that rule, as written, would appear to prohibit in the United States the very type of CDN caching arrangements that Google—a key net neutrality proponent—is reportedly pursuing in Great Britain (see above).[120]

4. P2P Content Distribution.

Under traditional content-distribution methods, a complete copy of a content file (such as a song or a feature-length movie) is stored on servers and distributed from there to the end users

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[119] *See* Ou, *FCC NPRM ban*, *supra*.

[120] This may explain why, in its "public policy blog," Google turns handstands to explain how it can possibly *support* the "'colocat[ion of] caching servers within broadband providers' own facilities" (which Google seeks to exploit) while *opposing* other forms of QoS enhancement (which Google has no need to exploit and would like to prevent others from using). *See* Richard Whitt, *Net neutrality and the benefits of caching*, Google Public Policy Blog, Dec. 15, 2008, http://googlepublicpolicy.blogspot.com/2008/12/net-neutrality-and-benefits-of-caching.html.

that request it. In contrast, P2P technologies disassemble content into small files and widely distribute them to different end-user computers for storage and subsequent retrieval and reassembly by other end users.[121] The result is the functional equivalent of a massively distributed server network, in which each end user's computer acts as an individual server for a portion of the content being distributed. Although P2P technology has been used (and continues to be used) by some parties for the unlawful distribution of pirated content, it has also been adopted as a mechanism for the distribution of lawful content by a variety of companies. Vuze, for example, claims that it "has attracted over 100 content partners, including A&E, BBC, CBC, G4 TV, Geneon, The History Channel, Ministry of Sound TV, National Geographic, PBS, Showtime, Starz Media, The Poker Channel, TV Guide Channel, and many more."[122]

In the past, content providers (and their distribution partners) have traditionally borne the costs of maintaining enough centralized storage and server capacity to convey their content to end users. By converting end-user devices into content caches for other end users, however, P2P technology offers a way to shift those costs to end users and their network providers. But while P2P distribution may thereby offer content providers a relatively cheap storage and distribution mechanism, most current implementations of P2P technologies impose enormous upstream and downstream traffic burdens on broadband networks, particularly with the rise of shared video. As network-engineering scholars from Yale and the University of Washington have explained, this "network-oblivious peering strategy . . . may cause traffic to scatter and unnecessarily

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[121] *See, e.g.*, Detlef Schoder, Kai Fischbach, & Christian Schmitt, *Core Concepts in Peer-to-Peer Networking* (2005), http://www.idea-group.com/downloads/excerpts/Subramanian01.pdf.

[122] Petition for Rulemaking, *Vuze Inc. Petition to Establish Rules Governing Network Management Practices by Broadband Network Operators, Broadband Industry Practices*, WC Docket No. 07-52, at 5-6 (Nov. 14, 2007); *see also* Abacast, Peer-Assisted Streaming, http://www.abacast.com/technology/peerassistedstreaming.php (describing the peer-to-peer technology used by Abacast to deliver streaming video and audio content).

traverse multiple links within a provider's network, leading to much higher load on some backbone links" and producing "inefficiencies for both P2P applications and network providers."[123]

None of this is to say that P2P technologies are inherently inefficient in all cases. Quite to the contrary, the distributed, peer-based content-delivery model underlying today's P2P technologies could bring tremendous benefits for content providers, network operators, and consumers alike—faster distribution at lower cost in some circumstances—*if* the industry can resolve the current inefficiencies in that model. To that end, AT&T is part of an industry-wide working group—composed of representatives from BitTorrent, LimeWire, Cisco, Verizon, Verisign, and researchers from Yale and Washington Universities, among others—that is trying to develop an efficient, network-*aware* peer-to-peer technology. Known as "P4P," this new generation of technology is being developed to optimize network resources rather than hoard them.[124]

5. Security Screening.

Finally, protection from spam, worms, viruses, distributed denial-of-service attacks, and other malicious behavior on the Internet is critical to network management, and no net neutrality advocate seriously contends otherwise. An important but often overlooked benefit of these robust network security practices is that keeping harmful traffic out of a network in the first place can significantly reduce network congestion by conserving network resources for traffic from

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[123] Haiyong Xie *et al.*, *P4P: Explicit Communications for Cooperative Control Between P2P and Network Providers*, Distributed Computing Industry Ass'n, at 1 (May 2007), http://www.dcia.info/documents/P4P_Overview.pdf.

[124] *See id.* Companies that have taken "observer status" in this effort include Abacast, Cablevision, CacheLogic, Cox Communications, Comcast, MPAA, NBC Universal, Oversi, PeerApp, Time Warner Cable, and Turner Broadcasting. *See* Laird Popkin & Doug Pasko, DCIA, *P4P: ISPs and P2P*, http://www.dcia.info/activities/p2pmslv2008/1-6%20P4PWG.ppt.

legitimate sources. According to Verizon Wireless, for example, a single spammer tried in 2007 to send 12 million text messages to its wireless customers.[125] As Verizon Wireless explained, wireless spam "impairs the delivery of legitimate messages, and because spam is often sent in high volume over short periods of time, it can place a strain on overall performance of the wireless network," and "[t]here's a lot of time and money that goes into blocking all of that."[126] Indeed, to address the flood of unwanted emails initiated by so-called "spam zombies" (*i.e.*, infected consumer computers that send out large amounts of spam unbeknownst to their owners), the Federal Trade Commission has specifically advised ISPs to "block[] a common Internet port [port 25] used for e-mail when possible" and to apply "rate-limiting controls for e-mail relays."[127] Of course, doing so may inadvertently block or slow the transmission of some legitimate emails, but the FTC has apparently deemed such incidental effects acceptable to combat the serious threat posed by these spam zombies.

With multiple petabytes of data passing through its network each business day, the first crucial step to effective network security for AT&T or any other network provider is rapid identification of illegitimate packets. By closely monitoring the traffic coming into and out of its network, a network provider like AT&T can take steps to detect the early stages of attacks on network integrity and activate mechanisms to minimize the effects of those attacks. "Before a worm strikes, technicians see strange spikes of traffic going to normally obscure ports, as malware developers test and tweak their code. A sudden, sharp increase in the amount of Web

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[125] *See* Verizon, Press Release, *Wireless Spammer Target Of Legal Action By Verizon Wireless*, June 1, 2007, http://news.vzw.com/news/2007/06/pr2007-06-01b.html.

[126] Howard Buskirk, *Verizon Wireless Says Filters Cut Wireless Spam's Impact*, Commc'ns Daily, June 4, 2007, 2007 WLRN 10554218.

[127] FTC, Press Release, *FTC, Partners Launch Campaign Against Spam "Zombies,"* May 24, 2005, http://www.ftc.gov/opa/2005/05/zombies.shtm.

traffic worldwide could mean breaking news—or a distributed denial-of-service ("DoS") attack being lobbed at a single company halfway around the world."[128] For example, "AT&T security analysts knew about the 2003 Slammer worm before it hit, because of strange traffic going to port 1434."[129] Any net neutrality regulations that would restrict the wide latitude network providers have to perform such critical functions would strike a serious blow to network security and consumer safety. Indeed, as vividly illustrated by the recent coordinated cyberattack on Google and over 30 other companies, policymakers would imperil national security if such regulations hamstrung the ability of network providers to respond to such attacks. *See* Discussion § V, *infra*.

Wireless broadband providers may also employ additional techniques to safeguard the security of wireless networks. AT&T, for example, uses a technique called "Code Signing" to control access to the network at the device and application layer. AT&T-partnered devices are configured to allow third-party applications to access the network only once AT&T has been assured (either through testing or through the developer's affirmative, contractual representation) that the application will not introduce malicious code or some other intrusive agent into the network. This "certification" process also helps prevent the introduction of applications that inappropriately access customer data (*e.g.*, contact lists and location information) and violate customers' reasonable privacy expectations. As discussed below, there are more "unmanaged" wireless service models that leave customers on their own to determine whether to allow an application to access data on the device or use network resources. But the more managed

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128 Sarah D. Scalet, *Introducing AT&T, Your Internet Security Company*, CIO, May 17, 2007, http://www.cio.com/article/110250/Introducing_AT_T_Your_Internet_Security_Company.

129 *Id.*

approach employed by AT&T and others provides an important alternative to customers that prefer a secure environment.

DISCUSSION

I. THE INTERNET ECOSYSTEM IS FUNCTIONING WELL WITHOUT ANY NEED FOR NEW PRESCRIPTIVE REGULATION.

In a series of decisions over the past decade, the Commission confirmed that all broadband Internet access services—from cable modem service to wireline and wireless broadband Internet access—should be free from common-carrier-style and other economic regulation.[130] In each case, the Commission found that the broadband Internet access market was competitive and dynamic, that market forces would protect consumer interests, and that regulation would do more harm than good. In particular, the Commission found, such regulation would have a "negative impact on deployment and innovation" and would thus violate "Congress' clear and express policy goal [in Section 706 of the 1996 Act] of ensuring broadband

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[130] Declaratory Ruling, *Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities*, 17 FCC Rcd 4798, 4822 ¶ 38 (2002) ("*Cable Modem Order*"), *aff'd*, *National Cable & Telecommunications Ass'n v. Brand X Internet Servs.*, 545 U.S. 967 (2005) (intermediate history omitted); Report and Order, *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities*, 20 FCC Rcd 14853, 14855-56 ¶¶ 1-3 (2005) ("*Wireline Broadband Order*"), *aff'd Time Warner Telecom v. FCC*, 507 F.3d 205 (3d Cir. 2007); Declaratory Ruling, *Appropriate Regulatory Treatment for Broadband Access to the Internet over Wireless Networks*, 22 FCC Rcd 5901, 5902 ¶ 2 (2007). The Commission has *never* regulated broadband Internet access services themselves, offered by any provider. Until 2005, wireline telephone companies that offered any information service to consumers were required to identify the underlying transmission component of that service, tariff it, and sell it on a common-carrier basis to other information service providers. The source of that obligation was the *Computer Inquiry* regime, which the Commission designed in the 1970s and 1980s to regulate information services in the complete absence of any transmission alternatives to the legacy telephone network. The *Cable Modem Order* rejected the extension of that monopoly-era regulation to cable modem providers on the ground that the broadband market was competitive, and the *Wireline Broadband Order* removed those rules from wireline providers too, for the same reason. *See Wireline Broadband Order*, 20 FCC Rcd at 14855-56 ¶¶ 1-3. In *Brand X* and *Time Warner Telecom*, the Supreme Court and the Third Circuit, respectively, affirmed these two rulings.

deployment, and its directive that we remove barriers to that deployment[.]"[131] Instead, the Commission adopted four consumer-oriented principles to ensure the future openness of the Internet, including principles protecting the right of consumers "to access the lawful Internet content of their choice" and "to run applications and services of their choice," subject to "reasonable network management."[132]

This market-oriented approach originated in the late 1990s with then-Chairman William Kennard, who, citing the rise of broadband competition and the need for regulatory "humility," repeatedly rejected calls to subject then-dominant providers of cable modem service to various forms of "open access" regulation.[133] The Commission's subsequent adherence to Chairman Kennard's "high-tech Hippocratic Oath," coupled with the four principles of the *Internet Policy Statement*, have proven more than adequate to address any and all concerns about Internet "openness." The Commission cannot now reasonably subject any aspect of the Internet

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[131] *Wireline Broadband Order*, 20 FCC Rcd at 14877-78 ¶ 44; *see also id.* at 14865, 14894-96 ¶¶ 19, 77-80.

[132] Policy Statement, *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities*, 20 FCC Rcd 14986, 14987-88 ¶¶ 4-5 & n.15 (2005) ("*Internet Policy Statement*").

[133] *See* p. 1, *supra*. During Chairman Kennard's tenure, the Commission also rejected proposals to impose "openness" requirements on cable operators in connection with its merger-review authority, in part because the Commission found that "the potential for competition from alternative broadband providers" would suffice to protect consumer interests. Mem. Op & Order, *Applications for Consent to the Transfer of Control of Licensees and Section 214 Authorizations from MediaOne Group to AT&T*, 15 FCC Rcd 9816, 9872-73 ¶ 127 (2000); *see also* Mem. Op & Order, *Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations from TCI to AT&T*, 14 FCC Rcd 3160, 3197-98 ¶¶ 74-75 (1999) (declining to impose open access requirement because, *inter alia*, "many other firms already are deploying or seeking to deploy high-speed Internet access services to residential customers using other distribution technologies, and . . . some of these firms may emerge as competitors"). The Kennard Commission also voted 4-1 (over the lone dissent of Commissioner Furchtgott-Roth) to file an amicus brief urging the Fourth Circuit to invalidate a municipal open-access mandate for cable modem providers. *See* Br. for the FCC & the United States, *MediaOne Group, Inc. v. County of Henrico, Virginia*, Nos. 00-1680(L) and consolidated cases (4th Cir. filed Aug. 11, 2000).

ecosystem to more onerous economic regulation—let alone a line-of-business restriction masquerading as a "nondiscrimination" rule (see below)—without a strong empirical showing of need for such extraordinary intervention. The Commission can make no such showing.

A. The Internet Ecosystem Has Never Been Healthier.

For many years, advocates of increased regulation have predicted that, unless the government intervenes for the first time in the modern Internet ecosystem, the Internet will "die." In 2001, Larry Lessig cited the growth of broadband itself as the agent of death: "Everyone knows that the broadband era will breed a new generation of online services, but this is only half the story. Like any innovation, broadband will inflict major changes on its environment. *It will destroy, once and for all, the egalitarian vision of the Internet.*"[134] In 2003, Commissioner Copps contended that the "Internet may be dying," that "we really are teetering on a precipice," and that "we could be witnessing the beginning of the end of the Internet as we know it."[135] In 2006, Lessig returned to the "death" theme, arguing that "[i]n the US, at least, broadband competition is dying."[136] Google's Vint Cerf agreed that "[t]he prospects for such 'intermodal' competition remain dim for the foreseeable future[.]"[137] And Free Press, never to be outdone in

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[134] Lessig, *The Future of Ideas*, *supra*, at 176 (emphasis in original; quoting with approval Charles Platt, *The Future Will Be Fast But Not Free*, Wired, May 2001, http://www.wired.com/wired/archive/9.05/broadband.html).

[135] Remarks of Michael J. Copps, Commissioner, FCC, *The Beginning of the End of the Internet? Discrimination, Closed Networks, and the Future Of Cyberspace*, New America Foundation, Oct. 9, 2003, http://www.cb3qn.nyc.gov/file_depot/0-10000000/0-10000/2480/folder/27964/FCC%20Commissioner%20Copps%20on%20danger%20to%20Internet.pdf.

[136] Lawrence Lessig, *Congress Must Keep Broadband Competition Alive*, FT.com, Oct. 18, 2006, http://www.ft.com/cms/s/2/a27bdb16-5ecd-11db-afac-0000779e2340.html.

[137] Prepared Statement of Vinton G. Cerf, Vice President and Chief Internet Evangelist, Google Inc. before the U.S. Senate Comm. on Commerce, Science, & Transportation, Hearing on "Net Neutrality," at 7, Feb. 7, 2006.

the art of hyperbole, announced that a failure to regulate broadband providers would somehow "guarantee noncompetitive broadband markets *for a generation*."[138]

These reports of the Internet's death were greatly exaggerated. Since 2005, when the Commission freed wireline broadband providers from the last vestiges of telephone-monopoly-era regulation, the Internet has exploded with new content and new applications. To take just a few examples:

- The video giant YouTube did not even exist in January 2005, but now delivers nearly 10.5 billion videos each month in the United States,[139] and has recently begun offering high-definition video with a resolution of 1080p.[140]

- Hulu, an online video site founded in March 2008, already attracts 42 million users per month and will generate an estimated $175 million in revenue this year, thanks to content from Fox, NBC, ABC, Comedy Central, and more than 100 other sources.[141]

- Social networking site Facebook, which was created in 2003 and was confined to college campuses until 2005, now claims over 350 million users and a valuation over $10 billion.[142]

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[138] S. Derek Turner, *Broadband Reality Check II: The Truth Behind America's Digital Decline*, Aug. 2006, http://www.freepress.net/files/bbrc2-final.pdf.

[139] *See* comScore, Press Release, *Hulu Delivers Record 856 Million U.S. Video Views in October During Height of Fall TV Season*, Nov. 25, 2009, http://www.comscore.com/Press_Events/Press_Releases/2009/11/Hulu_Delivers_Record_856_Million_U.S._Video_Views ("Google Sites continued to rank as the top U.S. video property in October as it delivered 10.5 billion videos viewed. YouTube.com accounted for nearly 99 percent of all videos viewed at the Google Sites property.").

[140] *See 1080p HD Is Coming to YouTube*, YouTube Blog, Nov. 12, 2009, http://youtube-global.blogspot.com/2009/11/1080p-hd-comes-to-youtube.html.

[141] *See* comScore, Press Release, *supra*; Daniel Lyons, *Old Media Strikes Back*, Newsweek, Feb. 21, 2009, http://www.newsweek.com/id/185790; Chris Preimesberger, *Could the Hulu, Disney Deal Create a Tangled Video Web?*, eWeek, May 2, 2009, http://www.eweek.com/c/a/Services-Web-20-and-SOA/Could-the-Hulu-Disney-Deal-Create-a-Tangled-Video-Web-822881/.

[142] Facebook, Press Room, Statistics, http://www.facebook.com/press/info.php?statistics; Douglas McIntyre, *Facebook gets funding offer from Russian private equity firm*, Daily Finance, May 23, 2009, http://www.dailyfinance.com/2009/05/23/facebook-gets-funding-offer-from-russian-private-equity-firm/.

- Twitter, which did not exist in 2005, is now the third most-used social network, with 55 million monthly visits.[143]

- And Amazon.com, which sold its first Kindle in late 2007, has altered the way that millions of people obtain and read books, periodicals, and blog content and has already bred several competing services.[144]

These content and application providers and others have changed the face of the Internet and society at large—all without any impediment from broadband providers or any need for government regulation. Indeed, the Internet has succeeded largely because broadband providers invested scores of billions of dollars into broadband network infrastructure.

The broadband market is likewise even more competitive now than it was in 2005, when the Commission deemed it competitive enough to complete the task of eliminating all economic regulation of all broadband Internet access services.[145] Here, too, the context of the debate is illuminating. When advocates first began calling for net neutrality regulation (or its predecessor-in-interest, "open access" regulation), they based those proposals on the premise that the broadband market was a cable *monopoly* in many areas.[146] Several years later, confronted with

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[143] Andy Kazeniac, *Social Networks: Facebook Take Over Top Spot, Twitter Climbs*, Compete.com, Feb. 9, 2009, http://blog.compete.com/2009/02/09/facebook-myspace-twitter-social-network/.

[144] *See* Mellissa J. Perenson, *Amazon Kindle Review: Igniting Interest in E-Books?*, PC World, Nov. 21, 2007, http://www.washingtonpost.com/wp-dyn/content/article/2007/11/21/AR2007112100030.html; BBC News, *Plastic Logic e-reader aims to challenge Kindle*, Jan. 7, 2009, http://news.bbc.co.uk/2/hi/technology/8446959.stm.

[145] *See AT&T 2007 Net Neutrality Comments* at 49-50 (discussing FCC orders between 2002 and 2005 rejecting economic regulation for different classes of broadband Internet access service).

[146] *See, e.g.*, Lessig, *Future of Ideas*, *supra*, at 167 ("As the Internet moves from the telephone wires to cable, which model should govern? . . . Freedom or control?"); Stephen Labaton, *Fight for Internet Access Creates Unusual Alliances*, NY Times, Aug. 13, 1999, at A14 (describing early initiatives to regulate cable modem service); Mem. Op. & Order, *Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations from MediaOne Group, Inc. to AT&T Corp*, 15 FCC Rcd 9816, 9865 ¶ 112 (2000) ("[Commenters]

evidence of fierce competition between cable modem and DSL providers, the same advocates began referring to the same market as a "cozy duopoly" that "dribble[s] out capacity in small increments at high prices,"[147] even though that market was inarguably characterized by price wars and rapidly increasing speeds.

Indeed, the aggressive rivalry between cable and telco providers of wired broadband Internet access services is anything but "cozy."[148] According to one prominent analyst, cable broadband providers have experienced monthly churn rates of between 2.4 percent and 3.0 percent,[149] which equates to annualized churn rates of *between 28.8 percent and 36 percent*. As detailed in the attached Confidential Declaration, AT&T's own experience with customer churn for its consumer wireline broadband Internet access services likewise demonstrates that competition in this segment of the market is fierce.[150]

Moreover, the proliferation of multiple broadband wireless networks today undermines whatever credibility this "duopoly" rhetoric might ever have had. As discussed in Section IV below, several wireless providers now provide 3G services across the entire United States, some are poised to deploy 4G services, new wireless competitors such as Clearwire are emerging, and prices are dropping.[151] The result is not simply *intramodal* competition among rival wireless

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argue that, given Excite@Home and Road Runner's dominance in the provision of broadband Internet access, the merged firm could charge monopoly rents to content providers for the right to receive favorable caching on Excite@Home and Road Runner networks[.]").

[147] Comments of the Consumer Federation of America, Consumers Union, and Free Press, WC Docket No. 07-52, at 11-12 (June 15, 2007).

[148] Declaration of Marius Schwartz at 31 (Jan. 14, 2010) ("Schwartz Declaration") (attached as Exh. 3).

[149] *See* Craig Moffett *et al.*, *supra* note 5, at 4, Exhibit 2.

[150] *See* Exh. 4, Rieth Declaration.

[151] *See* Thirteenth Report, *Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services*, WT Docket No. 08-27, DA 09-54, at 93, Table 12

broadband platforms, but *intermodal* competition between wireless and wired platforms. As Bain & Co. recently explained, "two fixed infrastructures with wireless challenger infrastructure competition (satellite-TV, DTT, 3G–4G voice and data) create a dynamic competitive market with economically sustainable competition."[152] Indeed, by proposing to extend net neutrality regulation to wireless broadband providers for the first time, the NPRM paradoxically confirms that those providers are integral participants in the broadband marketplace. Unfortunately, the NPRM does not follow this marketplace reality to its logical policy conclusion. Because so many broadband alternatives are now available to consumers, the "duopoly" argument is a dead letter, and there is no longer any sound rationale—if there ever was—for prescriptive regulation. In fact, the proposed rules would be perversely counterproductive because they would extend burdensome monopoly-style regulations to *new broadband entrants*. That is a recipe not for protecting consumers, but for deterring the wireless broadband deployment that consumers most need.

The sheer magnitude of broadband capital expenditures likewise undermines any argument that broadband competition is somehow "stagnant." Wireline carriers and the cable industry have spent more than a hundred billion dollars to lay millions of miles of fiber, copper, and coaxial cable, and to purchase and deploy countless routers, multiplexers, and other

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(rel. Jan 16, 2009) ("*Thirteenth CMRS Competition Report*") (showing declining prices year over year for improved service). It is also no answer to say that two of the nation's four national facilities-based wireless providers are affiliated with Verizon and AT&T, which also provide wired broadband connections. First, this argument overlooks Clearwire altogether, understates the significance of Sprint and T-Mobile as serious national players, and ignores strong regional players such as Leap and MetroPCS, which have a growing impact on the competitive landscape. Second, Verizon Wireless and AT&T obviously compete *with each other*, as well as with wireline and cable providers, to provide wireless broadband service throughout the United States—as confirmed by their warring, high-priced ad campaigns.

[152] *See* Bain & Co., *Next Generation Competition: Driving Innovation in Communications*, Liberty Global Policy Series, at 2 (Oct. 2009), http://www.bain.com/bainweb/publications/pdf.asp?id=27331).

equipment.[153] Wireless providers have been investing billions more in 3G, WiMAX, and 4G (LTE) wireless broadband networks.[154] And as anyone who watches television is aware, broadband providers are spending enormous sums on warring advertisements targeted at one another's services, which is itself strong evidence of competition. They are spending those advertising dollars for good reason: Consumers will readily cancel their broadband service whenever they believe they can get better service or a better price from a new provider.

At the same time, broadband subscribership more than tripled since 2003, as the Commission found last year in its most recent Section 706 Report.[155] And competition has steadily forced prices down while simultaneously forcing providers to increase the speed and improve the quality of their services. And this occurred, moreover, while average per-subscriber *use* of those services increased each year, giving consumers ever-greater value for their broadband dollars. As the FTC observed in 2007, the broadband marketplace is characterized by "declining prices for higher-quality service."[156] In recent years, AT&T has quadrupled the maximum speed of its top-tier residential DSL service while cutting the price of that service by more than 20 percent. And nationwide, the average monthly broadband bill *fell* 4 percent

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153 *See, e.g.*, Fifth Report, *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, 23 FCC Rcd at 9651, 9651 ¶ 74 (2008) ("*Fifth Section 706 Report*") (noting that the industry plans $50 billion in capital expenditures in 2008 and 2009); AT&T, Press Release, *AT&T to Invest More Than $17 Billion in 2009 to Drive Economic Growth* (Mar. 10, 2009), http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26597; NCTA, Industry Data, http://www.ncta.com/Statistics.aspx (showing more than 120 million homes with access to cable broadband service, and industry capital investments of $161.2 billion since 1996).

154 *See, e.g.*, Marguerite Reardon, *Verizon promises 4G wireless for rural America*, CNET Reviews, Apr. 1, 2009, http://reviews.cnet.com/8301-12261_7-10209933-51.html. *See generally AT&T 2007 Net Neutrality Comments* at 58-61.

155 *Fifth Section 706 Report*, 23 FCC Rcd at 9631-32 ¶ 33.

156 *See* Federal Trade Commission, *Staff Report: Broadband Connectivity Competition Policy*, at 10-11 (2007), http://www.ftc.gov/reports/broadband/v070000report.pdf ("*FTC Net Neutrality Report*").

between 2005 and 2008, even as connection speeds and usage increased.[157] USTelecom estimates that consumers paid *$11 less per month* in 2007 for a 7 Mbps connection than they paid in 2001 for a 1.5 Mbps connection.[158] In short, prices have fallen dramatically in real terms—*i.e.*, per increment of bandwidth.

None of this is news. In report after report over the past five years, the Commission has found the broadband market to be highly competitive.[159] Other agencies agree. A 2008 NTIA report found "substantial growth in the broadband marketplace punctuated by demonstrable increases in capital investment, innovation, and entry, as well as superior productivity relative to other countries."[160] And the FTC similarly found in 2007 that broadband competition is

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[157] John Horrigan, Pew Internet and American Life Project, *Wireless Internet Use*, at 8 (July 2009), http://www.pewinternet.org/~/media//Files/Reports/2009/Wireless-Internet-Use.pdf ("*Pew Study*"). The Pew Study also shows steady year-over-year growth in home broadband penetration. *Id.* at 1.

[158] USTelecom, *Wireline Broadband Pricing 2001-2007* (June 2008), http://www.ustelecom.org/uploadedFiles/Learn/Broadband.Pricing.Document.pdf.

[159] *See Fifth Section 706 Report*, 23 FCC Rcd at 9645 ¶ 59 ("Based on our analysis in this Report, we conclude that the deployment of advanced telecommunications capability to all Americans is reasonable and timely. The data reflect the industry's extensive investment in broadband deployment, including at higher speeds, as evidenced by increased subscribership for those higher-speed services. The record also reflects that providers are continuing to make significant investments in broadband facilities going forward. Further, while section 706 does not require the Commission to report on actual broadband subscribership, we believe that subscribership to broadband services continues to increase steadily as new broadband-dependent services and applications emerge in the marketplace, and that subscribership growth is important due to its relationship with deployment."). *See also Wireline Broadband Order*, 20 FCC Rcd at 14880-81 ¶ 50; *AT&T-BellSouth Merger* Order, 22 FCC Rcd at 5730 ¶ 127; Mem. Op. & Order, *Applications for Consent to the Assignment and/or Transfer of Control of Licenses, Adelphia Communications Corp., Assignors*, 21 FCC Rcd 8203, 8296-97 ¶¶ 217-18 (2006) ("*Adelphia Transaction Order*") (finding that "competition among providers of broadband service is vigorous" and "cable modem service and DSL service are facing emerging competition from deployments of cellular, Wi-Fi, and WiMAX-based competitors, and [BPL] providers").

[160] NTIA, *Networked Nation: Broadband in America 2007*, at 2 (Jan. 2008), http://www.ntia.doc.gov/reports/2008/NetworkedNationBroadbandinAmerica2007.pdf.

"moving in the right direction."[161] Against this backdrop, it is no surprise that in 2007, after an exhaustive year-long inquiry into the broadband marketplace, the FTC's professional staff and all five FTC commissioners found no "significant market failure or demonstrated consumer harm from conduct by broadband providers" and warned that "[p]olicy makers should be wary of enacting regulation solely to prevent prospective harm," because "[i]ndustry-wide regulatory schemes—particularly those imposing general, one-size-fits-all restraints on business conduct—may well have adverse effects on consumer welfare."[162]

B. The Proposed Rules Would Place the United States Out of Step with the Regulatory Policies of Other Nations on Net Neutrality Issues.

In 2007, the OECD, which monitors market conditions and develops regulatory policy proposals for some 30 member nations, found that "[t]here is little evidence of anti-competitive conduct" in broadband markets and that "it seems premature for governments to become involved at the level of network-to-network traffic exchange and demand neutral packet treatment for content providers."[163] This fact-driven view encapsulates how many foreign regulatory authorities view the net neutrality debate, which some consider a peculiarly American political phenomenon.[164]

International approaches to issues grouped under the "net neutrality" umbrella have been far less interventionist than the rules proposed in the NPRM. A number of countries, after

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161 *See FTC Net Neutrality Report* at 155.

162 *Id.* at 11.

163 Organisation for Economic Co-operation and Development, *Internet Traffic Prioritisation: An overview*, at 5 (Apr. 6, 2007), http://www.oecd.org/dataoecd/43/63/38405781.pdf.

164 For a more comprehensive survey of the telecommunications policies of foreign governments—and a thorough refutation of the various myths some pro-regulation advocates have circulated about those policies—see Comments of AT&T Inc. on NBP Public Notice No. 16, Berkman Center Report, GN Docket Nos. 09-47, 09-51, 09-157 (Nov. 16, 2009).

carefully examining the relevant market and engineering data, have expressly declined to impose *any* type of net neutrality regulation. Regulators in the United Kingdom, for example, have repeatedly refused calls to interfere with Internet service providers' management of their networks. In a March 2007 Policy Statement, Ofcom—the British counterpart to this Commission—explained:

> [T]he existing market structure, the level of competition in service provision and the regulatory policy in Europe, combined with powers to address such issues under the existing regulatory framework will be sufficient to address issues that arise in relation to network neutrality now and in the future. . . . Specifically, in a competitive market, with consumers that are well informed in relation to the activities of different ISPs and who can easily move to competing providers, competition itself can provide[] a constraint on behaviours that reduce consumer benefits. Therefore, Ofcom is keen that: [1] we continue to promote effective and sustainable competition in the delivery of broadband services to consumers; [2] consumers can access transparent information on the services they consume, so that they are fully informed of any traffic prioritization, degradation or blocking policies being applied by their ISP; and [3] consumers are able to effectively migrate between service providers.[165]

More recently, in a January 2009 report, the U.K. reiterated its rejection of net neutrality principles, noting that such market intervention would undermine the business case for investing in next-generation networks. In particular, the report noted that "ISPs might in [the] future wish to offer guaranteed service levels to content providers in exchange for increased fees. In turn this could lead to differentiation of offers and promote investment in higher-speed access networks. *Net neutrality regulation might prevent this sort of innovation*. Ofcom has stated that provided consumers are properly informed, *such new business models could be an important*

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[165] Ofcom, *Regulation of VoIP Services: Statement and publication of statutory notifications under section 48(1) of the Communications Act 2003 modifying General Conditions 14 and 18*, at 80-81 (Mar. 29, 2007), http://www.ofcom.org.uk/consult/condocs/voipregulation/voipstatement/voipstatement.pdf.

part of the investment case for Next Generation Access."[166] More generally, the U.K. government report noted that "the Government has yet to see a case for legislation in favour of net neutrality. In consequence, unless Ofcom find[s] network operators or ISPs to have Significant Market Power [justifying] intervention on competition grounds, traffic management will not be prevented."[167] The report concluded that, absent such a finding, net neutrality regulations are imprudent because they may stifle investment.

Ofcom recently announced a similar policy with respect to mobile wireless networks. After a nearly two-year-long assessment of the mobile sector, it reported: "In a competitive market we expect that the degree of traffic management (if any) will be determined by consumer choice and therefore does not require regulation. We therefore believe that our promotion of competition in the mobile sector has the potential to address these concerns to a large degree."[168] Ofcom acknowledged that prioritization and even blocking may occur in the absence of regulation, but concluded that the appropriate response is *transparency* about such practices, not substantive prohibition.[169]

In Japan, the Ministry of Internal Affairs and Communications ("MIC") has studied the issue of net neutrality in depth over the last several years and has concluded that there is no current need for regulation. After a number of public consultations, draft reports, and industry panels, MIC released a final report concluding, among other things, that *ex ante* rules are unnecessary and that charges for distribution of bandwidth-heavy content may be determined

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166 Dep't for Culture, Media, and Sport & Dep't for Business Enter. and Regulatory Reform, *Digital Britain, The Interim Report*, at 22 (Jan. 2009), http://www.culture.gov.uk/images/publications/digital_britain_interimreportjan09.pdf (emphasis added).

167 *Id.*

168 Ofcom, *Mobile Evolution: Ofcom's mobile sector assessment*, at 21 (Dec. 17, 2009), http://www.ofcom.org.uk/consult/condocs/msa/statement/MSA_statement.pdf.

169 *Id.*

through negotiations between ISPs and content providers.[170] Japan's regulators did, however, encourage communications providers themselves to develop guidelines for traffic shaping,[171] which remains a crucial network-management technique for addressing congestion even though Japan reportedly has some of the highest residential broadband speeds in the world.[172] In response, four trade associations for the communications industry issued guidelines in May 2008 that permit traffic shaping. These guidelines permit providers, subject to disclosure obligations, to impose restrictions on certain end users and applications (such as P2P) that consume disproportionate bandwidth and potentially degrade service quality for other users.[173] Those guidelines are not legally binding on Internet service providers; rather, compliance is voluntary.[174]

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[170] *See, e.g.*, Ministry of Internal Affairs & Commc'ns, *Report on Network Neutrality, Working Group on Network Neutrality*, at 9 (Sept. 20, 2007), http://www.soumu.go.jp/main_sosiki/joho_tsusin/eng/pdf/070900_1.pdf (noting that "transition from *ex ante* to *ex post* regulations to ensure minimum regulatory intervention" should apply to IP-based networks); *id.* at 27-28 ("[I]t is not appropriate to have a general rule for surcharging the content provider that distributes rich content. Above all, it is appropriate to entrust the matter to negotiations between the ISP and the content provider.").

[171] *Id.* at 28-30 (noting that certain users and applications "monopolize bandwidth" and that "bandwidth control [packet shaping] is recognized as an appropriate method" to ensure quality of service for Internet users, but stating that, "to establish a broad-based consensus on bandwidth control criteria, it is advisable to seek participation from diverse parties in drawing up 'packet shaping guidelines'"). *See also* Japan Internet Providers Association *et al.*, *Guideline for Packet Shaping*, at 1-3 (May 2008) ("*Japanese Shaping Guidelines*"), *available at* http://www.jaipa.or.jp/other/bandwidth/guidelines_e.pdf.

[172] Both fixed network ISPs and mobile network operators in Japan have confirmed that they utilize traffic shaping to manage the quality of Internet traffic.

[173] *See, e.g.*, *Japanese Shaping Guidelines* at 1-2, 4, 8-10.

[174] *Id.* at 3 ("The Guideline is not an interpretation of judicial precedents or application of laws and regulations by government institutions, but has been voluntarily formulated by organizations of telecommunications carriers as an action guideline. Therefore, the Guideline is not legally binding, and whether to observe it or not is at the discretion of individual telecommunications carriers.").

Even when countries have concluded that some net neutrality regulation is appropriate, the rules often resemble the existing four principles in the *Internet Policy Statement* rather than the much more highly interventionist rules proposed in the NPRM. For example, the European Union recently rejected proposals to adopt a heavily regulatory approach like the strict "nondiscrimination" principle proposed in the NPRM. In November 2009, the EU adopted a new Electronic Communication Framework (the "Telecom Package") after a multi-year drafting process involving detailed analysis and debate among the European Commission, the European Council, and the European Parliament.[175] Although the Telecom Package recognizes (as does the *Internet Policy Statement*) the need to prevent anticompetitive degradation of service,[176] it aims to achieve that goal primarily by promoting informed consumer choice through disclosures about traffic-management practices.[177] It further recognizes that providers should retain discretion not only to engage in reasonable network management, but also to develop "premium

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[175] The Telecom Package consists of one Regulation and two Directives. *See* Regulation (EC) No 1211/2009 of the European Parliament and of the Council of 25 November 2009 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Office, 2009 O.J. (L 337) 1; Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws, 2009 O.J. (L 337) 11 ("Directive 2009/136/EC"); Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services, 2009 O.J. (L 337) 37 ("Directive 2009/140/EC").

[176] *See, e.g.*, Directive 2009/136/EC at 15.

[177] Directive 2009/136/EC, art. 21, at 24 ¶ 3(d) (noting that service providers should "provide information on any procedures put in place by the provider to measure and shape traffic so as to avoid filling or overfilling a network link, and on how those procedures may impact on service quality").

high-quality services."[178] And to that end, it provides that "national regulatory authorities shall . . . promot[e] efficient investment and innovation in new and enhanced infrastructures, including by ensuring that any access obligation takes appropriate account of the risk incurred by the investing undertakings and by permitting various cooperative arrangements between investors and parties seeking access to diversify the risk of investment[.]"[179]

The European Commission thus rejected the type of interventionist approach proposed in this Commission's NPRM: the imposition of prescriptive rules to address speculative future problems. Instead, the EC concluded, it would "monitor the impact of market and technological developments on 'net freedoms' [and] report[] to the European Parliament and Council . . . on *whether* additional guidance is required, and will invoke *existing* competition law powers"—*i.e.*, generally applicable antitrust principles—"to deal with any *anti-competitive* practices that *may* emerge."[180] Significantly, the EC has adopted this moderate regulatory approach even though European countries, including the U.K., typically have *far less intermodal broadband competition* than does the United States—and the rationale for highly interventionist regulation is thus even more attenuated here than there.[181]

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[178] Europa, Press Release, *Agreement on EU Telecoms Reform paves way for stronger consumer rights, an open internet, a single European telecoms market and high-speed internet connections for all citizens*, Nov. 5, 2009, http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/09/491; *see also* Directive 2009/136/EC at (34) ("In order to meet quality of service requirements, operators may use procedures to measure and shape traffic on a network link so as to avoid filling the link to capacity or overfilling the link, which would result in network congestion and poor performance.").

[179] Directive 2009/140/EC, art. 1 at 51 (amending Article 8.5d of the EU Directive 2002/21/EC).

[180] Directive 2009/140/EC, Annex at 69 (emphasis added).

[181] In a recent Aspen Institute colloquy between Blair Levin and a leading British telecommunications regulator, Mr. Levin reportedly "emphasize[d], and other participants agreed, that competition between two pipes is significant, and that countries with both upgraded cable and telephone infrastructure are far better off—in terms of enjoying the benefits of

Finally, a new policy issued by the Canada Radio-Television and Telecommunications Commission ("CRTC") permits Internet service providers to use a variety of prioritization methods, including traffic shaping and slowing down of certain applications, so long as such practices do not result in "noticeable degradation of *time-sensitive* Internet traffic" or slow down other traffic "to such an extent that it *amounts to blocking the content*."[182] And although the new policy forbids practices that are "*unjustly* discriminatory" or "*unduly* preferential," it permits service providers to engage in a variety of prioritization practices so long as they do so in an even-handed manner that is transparent to consumers.[183] The CRTC justified its policy as "a principled approach that appropriately balances the freedom of Canadians to use the Internet for various purposes with the legitimate interests of ISPs to manage the traffic thus generated on their networks, consistent with legislation, including privacy legislation."[184]

C. The NPRM Identifies No Market Failure That Could Justify This Sharp Break From Its Own Precedent and International Regulatory Norms.

The NPRM's proposal for intrusive "net neutrality" regulation is out of step not only with the policy conclusions of these foreign regulatory authorities, but with the considered judgment of key U.S. experts as well. Opponents of such regulation include Internet founders David

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competition—than those with a broadband monopoly." Philip J. Weiser, Aspen Institute, *A Framework for a National Broadband Policy*, at 21 (2008), http://www.aspeninstitute.org/sites/default/files/content/docs/pubs/A_Framework_for_a_National_Broadband_Policy_0.pdf. In past advocacy, Free Press has expressed near-disappointment that the "historical accident" of intermodal competition in the United States removes the key justification for various "unbundling" or "structural separation" experiments conducted in some foreign countries. *See, e.g.*, Comments of Free Press, GN Docket No. 09-51, at 84 (June 8, 2009).

[182] Canada Radio-television and Telecommunications Commission, *Telecom Regulatory Policy CRTC 2009-657, Review of the Internet Traffic Management Practices of Internet Service Providers*, at ¶¶ 123-27 (Oct. 21, 2009) (emphasis added), http://www.crtc.gc.ca/eng/archive/2009/2009-657.htm. *See also id.* at ¶¶ 36-37, 44-45.

[183] *Id.* at Summary. *See also id.* at ¶¶ 38, 48, 56-67, 123-27.

[184] *Id.* at Summary.

Farber and Robert Kahn, former FCC Chairman William Kennard, preeminent economists such as Michael Katz, Gerald Faulhaber, William Baumol, Marius Schwartz, and Alfred Kahn, and by publications as diverse as the *Washington Post*, the *Wall Street Journal*, and the *Economist*.[185] The Commission should heed these voices of caution. If it begins regulating any aspect of the Internet ecosystem, including broadband Internet access, the United States will have diminished authority to object when other countries begin to regulate other aspects of the Internet as they see fit.

The NPRM displays none of the caution urged by these senior policy experts or the foreign regulatory authorities that have studied the net neutrality issue in such depth. Instead, it proposes not just to ossify the Commission's existing consumer-oriented principles into prescriptive rules, and not just to extend them to new entrants in the wireless broadband segment, but to add two more rules to the mix for everyone, one of which would categorically ban broadband providers from entering into QoS agreements with application and content providers.

The NPRM cites no actual market failures—because there have been none—to justify its radical change in perspective on the need for regulation. Instead, it cites a grand total of two incidents over the nearly fifteen-year history of consumer broadband: the five-year-old *Madison River* and two-year-old *Comcast* controversies. In *Madison River*, a small rural telephone company tried to block its users from using their DSL connections to place VoIP calls.[186] And in *Comcast*, a cable company was found to have singled out and degraded the BitTorrent P2P

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185 *See AT&T 2007 Net Neutrality Comments* at 3-4 & n.7, 84 n.223 (citing sources); Comments of NCTA, WC Docket No. 07-52, at 3-4 & nn.7, 9 (filed June 15, 2007) (same); William E. Kennard, *Spreading the Broadband Revolution*, N.Y. Times, Oct. 21, 2006, http://query.nytimes.com/gst/fullpage.html?res=9B0CE1DA163FF932A15753C1A9609C8B63.

186 Order, *Madison River Commc'ns LLC*, 20 FCC Rcd 4295 (2005).

application.[187] Both cases were promptly resolved through voluntary agreements, and both underscore the adequacy of the Commission's current regime. They do not remotely suggest that new rules need to be added.

First, in each of these two cases, the broadband provider *blocked or degraded disfavored applications*. The existing four "openness" principles (and the first two in particular) *already address* such conduct, and the Commission thus simply applied those principles to the facts of those cases to encourage voluntary provider-specific resolutions. Neither case involved the subject matter of the strict new "nondiscrimination" rule proposed here: business-to-business agreements to provide QoS *enhancements* for unusually performance-sensitive content or applications. The proposed new ban on such agreements, even if it had been adopted five years ago, therefore would not have even addressed the *Comcast* and *Madison River* incidents. There is thus not even a logical connection between any reported "problem" with the Internet and the radically overbroad "solution" the Commission proposes.

In any event, these two isolated examples, which involved two discrete companies and were both resolved voluntarily by those companies, cannot justify shackling *the entire broadband industry* with onerous new regulations even if those regulations *were* well-tailored to redress the conduct of those two companies. In particular, the proposed ban on commercial QoS agreements would amount to a full-blown line-of-business restriction—a remedy that is normally imposed only on *monopolists* that have engaged in demonstrated and adjudicated acts of *anticompetitive conduct*. *See* Discussion § III.A, *infra*. The Commission could make no such showing here for any broadband provider, let alone AT&T. More generally, as discussed in

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[187] Mem. Op. & Order, *Formal Complaint of Free Press and Public Knowledge Against Comcast Corp. for Secretly Degrading Peer-to-Peer Applications*, 23 FCC Rcd 13028 (2008), *pet'n for review filed*, *Comcast Corp. v. FCC*, No. 08-1291 (D.C. Cir. Sept. 4, 2008).

Section VIII below, the lack of any demonstrated need for the proposed rules would doom them to judicial invalidation.

In sum, the Commission identifies no present market failure or other problem that these rules could rationally address, and the Commission can resort only to theoretical speculation about "problems" that might someday arise in the future. As discussed in Section III.B below, that speculation is baseless even as a theoretical matter. But even if there *were* some basis for that speculation, the Commission identifies no reason why heavy-handed prescriptive regulation is needed *now*, rather than in the *future*, if and when any problem actually takes shape. Certainly the Commission does not explain why it would somehow be "too late" to intervene in the market only after a demonstration of some concrete need for intervention. Any preemptive intervention now would be arbitrary and capricious for that reason alone.

II. THE NPRM'S PROPOSED DEFINITION OF THE "INTERNET" SERVICES AT ISSUE IN THIS PROCEEDING SHOULD BE NARROWED TO AVOID UNINTENDED REGULATION OF LIMITED-FUNCTIONALITY IP-BASED SERVICES.

Before we turn to the merits of the Commission's proposed new rules, we first address a threshold issue: the definitions of "Internet," "broadband Internet access," and "broadband Internet access service," which will govern the scope of any "net neutrality" rules adopted in this proceeding. Beginning with the 1998 *Report to Congress* and continuing with the 2002 *Cable Modem Declaratory Ruling*, the 2005 *Wireline Broadband Order*, and the *Internet Policy Statement*, the Commission has consistently focused its Internet policy on two basic things: (i) broadband Internet access service, and (ii) the content, applications, and services provided via broadband Internet access service. As the Commission explained in the *Report to Congress*, Internet access service offers users "open-ended Internet connectivity" and thus the "ability to run a variety of applications, including World Wide Web browsers, FTP clients, Usenet

newsreaders, electronic mail clients, Telnet applications, and others."[188] This focus on Internet access service and the applications, content, and services provided over it was, and still remains, the proper approach for preserving and advancing "the open and interconnected . . . public Internet."[189]

The definitions proposed in the NPRM go far beyond these fundamental concepts and take the Commission deep into uncharted waters. In particular, the NPRM proposes to define "broadband Internet access service" (and adopt subsidiary definitions of "Internet" and "broadband Internet access") so as to cover *any* "data transmission" between an end-user device and *any* "endpoints reachable, directly or through a proxy, via a globally unique Internet address assigned by" IANA. *See* NPRM, Appendix A, § 8.3. This definition encompasses far too much. It would sweep in many services that merely use the common *addressing scheme* for Internet Protocol services, but that do not constitute "broadband Internet access services"—at least not as consumers and service providers understand that term.

Consider, for example, the following services, all of which appear to fall within the scope of the proposed definition:

- Wireless providers increasingly collaborate with equipment manufacturers and application providers to offer "end users" machine-to-machine ("M2M") services. These include the IP-based transmission of data between (for example) a heart monitor, a utility meter, a networked vending machine, or a vehicle telemetry sensor to some other "endpoint" with an IP address, such as a server operated by a hospital, an electric company, a vending machine supplier, or a trucking company.

- The "Telepresence" real-time videoconferencing service offered by Cisco and AT&T likewise uses IP addresses to set up high-quality connections between endpoints associated with the conference participants.

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188 Report to Congress, *Federal-State Joint Board on Universal Service*, 13 FCC Rcd 11501, 11531, 11537, ¶¶ 63, 76 (1998) ("*Report to Congress*").

189 *Internet Policy Statement* ¶ 4.

- The network-based VPN services offered to business customers similarly establish secure connectivity between two or more discrete end points and route traffic between those end points using IP addresses.

- Specialized consumer services integrated with particular devices—such as the Kindle and Nook e-readers and certain 3G-enabled GPS navigation devices—likewise offer end users the ability to use IP-based communications to reach a discrete set of end points with Internet addresses (*e.g.*, servers containing applications or content relevant to the device or service).

- A variety of multichannel video programming distributors now include "widgets" with their services that allow consumers to access certain applications and content on their televisions, such as stock quotes, weather, and sports scores. Many of these widgets, including those in the "U-Bar" available with AT&T's U-verse IPTV service, enable consumers to use their remote controls to obtain discrete content from servers that are operated by third-party providers and accessed by means of pre-authenticated Internet addresses.

The common theme among all of these services and devices is that they are not offered to support "open-ended Internet connectivity"—and the consumers who purchase such services and devices likewise do not *think* that they are purchasing broadband Internet access service. It would thus make no sense to classify any of these as "broadband Internet access services" and subject them to any of the proposed "openness," "nondiscrimination," or other proposed rules. For example, there is no plausible basis to create a government-mandated right for an end user to use the wireless component of a heart monitor, smart meter, or e-reader to access YouTube videos or make VoIP calls (assuming it would even be technically feasible to do so). Yet the NPRM's definition of covered services could be read to subject all of these offerings to such an obligation, which would quite obviously destroy the business models that made these services possible in the first place.[190]

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[190] As written, the NPRM's definition also appears to cover the various providers that may be involved in transmitting a communication between the end user and an Internet "endpoint." For example, when a search provider or a content provider connects (directly or indirectly) with an ISP and "transmits" the end user's query through to its own server with an Internet address (*i.e.*, an Internet endpoint), the search or content provider would seem to fall squarely within the NPRM's definition of "broadband Internet access service."

At a minimum, the Commission should revise its proposed definitions to clarify the services it proposes to address. In particular, it should more narrowly define "broadband Internet access service" to mean a service that offers to the public the capability to transmit data to, and receive data from, all or substantially all[191] endpoints that have a unique IANA-assigned Internet address that is publicly announced and globally reachable (either directly or through a proxy).[192] And it should clarify that any "net neutrality" principles or rules adopted here relate to those broadband Internet access services and the applications, content, and services provided via those services.

This bright-line definition would properly exclude all of the examples set forth above, without requiring the Commission to identify and define an ever-expanding hodgepodge of exempt services. In contrast, the NPRM's proposed approach would begin with a radically overbroad definition of "broadband Internet access service" but hold out the prospect that some services—at some future date—*might* be excluded upon ad hoc findings that they should be

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[191] This definition uses the phrase "all or substantially all" because in some cases, not "all" endpoints with an IANA-assigned Internet address will be reachable at all times for technical, legal, or other reasons (*e.g.*, network failures, statutory prohibitions on hosting unlawful content such as child pornography, etc.). The definition is intended to capture the Commission's articulation of "open-ended Internet connectivity" as set forth in its *Report to Congress*, while recognizing that such connectivity may not literally be available in every instance to every end point. *See Report to Congress*, 13 FCC Rcd at 11531 ¶ 63. At the same time, the proposed language is intended to address the Commission's desire to exclude "private" IP networks and end points from the definition of broadband Internet access service. *See* NPRM ¶ 48 n.103. In particular, by clarifying that only endpoints with "publicly announced and globally reachable" Internet addresses are considered part of the "Internet," the Commission would ensure that networks and devices that merely use unique IP addresses—but that were not intended to be part of the "public Internet" and whose addresses are not configured for that purpose—are not inadvertently captured by the proposed definition.

[192] Of course, a provider should be deemed to offer such access only if it is deliberately offering that capability. For example, if a provider offers a limited-purpose device like an e-reader that a customer hacks or otherwise uses in violation of the applicable terms and conditions, the provider should not be deemed to be "offering" the customer that improper, unanticipated use.

treated as "managed" or "specialized" services instead. That framework would be highly unstable and would inflict needless regulatory uncertainty, delay, and costs on the developing market for IP-based applications, content, and services. The Commission learned that lesson the hard way in its previous struggles to define nascent "enhanced" or "information services," yet the NPRM appears poised to repeat those same mistakes.

Over thirty years ago, the Commission rejected a remarkably similar approach to defining the scope of covered services for purposes of its *Computer II* rules: namely, an overbroad definition subject to many ad hoc carve-outs. Initially, the Commission had adopted an overbroad definition of covered "data processing" services, whose reach depended on whether a given service within the literal scope of that definition *also* fell outside various exceptions and carve-outs.[193] Within a few years, the Commission concluded that it should instead "define data processing *positively*, in terms of what it is, rather than by exception as we had previously done."[194] As the Commission explained, this affirmative definitional approach (using the term "enhanced service") would provide an unambiguous, "objective identification of those uses of computers by carriers" that were subject to the rules, which would help with "the stimulation of economic activity in the regulated communications sector by removing ambiguities in the previous definition."[195] The Commission should heed that lesson here by adopting more precise definitions of the "broadband Internet access services" covered by any "net neutrality" rules or principles.

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[193] Tentative Decision of the Commission, *Regulatory and Policy Problems Presented by the Interdependence of Computer and Communications Services and Facilities*, 28 FCC 2d 291, 295 ¶ 15 (1970) (defining "data processing" to include the use of a computer for processing *other* than circuit or message switching and also distinguishing "hybrid" services).

[194] Notice of Inquiry and Proposed Rulemaking, *Amendment of Section 64.702 of the Commission's Rules*, 61 F.C.C.2d 103, ¶ 16 (1976) (emphasis added).

[195] *Id.*

The NPRM's proposed approach would also be a very poor way of protecting "managed services" from ill-conceived regulation. The Commission has proposed to create this new category presumably to avoid interfering with VoIP, subscription video, and other services that "provide consumer benefits." NPRM ¶ 148. It would be hard-pressed, however, to come up with any type of workable definition of "managed services." That category would have to be defined broadly enough to encompass the range of evolving services that broadband providers and their partners will develop (if permitted) over the coming years. But it would also have to be defined concretely enough to allow both the Commission and industry stakeholders to differentiate "managed" services from the broadband Internet access services with which they share network facilities and transmission capacity.

No such definition would be available, and trying to devise one would be a fool's errand. Over the past decade, the Commission has had a difficult enough time distinguishing between "telecommunications services" and "information services" in this era of increasing convergence. Some of those categorization questions have taken the Commission *years* to resolve.[196] And others remain undecided after half a dozen years of regulatory wheel-spinning, as illustrated by

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[196] For example, the Commission first received a petition for declaratory relief in 2003 with respect to the regulatory status of "enhanced" prepaid calling cards. It took the Commission until 2005 to resolve that question and declare those cards to be telecommunications services. Order and Notice of Proposed Rulemaking, *AT&T Corp. Petition for Declaratory Ruling Regarding Enhanced Prepaid Calling Card Services, Regulation of Prepaid Calling Card Services*, 20 FCC Rcd 4826 (2005). The Commission took a full year to determine whether Pulver's "Free World Dialup" service was an information service. *See* Mem. Op. & Order, *Petition for a Declaratory Ruling That pulver.com's Free World Dialup Is Neither Telecommunications Nor a Telecommunications Service*, 19 FCC Rcd 3307 (2004). The Commission also struggled with the proper categorization of broadband wireline services themselves—declaring those to be information services a full three years after it had reached the same decision for cable modem services. *See Wireline Broadband Order*, 20 FCC Rcd at 14877-78 ¶¶ 44-45; Declaratory Ruling and Notice of Proposed Rulemaking, *Inquiry Concerning High-Speed Access to the Internet over Cable and other Facilities*, 17 FCC Rcd 4798, 4825, 4828-31 ¶¶ 44, 52-55 (2002) ("*Cable Modem Order*").

the enduring classification limbo of PSTN-interconnected VoIP services.[197] Given the intractable difficulties posed by just these two regulatory categories, the Commission should not contemplate adding *two more* categories to the mix (as depicted below):

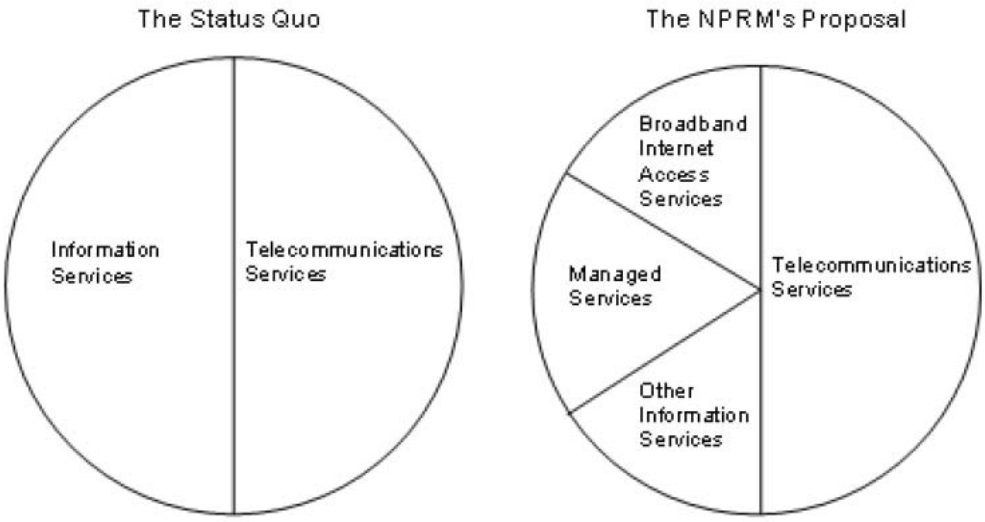

Figure 10: Proposed service categories

Of course, the need to sort among these four regulatory categories would keep Commission lawyers and private practitioners fully employed for years to come. But as experience has shown, the price would be regulatory uncertainty, delay, and litigation, with attendant investment-chilling consequences. For this reason as well, the Commission would better serve the industry, itself, and consumers by revising its definition to focus narrowly on the select group of services that are properly the subject of this regulatory proceeding.[198]

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[197] *See* Mem. Op. and Order, *Vonage Holdings Corp.*, 19 FCC Rcd 22404, 22411, ¶ 14 (2004) (declining to resolve debate about whether interconnected VoIP services are "telecommunications services" or "information services"), *aff'd*, *Minnesota Pub. Utils. Comm'n v. FCC*, 483 F.3d 570 (8th Cir. 2007).

[198] Finally, the Commission need not define "managed service" to ensure that ISPs provide "sufficient capacity for robust broadband Internet access service on shared networks used for managed or specialized services," as the NPRM appears to suggest. NPRM ¶ 153. If ISPs are providing their appropriately defined "broadband Internet access services" in compliance with the applicable Internet openness principles, it should be irrelevant what *other* services they provide over their network facilities, or how precisely those other services are defined. Further,

III. THE PROPOSED STRICT "NONDISCRIMINATION" RULE WOULD ADDRESS NO ACTUAL MARKET PROBLEM, WOULD REST ON NO COHERENT ECONOMIC RATIONALE, AND WOULD IRRATIONALLY STUNT THE PRO-CONSUMER EVOLUTION OF THE INTERNET.

The NPRM's proposed nondiscrimination rule purports to enforce two central principles that, on first blush, might seem unobjectionable: "neutrality" and "nondiscrimination." But the NPRM does very little to assign content to these protean terms, and what content it does assign would dictate outcomes that are neither "neutral" nor "nondiscriminatory." As discussed below, this proposed rule would be at once needless—because competition and the *Internet Policy Statement* fully protect consumer interests already—and injurious, because it would raise consumer prices, chill investment, and stifle innovation.

A. The Proposed Rule Is Ambiguous and Vastly Overbroad.

In previous sections, we have explained how pro-regulation advocates misuse the concept of "neutrality." We have explained that the Internet is not in fact "neutral" because, for example, it strongly favors larger and better-capitalized providers that can afford the state-of-the-art CDN functionality needed for optimal Web experiences. *See* Engineering Background § C, *supra.* We have also noted that it is unclear what "neutrality" means from the perspective of a broadband provider that must allocate finite bandwidth during congested periods to many different end users running many different types of applications. *See* Engineering Background § D, *supra.* Does "neutrality" mean the provider must passively stand by while UDP-based applications seize all available capacity from "congestion-aware" TCP-based applications, which will throttle back potentially to the point where they become non-functional? Does "neutrality" mean the provider must treat packets associated with a bulk file-sharing session exactly the same

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the Commission should reject any notion that it could make sense to impose some of the proposed rules on managed services. NPRM ¶ 152. The point of distinguishing those services from "broadband Internet access" is to *protect* them from improper regulatory incursion, not to expand the scope of the net neutrality rules to lengths never before anticipated.

as packets associated with a real-time video application, even though the latter application *needs* QoS enhancements to function properly while the former does not? Advocates of net neutrality regulation tend to avoid answering such questions because the rhetorical appeal of words like "neutrality" is much stronger than the substantive appeal of the amorphous regulatory scheme they would inflict on the Internet.

The term "nondiscrimination" is much the same. The word elicits favorable associations, even though most economists recognize that "discrimination" can often promote efficiency and consumer welfare.[199] But its meaning in the Internet context is most unclear. Unless filled with substantive content, the concept of "nondiscrimination," like "neutrality," is an empty vessel—and that is one of its greatest dangers. As Alfred Kahn explains, net neutrality advocates are "guilty of using the term 'discrimination,' sloppily, to embrace mere *differences* in price for different qualities of service."[200] Depending on what meaning is ultimately assigned to this term, the proposed "nondiscrimination" rule could wipe out whole categories of established and beneficial network practices, as discussed in Section III.A.1 below.

In particular, the one substantive meaning the Commission *does* explicitly propose to assign to the term—a ban on certain commercial QoS arrangements between broadband and content providers, NPRM ¶ 106—is not properly described as a "nondiscrimination" rule in the first place. If it were a nondiscrimination rule, it would *permit* broadband providers to enter into commercial QoS arrangements with content providers but generally require them to offer comparable terms to other, similarly situated content providers. Instead, the proposed ban on

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199 Exh. 3, Schwartz Declaration, at 10; Exh. 1, Faulhaber & Farber, at 23.

200 Statement of Alfred E. Kahn, Robert Julius Thorne Professor of Political Economy, Emeritus, Cornell University, before the FTC Workshop on Broadband Connectivity Competition Policy, at 4 (del. Feb. 13, 2007), http://www.ftc.gov/opp/workshops/broadband/presentations/kahn.pdf (Feb. 21, 2007 rev.) (some emphasis omitted).

commercial QoS agreements, if adopted, would be more accurately described as a line-of-business restriction, because it would foreclose all such arrangements outright. That proposed ban—which is itself deeply ambiguous—would harm consumers and many content and application providers while serving no discernible policy objective, as discussed later in this section.

1. The Commission's Proposed "Nondiscrimination" Rule Is Drafted So Broadly That It Could Encompass Many Services That No One Could Rationally Seek to Ban.

The proposed nondiscrimination rule provides that, "[s]ubject to reasonable network management," "a provider of broadband Internet access service must treat lawful content, applications, and services in a nondiscriminatory manner." NPRM, Appendix A, § 8.13. As written, this rule is so ambiguous that it would encompass several types of conduct to which no one could rationally object.

First, construed literally, the proposed language could prohibit many business practices that do not even involve QoS enhancements for particular applications or content. For example, AT&T and other broadband providers routinely offer term and volume discounts to large business customers—including application and content providers—to encourage them to purchase enterprise-grade Internet access services in larger quantities. Those discounts enable enterprise customers to lower their per-unit rates by purchasing more service and, thus, offer lower-priced services to consumers. Technically, unless it could somehow defend each and every discount arrangement as "cost-based" (a showing that has traditionally required detailed cost studies), the broadband provider could be said to "discriminate" among content customers under the proposed rule by offering them differential per-unit rates based on their total purchase levels. In today's common-carrier world governed by Title II of the Communications Act, such discrimination is generally permissible because it is "reasonable," and Section 202 prohibits only

"unreasonable" discrimination.[201] The proposed rule contains no such qualifier and thus, on its face, could ironically prohibit many efficient and pro-consumer retail arrangements that Title II has been construed to permit.

Nor is this the only type of uncontroversial non-QoS-related business arrangement that a literal interpretation of the "nondiscrimination" rule would prohibit. Suppose that, as part of a joint advertising venture with a subscription-based online video provider, a broadband Internet access provider offers customers three free months of service from the video provider when they sign up for the broadband provider's service. No one could seriously suggest that this arrangement is harmful to consumers or otherwise problematic or that, by entering into this joint venture, the broadband provider obligates itself to deal on the *same* commercial terms with *any and all* other providers that wish to attract customer attention in the same way, regardless of the quality of the other video providers' services, the administrative burdens on the broadband provider, or any other common-sense considerations that any ordinary business would take into account. Yet the proposed rule appears to ban such commonplace, pro-consumer marketing practices.

Likewise, some broadband providers partner with content and application providers to create a default "home page" or "portal" for their residential broadband customers. The default home page for AT&T's wireline Internet access service, for example, is "powered by Yahoo!" and includes a variety of Yahoo!-provided content, such as weather, sports, news, games, and videos.[202] Some might argue that, under this arrangement, AT&T is "discriminating" in favor of

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[201] 47 U.S.C. § 202(a). In competitive markets, the Commission and the courts have generally construed the Section 202 prohibition very narrowly and have upheld most "discriminatory" practices as "reasonable" without any need for "cost support." *See, e.g.*, *Orloff v. FCC*, 352 F.3d 415, 420 (D.C. Cir. 2003).

[202] *See* at&t.net, http://att.my.yahoo.com/.

Yahoo! and against any other provider that would like to have its own content appear on users' screens as the default home page. And some might seek to ban all such arrangements altogether on the ground that they violate the proposed rule mandating that each broadband Internet access provider "must treat lawful content . . . in a nondiscriminatory manner." NPRM, Appendix A, § 8.13.

Of course, the Commission presumably did not intend such outcomes. But that is precisely the point—when a broad prohibition against "discrimination" (unqualified by "unreasonable") is applied to the dynamic Internet marketplace, there will be countless unintended consequences that harm providers and consumers alike.

The NPRM poses similarly intractable questions when it turns specifically to traffic-management issues and acknowledges the need to "distinguish[] socially beneficial discrimination from socially harmful discrimination in a workable manner."[203] First, the NPRM suggests that the "reasonable network management" qualifier to its proposed nondiscrimination rule might be construed to entitle "a broadband provider to protect the quality of service for those applications for which quality of service is important by implementing a network management practice of prioritizing classes of latency-sensitive traffic over classes of latency-insensitive traffic."[204] In the same breath, however, the NPRM cites concerns that "such a practice would be difficult to implement in a competitively fair manner."[205] But "competitive fairness" should not

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[203] NPRM ¶ 103; *see also Keeping the Internet Neutral?: Tim Wu and Christopher Yoo Debate*, 59 Fed. Commun. L.J. 575, 577 (2007) (Tim Wu: "[A]n absolute ban on discrimination would be ridiculous . . . there are good and bad types. And what I think is going on in the network neutrality debate—the useful part of it—is getting a better grip on what amounts to good and bad forms of discrimination on information networks.").

[204] *See* NPRM ¶ 137; *see also id.* at ¶ 103 (acknowledging that "discrimination" can be "socially beneficial").

[205] *Id.*

be a concern if market forces are allowed to function as they ordinarily do: by relying on price signals to allocate scarce resources to the uses consumers most value. Indeed, the NPRM cites not a single instance where a broadband network has engaged in anticompetitive behavior in the provision of QoS enhancements. Quite to the contrary, as discussed above, network operators have been offering such enhancements on commercial terms for years, and no one has complained to the Commission.

Ironically invoking the principle of "nondiscrimination," however, the NPRM proposes to *ban* any market-based solution to the need for equitable allocation of QoS enhancements, as discussed in the next section. Yet in the absence of commercial QoS agreements, there would be no practical mechanism to ensure accurate identification of which packets belong to which applications and which applications need which QoS enhancements. And there would be no price mechanism that could preclude widespread "cheating" by forcing companies to internalize the opportunity costs of prioritizing some data over others. In other words, without price signals, *every* application or content provider would mark *all* of its packets as "QoS sensitive," because every provider would incur no cost in doing so. That outcome would leave all packets in the same relative position as before—and would thus deprive all packets of any meaningful QoS enhancement. As discussed below, the NPRM's proposed ban on commercial QoS arrangements would thereby thwart the promise of convergence by making the IP platform an inhospitable environment for QoS-sensitive classes of applications and content.

2. The Commission's Proposed Ban on Business-to-Business QoS Agreements Would Foreclose a Potentially Limitless Variety of Pro-Consumer Services.

One could imagine a "nondiscrimination" rule that, instead of flatly banning remunerative QoS arrangements, would ban unreasonable and anticompetitive discrimination among application and content providers in the terms of any QoS arrangements they enter into

with broadband providers.[206] This prohibition on discrimination in the terms of commercial agreements would be analogous to the "nondiscrimination" concept in Section 202(a) of the Communications Act—which, even in the days of monopoly telephone service, was always accompanied by an "unjust and unreasonable" qualifier.[207] The NPRM, however, proposes an entirely different type of "nondiscrimination" rule. First, the proposed rule contains no qualifier, not even the "unjust and unreasonable" qualifier embodied in Section 202. That in itself is unfathomable and legally indefensible. *See* Discussion § VIII.A.1, *infra*. From both a legal and policy perspective, it is difficult to imagine how a nondiscrimination requirement that effectively governed franchise monopolies for decades is somehow inadequate for the highly competitive and much more complex broadband Internet access marketplace.

Those objections, however, pale in comparison to the most jarring problem with the proposed rule: It is *not* just a prohibition on "discrimination" in commercial relationships; it is also, as discussed, a full-blown ban on remunerative arrangements for the provision of end-to-end QoS enhancements. In particular, the NPRM explains that, under the proposed rule, broadband providers "may not charge"—*i.e.*, may not enter into a remunerative relationship with—"a content, application, or service provider for enhanced or prioritized access to the subscribers of the broadband Internet access service provider[.]" NPRM ¶ 106.

Line-of-business restrictions are and always have been very rare anywhere in the economy, and comparisons to previous line-of-business restrictions in this sector reveal just how anomalous the restriction proposed here would be. First, the proposed rule would closely resemble the appropriately short-lived line-of-business restriction imposed in the *Computer I* regime, which barred providers of "basic" telecommunications services (*i.e.*, local exchange

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206 *See* note 8, *supra* (quoting letter from Sen. Snowe).

207 *See* 47 U.S.C. § 202(a); *see generally Orloff*, 352 F.3d at 420.

carriers) from providing "enhanced" (data-processing) services as well.[208] The Commission abolished that rule in the early 1980s after concluding that it was unnecessary even in a highly regulated marketplace where incumbent LECs were *monopolists* that controlled the only telecommunications platform for virtually all homes and businesses.[209] The rule proposed here would also resemble the line-of-business restriction that a federal antitrust court imposed on the post-divestiture Bell Operating Companies in 1982 as part of a consent decree reflecting a conclusion that the Bell System had monopoly power and had persistently abused that power to exclude competition in violation of the Sherman Act.[210] Unlike those line-of-business restrictions, the one proposed here would apply to a market the Commission has already affirmatively *deregulated*, that is characterized by *competition* rather than monopoly, and that has involved *no anticompetitive conduct, no market failure*, and *no consumer harm* in the provision of the relevant service (QoS enhancements).

This proposed restriction would be not only unprecedented, but destructive. It would harm the Internet in general and consumers in particular in a variety of respects addressed throughout these comments. In this section, we focus on a highly pragmatic concern: Adoption of the proposed ban on business-to-business QoS agreements would both prevent broadband Internet access providers from offering a broad range of high-value services to content and

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[208] Final Decision and Order, *Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities*, 28 F.C.C.2d 267 (1971).

[209] Final Decision, *Amendment of Section 64.702 of the Commission's Rules and Regulations (Second Computer Inquiry)*, 77 FCC 2d 384, ¶¶ 195, 282-85 (rel. May 2, 1980) ("*Computer II Final Decision*").

[210] *United States v. AT&T*, 552 F. Supp. 131, 223-224 (D.D.C. 1982) *aff'd sub nom. Maryland v. United States*, 460 US 1001 (1983) ("*MFJ*").

application providers to the benefit of their consumers and cast doubt for the first time on certain *existing* network practices. These include, among others:

- *QoS enhancements sold to enterprise customers*. Like other broadband providers, AT&T today sells enterprise customers, including application and content providers, a range of services that prioritize or enhance the delivery of packets throughout various portions of its network. These include services operating at Layer 3 (IP/DSCP), Layer 2.5 (MPLS), and Layer 2 (Ethernet, ATM, and Frame Relay). These packets are ultimately routed, via such prioritized delivery, to AT&T's *other* enterprise customers as well as its residential end users (although the packets are not today prioritized over the last-mile networks AT&T has deployed to residential end users). *See* Engineering Background §§ D.2, D.3, E.2, *supra.*

- *CDNs/CDN collocation.* The proposed ban on remunerative agreements for prioritized or enhanced treatment could prohibit many business arrangements that do not involve "packet prioritization" as such but would employ other techniques for the cost-efficient distribution of high-bandwidth, latency-sensitive content. Casualties could include various CDN services, including CDN collocation (*see* NPRM ¶¶ 57, 106-07), under which a content provider stores its content in cache servers near or within a broadband provider's access/aggregation networks. *See* Engineering Background § E.3, *supra.*

- *IP Multicast.* A related casualty of the proposed ban on business-to-business QoS agreements could be IP multicast arrangements, under which a broadband network configures its routers to replicate a content provider's packets instantaneously to the end users that have selected the multicast content. If permitted, such arrangements, now offered by Sprint and others, will dramatically lower the costs of distributing real-time high-definition programming and other content over the Internet and thereby increase the amount and diversity of such programming available to consumers. *See id.* Prohibiting such "enhanced" arrangements (*see* NPRM ¶¶ 106-07, Appendix A, § 8.13) would have the opposite effect and foreclose consumer options.

- *Paid peering.* The proposed rule would also cast serious doubt on "paid peering" arrangements. As discussed (Engineering Background § E.3, *supra*), these are the arrangements that enable content providers (among others) to peer directly with broadband networks for fast and cost-efficient delivery of their traffic to end users.[211]

- *VPNs.* As discussed (Engineering Background § E.3, *supra*), network providers sell VPN services to business customers in order to provide network security and end-to-end QoS enhancements. A VPN gives a customer—or multiple customers, if they intercommunicate—the experience of using "their own private network, even though their traffic is traversing a public network infrastructure and they are sharing that infrastructure with other businesses."[212] Because VPN QoS arrangements require

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211 *See* Ou, *FCC NPRM ban*, *supra*.

212 Cisco, *Introduction to Cisco MPLS VPN Technology*, *supra*, at 1-3.

> prioritizing certain content (as compared to either other content on the same VPN or other content off that VPN but routed over the same infrastructure), these existing, widespread arrangements may violate the proposed rule mandating the "treat[ment of] lawful content . . . in a nondiscriminatory manner."[213]

At worst, the Commission's proposed rules, construed literally, could preclude some of these listed services outright. At best, they would create serious doubt about whether the services may be lawfully offered—whether or not, for example, they fit within any definition of "managed service" the Commission might try to formulate (see Discussion § II, *supra*). That doubt alone would nip a number of these services in the bud. On the margin, the affected businesses—network operators and application and content providers—will not sink investments into ventures that a regulator might well decide, several years hence, cannot be lawfully offered.

The Commission could not mitigate these conundrums simply by making an exception for "business" customers and limiting the prohibition proposed in paragraph 106 to "residential" or "eyeball" customers. To begin with, many of the nascent business arrangements that the proposed rule would ban or severely limit would *primarily* benefit residential consumers. For example, IP multicast and CDN caching offer promising new models for the distribution of performance-sensitive content over the Internet to consumers who might not otherwise receive such content at all. *See* Engineering Background § E.3, *supra*. And more generally, it would make no sense to deprive "residential" customers of the same technological innovations that have long benefited enterprise customers.

In all events, any regulatory distinction between "business" and "residential" customers would be inherently unstable. For example, which category would encompass students living on the campus of a university, or service personnel living on a military base, that has purchased

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[213] NPRM, Appendix A, § 8.13. As discussed in Section II of the Discussion above, VPN services should not fall within the definition of "broadband Internet access service" in the first place, but under the current proposed definition, they apparently do.

enterprise-grade services from a network provider? Which category should encompass subscribers who run e-commerce businesses out of their homes? Or teleworkers who use their broadband connection for both personal access to the Internet as well as secure access to a corporate VPN? *See* Engineering Background § D.3, *supra*. More fundamentally, as the NPRM itself suggests (at ¶ 99), any distinction between "content-producing" network users and "eyeballs" should collapse further over time because *every* user of the Internet is potentially both a content provider and a pair of eyeballs, and the Commission should not frustrate that natural evolution by creating regulatory silos for the artificial classification of IP networks or users.

A concrete example underscores this concern. Suppose different "residential" end users who collaboratively use the same applications and shared performance-sensitive content—such as gaming or Telepresence high-definition videoconferencing—each wish to purchase a network service that prioritizes the associated packets they send out through the network.[214] Although such services are today sold mainly to enterprise customers, there is no reason they should be limited to such customers as end users become application and content providers in their own right. Now suppose that, for the service to function properly, the packets associated with the multi-participant applications or content need to retain their priority through every link en route to the other end users in the collaborative community. The prohibition in paragraph 106 would apparently preclude any network provider from providing that service to its end users. And as QoS peering develops (*see* Engineering Background § D.3, *supra*), the prohibition would also preclude each IP network from entering into remunerative agreements with other IP networks to

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[214] *See, e.g.*, AT&T, Press Release, *AT&T Telepresence Solution Helps Cerner Connect Clients, Associates Around the Globe*, Nov. 23, 2009, http://www.att.com/gen/press-room?cdvn=news&pid=4800&newsarticleid=27579; Cisco, Cisco TelePresence Extended Reach, http://www.cisco.com/en/US/prod/collateral/ps7060/ps8329/ps8330/ps9599/qa_c67-528820.html (claiming that Cisco's Extended Reach Telepresence offering can run in 720p quality at data rates as low as 1.5 Mbps).

honor the wishes of each network's end users to ensure high-quality service for all end users within the collaborative community.

As discussed in more detail below, adoption of this proposed line-of-business restriction would harm consumers in more general respects as well. For example, prohibiting broadband Internet access providers from providing whole categories of remunerative services to application and content providers would inevitably push end-user rates up, force ordinary users to subsidize the bandwidth-intensive activities of a comparative few users, and exacerbate the digital divide. *See* Discussion § III.B.6, *infra.* It would also violate the free speech rights of broadband providers—and of the content providers that want to communicate with end users in formats that require prioritization to function properly. *See* Discussion § VIII.C, *infra.* The main question is: What market failure, if any, has the Commission identified that could justify creating the unintended anti-consumer consequences that would be the inevitable result of this unprecedented intervention into the inner workings of the Internet? The Commission has identified no such market failure, real or potential.

B. The NPRM Identifies No Prospect of a Future Market Failure Sufficient to Justify the Proposed Ban on Business-to-Business QoS Agreements.

As explained in Section I.C of the Discussion above, there is no *actual* problem in the broadband market that could justify new regulatory measures beyond the existing four principles of the *Internet Policy Statement*, which proved more than adequate to address the only two documented incidents of "blocking" or "degradation" in the dozen-plus years since the inception of broadband (*Madison River* and *Comcast*). Because there is no actual problem that could justify any regulatory "remedy," let alone the regulatory sledgehammer proposed here, the Commission cannot reasonably find that it erred in 2005 when it concluded that, as an empirical matter, competition in that market was strong enough to make any common-carrier-type

regulation unnecessary and counterproductive. To the contrary, the broadband market is indisputably even more competitive now than it was in 2005. *See* Discussion § I.A, *supra.*

As discussed below, the lack of any market "problem" today is strong evidence that no problem will arise in the future, because many of the market arrangements that supposedly create the potential for such problems *already exist.* For example, if cable companies genuinely had the incentive and ability to "degrade" the Internet access portion of their pipes and consign best-effort Internet traffic to "the digital equivalent of a winding dirt road"[215] so that they could extract greater profits from their dominant multichannel TV services, we would expect to see that happening today. Instead, we see the opposite: cable companies spending billions upon billions of dollars to upgrade their best-effort Internet access platforms to DOCSIS 3.0 so that their end users can enjoy download and upload speeds 10-50 times faster than in 2005, *and* we see them (and their competitors) sinking many millions more in cut-throat advertising about which provider has the edge in Internet speeds.[216] And wireline providers such as AT&T (U-verse) and Verizon (FiOS) have likewise raised Internet access speeds substantially even while using the same underlying platform to provide broadband-enabled video and voice services. *See* Engineering Background § D.2, *supra*; Discussion § I.A.1, *supra.*

At a minimum, therefore, the Commission should wait and see whether any "problem" actually develops before imposing this unprecedented restriction on commercial relationships. But the problem with the Commission's proposal to regulate *now* goes even deeper than that. Quite apart from the absence of evidence that the market has failed *to date*, and quite apart from

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[215] Lawrence Lessig & Robert W. McChesney, *No Tolls on the Internet*, Wash. Post, June 8, 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/06/07/AR2006060702108.html.

[216] *See* Discussion § I.A, *supra*; Exh. 3, Schwartz Declaration, at 32-33; Exh. 1, Faulhaber & Farber, at 35-36.

the evidence that the market is instead performing exactly as it should, the NPRM does not even identify a valid *theoretical* basis for speculating that any market failure might *ever* arise in the absence of this proposed new line-of-business restriction. The following discussion addresses each of the NPRM's proposed theoretical justifications for intervention, starting with its unsupported suggestion that broadband providers have "market power" and progressing through various suggestions that the broadband marketplace could "fail" even if it is intensely competitive—as indeed it is.

1. The NPRM Conducts No "Market Power" Analysis and Identifies No Market Power Concern That Could Justify This Line-of-Business Restriction.

In several passages, the NPRM appears to assume that "market power" gives broadband Internet access providers the incentive and ability to act in an anticompetitive manner. *See, e.g.*, NPRM ¶¶ 70-72. This is an odd assumption to make, given that the broadband marketplace is indisputably more competitive today than it was in 2005, when the Commission concluded that the market was competitive enough that it removed the last vestiges of economic regulation. *See* Discussion § I.A, *supra*. Notably, the NPRM does not suggest otherwise.

More generally, the NPRM neither conducts nor invites any serious economic analysis of the type that could support conclusions about "market power." It does not define the "relevant market" in which broadband providers are theorized to exercise such "power," nor does it seek comment on the potential barriers to entry or market share of any given provider within such markets. Nor does the NPRM acknowledge that the recent proliferation of wireless broadband services has profound significance for any conclusions about "market power"—not just as to those services, but also as to any wired service in the same market. Nor does the NPRM acknowledge the economic scholarship that explains why, even if the broadband market were a wireline/cable "duopoly" (which it plainly is not now, if it ever was), the economic

characteristics of this market would likely keep each "duopolist" highly attentive to the interests of consumers.[217]

In all events, even in other contexts where the Commission has conducted a meaningful market analysis and concluded that a provider has "market power" in some relevant market, it normally does not react as it proposes to do here: by prohibiting the provider from entering into any commercial arrangements with an entire class of customers. Instead, it subjects the provider to various forms of common-carrier regulation: *i.e.*, a ban on *unreasonable discrimination* among potential customers. The much more draconian line-of-business restriction proposed here, which is virtually never imposed even in *monopoly* markets, *see* Discussion § III.A.2, *supra*, should thus be a nonstarter.

Moreover, because the NPRM conducts no analysis of what "relevant markets" might be at issue, it appears to assume that the only market that could be at issue here is the (competitive) broadband services market, as seen from the perspective of individual end users. The NPRM thus overlooks the other market at issue in this proceeding: the market for the service-enhancement technologies that application and content providers and other Internet users may purchase to ensure they and their customers have high-quality experiences. *See* Engineering Background § E, *supra*. Although both markets are relevant to this proceeding, this latter market is arguably the more relevant of the two, because it is the market the Commission proposes to bar broadband providers from participating in.

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[217] In a nutshell, the high fixed costs and low marginal costs of broadband service give providers unusual incentives to recruit and retain as many customers as possible, in that few costs are avoided, yet substantial revenues are lost, if any customer defects to an alternative provider. *See* Timothy J. Tardiff, *Changes in Industry Structure and Technological Convergence: Implications for Competition Policy and Regulation in Telecommunications*, 4 Int'l Econ. & Econ. Pol. 109 (2007); *see also* Bain & Co., *Next Generation Competition*, *supra*, at 63.

Several features of this market for QoS-enhancement technologies reveal just how misguided this proposed line-of-business restriction would be. First, the market is vibrantly competitive. As discussed above, application and content providers have many options for enhancing the service quality of their products as experienced by end users, including—but not limited to—many competing CDN providers. Second, the service-enhancement market is *national* and indeed *global*, not local. Application and content providers operate on a national or global scale, as do CDNs. In contrast, wired broadband Internet access providers have limited geographic footprints, and thus no such provider has more than a 22 percent share of broadband subscribers nationally, and none has more than 3 percent of broadband subscribers globally.[218] This means that when Comcast competes with Akamai in the provision of service-enhancements to large application and content providers, neither has any "market power" advantage. Comcast may well compete at a disadvantage to Akamai because of its smaller geographic footprint. And either Comcast or Akamai may have less bargaining leverage than the national or global application or content provider it is offering to serve.

A proper understanding of this global market for service-enhancing technologies also shines light on the rent-seeking character of the Commission's central proposal to ban broadband providers from selling QoS enhancements to application and content providers. When CDN-equipped companies like Google ask the Commission to ban paid packet-differentiation by broadband Internet access providers, they are really asking the government to create an arbitrary regulatory preference for one commercial QoS-enhancement strategy—theirs—by forbidding key alternatives, even though their QoS strategy is no more "neutral" than the alternatives in its

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[218] *See* Comments of Verizon and Verizon Wireless, WC Docket No. 07-52, at 51 (June 15, 2007); *see also* Alex Goldman, *Top 23 U.S. ISPs by Subscriber: Q2 2008*, ISP Planet, Dec. 2, 2008, http://www.isp-planet.com/research/rankings/usa.html.

disparate impact on application and content providers. Put differently, net neutrality proponents like Google invite the Commission, for no good reason, to deprive network engineers of all service-enhancement tools except the ones that Google and similar companies use and have built their fortunes on. Worse yet, they appear to be asking the Commission to prohibit broadband Internet access providers even from providing the types of tools that Google and others use.[219] In these respects, their proposals are anticompetitive and inimical to the interests of the application and content providers that would benefit from the alternative QoS strategies the NPRM proposes to ban.

2. "Vertical Leveraging" Concerns Likewise Cannot Justify This Line-of-Business Restriction.

The Commission also suggests that "additional concerns may arise" where "broadband Internet access service providers have market power and are vertically integrated or affiliated with content, application, or service providers," on the theory that such providers might "have an incentive . . . to make it more difficult or expensive for end users to access services competing with those offered by the network operator or its affiliates." NPRM ¶ 72. For several independent reasons, these "vertical leveraging" concerns could not begin to justify the proposed rules even if broadband providers in fact possessed "market power."

To begin with, the NPRM's proposed remedy is radically broader than the underlying policy concern. Even if there were reason to fear anticompetitive vertical discrimination in this context (which, as discussed below, there is not), the Commission could address that concern simply by adopting a narrowly targeted prohibition on such discrimination, and the Commission

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[219] *See* NPRM ¶¶ 57, 106-07; Engineering Background § E.2, *supra* (discussing Google's development and use of SPDY protocol to favor some content over others in webpage data stream); *id.*, § E.3, *supra* (discussing Google's distinction favoring CDN caching, which Google exploits, and alternative QoS arrangements, which Google wishes to keep others from exploiting).

could apply that prohibition on a case-by-case basis—as it did, for example, when Madison River discriminated against unaffiliated VoIP providers in 2005. *See* Discussion § I.C, *supra.* Such a concern could *not* justify the "remedy" the Commission proposes here: an expansive prohibition on all commercial arrangements between broadband providers and application and content providers, whether those arrangements present vertical leveraging concerns or not.

In any event, there is neither a theoretical nor an empirical basis for concern that any broadband provider will in fact anticompetitively favor affiliated over unaffiliated applications and content. First, as the Commission has explained, broadband competition keeps any individual provider from sabotaging the value of its broadband platform to consumers by anticompetitively degrading the complementary applications that ride on top of it.[220] Again, the broadband market is considerably more competitive today than it was when the Commission made that observation. That competition is a complete answer to any "vertical leveraging" concern.

Second, even if there were some competitive defect in the broadband platform market—and the Commission's own orders foreclose that conclusion—there would still be no basis for concern that a vertically integrated broadband provider would act anticompetitively towards unaffiliated application and content providers. Modern antitrust analysis recognizes that, except in very specific contexts, even a *monopolist* in a platform market generally has little incentive to act anticompetitively towards unaffiliated application providers that wish to use its platform. In particular, a platform provider free from retail price regulation—as all broadband providers are today—will normally have incentives to deal evenhandedly with independent providers of

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[220] *See, e.g.*, *AT&T-BellSouth Merger Order*, 22 FCC Rcd at 5724-27 ¶¶ 116-20; *Adelphia Transaction Order*, 21 FCC Rcd at 8295-99 ¶¶ 212-23; *see also Wireline Broadband Order*, 20 FCC Rcd 14885-87 at ¶¶ 61-64; Christopher S. Yoo, *Comment on the End-to-End Debate*, 3 J. Telecom. & High Tech. L. 23, 67 (2004).

complementary applications, because anticompetitive discrimination in the applications market would simply devalue the platform and, as a general matter, would not enable the provider to earn any profits it could not otherwise earn for the underlying platform itself.[221] This is why Microsoft permits the Windows operating system to support applications from rival software developers: *e.g.*, WordPerfect as well as Word, and Groupwise as well as Outlook. No federal regulator tells Microsoft how to write its code to accommodate users who would like to run non-Microsoft applications on top of the dominant Microsoft Windows operating system. Indeed, no federal authority subjects Microsoft or other platform monopolists to prescriptive economic regulation of any kind; at most, Microsoft is subject to narrowly tailored judicial decrees based on *demonstrated antitrust violations*.

All of these considerations explain why, in proceeding after proceeding, this Commission has found that there is no "evidence that [broadband providers] are likely to discriminate against Internet content, services, or applications," and that government intervention in the market would be premature unless and until "affected parties . . . file a complaint with the Commission" alleging specific market failures.[222] Even Google's Vint Cerf, a key net neutrality proponent, has acknowledged that, if the government rejects calls for preemptive rules, "we will be less happy, but then we will have to wait and see *whether or not there actually is any abuse*. . . . [W]e will

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[221] *See, e.g.*, Joseph Farrell & Philip J. Weiser, *Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age*, 17 Harv. J.L. & Tech. 85, 104 (2003); *see also* Christopher S. Yoo, *Network Neutrality and the Economics of Congestion*, 94 Geo. L.J. 1847, 1888-89 (2006).

[222] *Adelphia Transaction Order*, 21 FCC Rcd at 8298 ¶ 220; *accord AT&T-BellSouth Merger Order*, 22 FCC Rcd at 5726 ¶ 118.

simply have to wait until something bad happens, and then we will make known our case to the Department of Justice's antitrust division."[223]

Finally, whenever regulators *have* taken preemptive steps to address "vertical leveraging" concerns in recent years, the concerns turned out to have been false alarms. In the AOL/Time Warner merger, for example, the Commission imposed various interoperability requirements on the "next-generation" applications of AOL's instant messaging technology because of fears that AOL would dominate the underlying instant messaging market.[224] A few years later, the Commission found that *removing* these pointless rules had become necessary to "provide public interest benefits" by "enhancing competition" and thus "accelerat[ing] the pace of innovation for IM services."[225] In some cases, preemptive "safeguards" against vertical leveraging have turned out to be not just needless, but also anticompetitive in their own right. In the 1990s, for example, the Commission adopted so many prophylactic restrictions on video dialtone services that telephone companies never offered them at all.[226] In the end, consumers were far worse off for the lack of additional competition. The Commission should take pains to avoid a similar outcome here.

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223 Reuters, *Google says bill could spark antitrust battle*, Computer World, Jul. 5, 2006, http://www.computerworld.com/s/article/9001570/Google_says_bill_could_spark_antitrust_battle (emphasis added).

224 *See* Mem. Op. & Order, *Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations by Time Warner Inc. and America Online, Inc., Transferors, to AOL Time Warner Inc., Transferee*, 16 FCC Rcd 6547, 6679 ¶ 325 (2001).

225 Mem. Op. & Order, *Petition of AOL Time Warner Inc. for Relief From the Condition Restricting Streaming Video AIHS*, 18 FCC Rcd 16835, 16839-40 ¶ 12 (2003) ("*AOL Time Warner Interoperability Relief*").

226 *See, e.g.*, Thomas W. Hazlett & George Bittlingmayer, *The Political Economy of Cable "Open Access,"* AEI-Brookings Joint Center for Regulatory Studies, at 35-36 (2003), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=286652#PaperDownload.

3. The Proposed Line-of-Business Restriction Is Unnecessary to Prohibit the Assessment of "Tolls" on Internet Traffic or to Address Any "Terminating Access Monopoly."

Most of the populist rhetoric in favor of net neutrality rules, and much of the analysis in the NPRM, assumes that a "nondiscrimination" rule is necessary to keep broadband providers from blocking disfavored applications or content, exacting "tolls" on applications or content providers for access to end users, and imposing a regime of "innovation by permission."[227] That concern is misplaced. To begin with, the existing four principles (along with commercial realities) already address any concern about the "blocking" or "degradation" of traffic.[228] AT&T supports the existing four principles in their current form. There is no need to add a new "fifth" principle—the nondiscrimination requirement and associated line-of-business restriction—to do the same work. In any event, as we have explained above and in prior filings, broadband providers lack the incentive or ability to undermine the value of their broadband platforms by blocking or degrading traffic on the basis of its source, given the prospect for consumer dissatisfaction and provider retaliation.[229]

This inability to *block* traffic likewise precludes a broadband provider from assessing unilateral *"tolls"* on that traffic. Because broadband providers cannot block or degrade packets and cannot post tariffs for the "termination" of packets, they have no power to impose unilateral

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[227] *See, e.g.*, Tim Karr, *NYT: Time to Make Net Neutrality the Law*, Save the Internet Blog, Aug. 29, 2009, http://www.savetheinternet.com/blog/09/08/29/nyt-time-make-net-neutrality-law; Dan Stober & Arielle Lasky, *FCC hears calls for net neutrality from lawyers and executives*, Stanford University, Apr. 18, 2008, http://news.stanford.edu/news/2008/april23/lessig-042308.html.

[228] Those principles are of course subject to the Commission's exception for reasonable network management—a key caveat discussed below and more fully in AT&T's 2008 submissions in response to the petitions of Free Press and Vuze. Comments of AT&T on Petitions of Free Press and Vuze, WC Docket No. 07-52 (Feb. 13, 2008); Reply Comments of AT&T on Petitions of Free Press and Vuze, WC Docket No. 07-52 (Feb. 28, 2008).

[229] *AT&T 2007 Net Neutrality Comments* at 67-71.

"termination charges" for access to their end users. That fact forecloses the NPRM's implicit reliance (NPRM ¶ 73)—and the explicit reliance of some pro-regulation commenters[230]—on the concept of the "terminating access monopoly" as a basis for prohibiting any commercial QoS arrangement between broadband and content providers.

The phrase "terminating access monopoly" refers to the "monopoly" that any interconnected communications provider, no matter how competitively insignificant it may be in the retail market, is said to possess for the "service" of terminating traffic to its own subscribers. Citing the Commission's experience with excessive CLEC access charges in the early 2000s, advocates of net neutrality regulation claim that this putative "monopoly" can create market failures *even in highly competitive markets*—and that it will do so here unless the Commission adopts net neutrality rules. In particular, they say, this "bottleneck" control could permit providers to charge supracompetitive rates for access to their end users.[231]

This analogy to the CLEC access charge controversy is fundamentally misconceived, and there is no analogous phenomenon that could give rise to similar "terminating access" concerns in the broadband context. First, the problem underlying the CLEC access charge controversy arose from the application of *Title II regulation*, not from free market dynamics, as the Commission itself has acknowledged.[232] Before the Commission intervened in 2001, a CLEC could charge radically inflated rates for terminating access traffic only because the

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[230] Comments of Google, Inc., WC Docket No. 07-52, at 19-20 (June 15, 2007) ("*2007 Google Comments*"); Comments of the Open Internet Coalition, WC Docket No. 07-52, at 9-11 (June 15, 2007).

[231] *See, e.g.*, *2007 Google Comments* at 19-20.

[232] *See* Seventh Report and Order, *Access Charge Reform*, 16 FCC Rcd 9923, 9924-25 ¶ 2 (2001) ("*CLEC Access Charge Order*") ("[W]e limit the application of our tariff rules to CLEC access services in order to *prevent use of the regulatory process* to impose excessive access charges on IXCs and their customers.") (emphasis added).

Commission's Title II rules (i) entitled the CLEC to tariff its termination rates unilaterally; (ii) compelled long-distance companies ("interexchange carriers" or IXCs) to interconnect with the CLEC and hand off all terminating traffic bound for its customers; and (iii) required those IXCs to pay the tariffed termination rates in the process, no matter how objectionably high they might be.[233] In addition, Title II rules precluded these IXCs not only from sending the bill to the called parties (*i.e.*, to the CLEC's end users), but also from passing the inflated termination charges through to the specific calling parties who placed these particular calls.[234] The net result of these Title II regulations was to make the CLECs' subscribers completely indifferent to the level of these termination charges—and thus to preclude any market response to them. The Commission corrected this regulation-induced market failure by "mandatorily detariff[ing]" CLEC access rates above certain levels and forcing CLECs to "*negotiate* [any] higher rates with the IXCs"—thereby subjecting those rates, for the first time, to the discipline of market forces.[235]

The broadband market contains no such regulatory distortions today.[236] A broadband provider cannot file tariffs, nor can it force application or content providers to interconnect with it—nor, under the existing four principles, may it block or degrade their packets if they *do* choose to interconnect with it directly or indirectly (subject to the reasonable-network-

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233 *See id.*

234 *See* 47 U.S.C. § 254(g).

235 *CLEC Access Charge Order*, 16 FCC Rcd at 9925 ¶ 3 (emphasis added).

236 Indeed, in contrast to the regulated intercarrier compensation regime that governs the PSTN today, which Commissioner Copps has aptly described as "Byzantine and broken," the entirely unregulated exchange of broadband Internet traffic on commercial terms through peering and transit arrangements is a model of economic efficiency. *See* Engineering Background § B.1, *supra.*

management caveat).[237] Moreover, unlike CLECs terminating PSTN traffic, a broadband Internet access provider could face complaints from *its own end users* if it sought to impose unreasonable charges on application and content providers, because (unlike IXCs subject to Section 254(g)) those providers are free to pass at least a portion of those charges through to end users of the broadband Internet access provider. By the same token, a broadband network would face significant customer complaints and ultimately defections if it degraded the quality of its service by relegating certain applications and content to a fabled "dirt road" (*see* Discussion § III.B.4, *infra*) because these harms would be inflicted on its *own customers*.[238]

In short, the broadband market contains none of the features that led to a regulation-induced market failure in the CLEC access charge context. And there is no reason to doubt that market forces would produce efficient, pro-consumer outcomes without regulation. The wireless industry provides a useful lesson. AT&T and Verizon Wireless have more than 80 million wireless subscribers each, over which they purportedly have "terminating access monopolies."

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[237] As the ESPN 360 example illustrates, such providers sometimes block their applications and content from any broadband network that does not pay *them* an interconnection fee. *See* Engineering Background § C, *supra*.

[238] The relationship between tariffs and the "terminating monopoly" issue has long been misunderstood. In 1996, Hyperion Telecommunications, Inc. filed a petition seeking forbearance from tariff filing requirements for competitive access providers. In comments, WorldCom, Inc. argued that forbearance was inappropriate because competitive access providers possessed market power over IXCs in the provision of switched access services on the theory that IXCs that seek to originate or terminate a call to a particular subscriber have no competitive alternatives to complete that call. *See Hyperion Telecommunications, Inc. Petition Requesting Forbearance; Time Warner Communications Petition for Forbearance; Complete Detariffing for Competitive Access Providers and Competitive Local Exchange Carriers*, 12 FCC Rcd 8596, 8604 ¶ 14 (rel. June 19, 1997) Accordingly, WorldCom feared that forbearance from tariffing requirements would expose it to discriminatory pricing. The Commission brushed aside WorldCom's concerns about the terminating monopoly problem, and asserted that "marketplace forces [would] preclude non-ILECs from charging unreasonable rates for interstate exchange access." *Id.* at ¶ 24 (rel. June 19, 1997). Ironically, neither WorldCom nor the Commission recognized at the time that the Title II tariff process itself was the source of the alleged "terminating monopoly"—a point the Commission finally acknowledged in the *CLEC Access Charge Order*. 16 FCC Rcd at 9924-25 ¶ 2.

But because they have no right to tariff access charges and because they are not permitted to block or degrade calls, they have no means of forcing other carriers to pay terminating access fees. The Commission's *Sprint PCS Order* made these points clear almost eight years ago,[239] and since then no wireless provider has seriously sought to unilaterally impose access charges on another carrier.

In sum, there is no empirical or theoretical basis for concern that broadband Internet access providers could exercise any "terminating access monopoly" power to extract unilateral "tolls" from application and content, and that concern therefore cannot support the proposed rules. Any fees broadband providers would charge application and content providers would arise instead from wholly voluntary agreements, and they would be charged for the same types of services that broadband providers (along with CDNs and others) *uncontroversially sell application and content providers today:* fees for service enhancements designed to optimize the use of performance-sensitive applications. *See* Engineering Background §§ D.3 & E, *supra.*

4. No Prohibition on Commercial QoS Agreements Is Necessary to Prevent Broadband Providers from Consigning Best-Effort Internet Access to "The Digital Equivalent of a Winding Dirt Road."

A common refrain among supporters of net neutrality regulation is that a network cannot provide QoS enhancements for some applications without necessarily "degrading" all other applications sharing the same infrastructure, and that prioritization is in this sense inherently a zero-sum game among different applications.[240] This concern, too, is misconceived. Some applications are highly performance-sensitive and thus *need* QoS enhancements to function

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[239] *See* Declaratory Ruling, *Petitions of Sprint PCS and AT&T Corp. for Declaratory Ruling Regarding CMRS Access Charges*, 17 FCC Rcd 13192 (2002) ("*Sprint PCS Order*"), *appeal dismissed sub nom. AT&T Corp. v. FCC*, 349 F.3d 692 (D.C. Cir. 2003).

[240] *See, e.g.*, Lessig & McChesney, *supra*; SavetheInternet.com Coalition, Frequently Asked Questions, http://www.savetheinternet.com/faq.

optimally, and accommodating those application-specific needs will not materially impair the performance of other, less latency-sensitive applications. For example, "in many multimedia applications, packets that incur a sender-to-receiver delay of more than a few hundred milliseconds are essentially useless to the receiver," and such "characteristics are clearly different from those of elastic applications such as the Web, e-mail, FTP, and Telnet," for which even "long delays" are "not particularly harmful."[241] In other words, if ensuring QoS for gaming or real-time video applications means a loss of several milliseconds in the loading of a webpage or a P2P file-sharing session, users of the latter applications will neither notice nor care.

The NPRM also expresses a theoretical concern that, if broadband providers enter into commercial QoS arrangements with some application and content providers, they "may have the incentive and ability to reduce or fail to increase the transmission capacity available for standard best-effort Internet access service, particularly relative to other services they offer, in order to increase the revenues obtained" from those QoS arrangements. NPRM ¶ 71. This, too, is a familiar concern voiced for years by advocates of greater regulation: a fear that once broadband providers ensure QoS for *some* latency-sensitive traffic, they will have the incentive and ability to consign *all other* traffic "to the digital equivalent of a winding dirt road."[242] This argument is unhinged from market realities and just flat wrong.

First, as discussed, Internet access speeds keep increasing year after year across the industry; broadband providers are investing tens of billions of dollars to increase those speeds; and they are spending millions more on advertising to compete on the basis of such bandwidth. *See* Discussion § 1.A, *supra*. Providers would not be investing those sums, or competing on that basis, if it were commercially viable to consign their own consumers to a "dirt road." In fact, it

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241 *Kurose & Ross*, *supra*, at 598.

242 Lessig & McChesney, *supra*.

is not commercially viable at all. If Broadband Provider X began degrading its best-effort Internet access platform to favor its "prioritized" content, such that most applications and content loaded more slowly on X's network than on its rivals' Internet access platforms, customers would begin switching to those rivals en masse.[243] The rivals would encourage consumers to do precisely that by running advertisements emphasizing the poor performance on the Broadband Provider X's network. For that matter, *application and content providers themselves* would likewise be free to broadcast their preference for X's rivals *right on their homepages* for all traffic bound for X's current customers. There is nothing speculative about such self-help remedies: This is *precisely* the technique Disney uses to call out broadband providers that do not pay the fees Disney requires before giving their customers access to ESPN360. *See* Figure 3, *supra* (displaying ESPN360 screenshot).

Moreover, if any class of providers were most likely to favor prioritized over best-effort Internet content, it would be cable providers in their relative treatment of their dominant multichannel TV services and their best-effort Internet access. But instead of slowing down Internet access, as the dirt-road hypothesis would predict, cable companies are in fact spending billions of dollars to upgrade their Internet access networks to DOCSIS 3.0, which is reportedly capable of providing top speeds of 100 Mbps to the home.[244] Verizon and AT&T are likewise offering dramatically faster Internet access to their end users along with multi-channel video

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[243] *See generally* Exh. 4, Rieth Declaration (discussing churn).

[244] *See, e.g.*, *Mediacom to launch 100 Mbps DOCSIS 3.0 Service*, SpeedGuide.net, Nov. 9, 2009, http://www.speedguide.net/read_news.php?id=3079; Todd Spangler, *Comcast To Hit 100-Mbps In Augusta, Ga., After Going 100% Digital*, Multichannel News, Dec. 18, 2009, http://www.multichannel.com/article/441155-Comcast_To_Hit_100_Mbps_In_Augusta_Ga_After_Going_100_Digital.php ("Comcast plans to roll out an additional 18 HD channels and will be offering a 100-Mbps high-speed Internet tier to Augusta businesses in addition to the 22- and 50-Mbps DOCSIS 3.0 residential tiers that are available in other markets.").

programming as part of their own multi-billion-dollar FTTH and FTTN buildouts. *See* Engineering Background § D.2, *supra*.

Last but not least, the "dirt road" rhetoric is particularly fanciful when applied in the wireless context. Wireless providers, which generally did not even provide full Internet access until several years ago, have spent billions of dollars a year on spectrum and 2G, 3G, and now 4G technologies precisely to give their customers access to the Internet at large, at speeds that increasingly rival those on today's wired broadband connections.

In short, *all* available market data refute the dirt-road hypothesis. And pro-regulation advocates cannot simply write off this empirical reality on the theory that broadband providers have not yet had the chance to relegate best-effort traffic to a dirt road because they have not yet begun prioritizing packets over their shared IP platforms. In fact, providers have been differentiating packets among classes of service for many years. *See* Engineering Background § D, *supra*. And if they were ever to have the incentive or ability to sabotage the quality of their best-effort Internet traffic, they would have done so already. In the enterprise space, AT&T and other providers have long offered QoS enhancements to business-class customers, and no one has ever suggested that they have ever degraded bandwidth for the best-effort Internet access platform to increase the value of their prioritized services. To the contrary, such bandwidth has increased exponentially over the years, and the reason is simple: Customers demand it.[245] Similarly, as noted, AT&T and other FTTP/FTTN providers have used DSCP-based prioritization (and related technologies, like MPLS) to ensure QoS for the video (and VoIP) services they offer over the same physical transmission facilities used for "best effort" Internet service. But that Internet service still provides a high-quality user experience that is *better* than

[245] Exh. 1, Faulhaber & Farber at 11-12; *see also* Schwartz Declaration at 27-30.

the performance of AT&T's legacy ADSL Internet access service, which does *not* share its physical-layer broadband platform (the high-frequency portion of a copper loop) with any other service. *See* Engineering Background § D.2, *supra.*

In sum, all available market facts refute the dirt-road concern, and the Commission cannot reasonably adopt that concern as the basis for market intervention, especially the extreme form contemplated here. At most, the Commission should continue monitoring market developments and intervene only if and when a demonstrated problem arises.

5. Common-Law Principles of "Common Carriage" Cannot Supply the Missing Rationale for a Line-of-Business Restriction Either.

In several passages, the Commission suggests that traditional theories of "common carriage" (or "bailment") might justify the line-of-business restriction even in the absence of any concern about market failure. This "common carrier" rationale is flawed as a matter of both law and logic. First, simply as a legal matter, Congress has ruled out this rationale as a basis for broadband regulation by prohibiting the Commission from treating information service providers as "common carriers."[246]

In any event, this argument about common carriage cannot even *logically* justify the proposed line-of-business restriction. Again, if the Commission *were* to treat broadband providers as "common carriers," this would simply mean that they could offer QoS enhancements to application and content providers for a fee, but that they would generally have to offer similar service-enhancements on similar terms to similarly situated providers. Here, in contrast, the Commission proposes to ban such commercial arrangements outright, whether provided on a common carriage basis or not. That proposed ban would be unprecedented even from the perspective of traditional common-carrier regulation. Since the Bell companies

[246] *See* 47 U.S.C. § 153(44); *see generally* Discussion § VIII.A.1, *infra.*

emerged years ago from their company-specific restrictions on the provision of long-distance services, the Commission has regulated common carriers only with respect to *how* they provide whatever services they wish to offer. Neither the Commission nor anyone else has restricted *which* services carriers may provide and which markets they may enter. But that is precisely what the Commission is proposing to do with its "nondiscrimination" rule.

Finally, the Commission's invocation of "bailment" principles is particularly ironic here, given that, under the common law, a bailee assumes special duties to care for packages that need special care.[247] Here, broadband providers *seek the right* to act as bailees in this respect—to sell special packaging (QoS enhancements) to merchants (application or content providers) that wish to contract for extra care in the delivery of their services to recipients. And the Commission's proposed line-of-business restriction would paradoxically bar them from doing so.

6. The Commission Would Harm Rather Than Help Ordinary Consumers by Forcing Them, Via This Line-of-Business Restriction, to Subsidize Application and Content Providers.

The NPRM suggests in several places that a ban on commercial QoS arrangements might be appropriate simply to keep application and content providers from paying money for service enhancements that, according to pro-regulation advocates, they could better spend on innovation at the "edge." *See* NPRM ¶¶ 67-69. The NPRM might be articulating one of two theories of regulatory intervention here: (1) a concern about potential market failure, or (2) a naked desire

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[247] *See, e.g.*, Kurt Philip Autor, *Note: Bailment Liability: Toward a Standard of Reasonable Care*, 61 S. Cal. L. Rev. 2117, 2131 (1988) ("[T]he particular classification of bailment transaction determines the level of care required by law—either slight, ordinary, or great . . . . [I]f there is a duty of great care, the bailor is liable for mere slight negligence.") (citing *Coggs v. Bernard*, 2 Ld. Raym. 909, 92 Eng. Rep. 107 (1703)); J. Story, *Commentaries on the Law of Bailments* § 10 (1878) ("Natural justice would hardly persuade us that the same obligations and the same duties ought to arise in all classes of bailments[.]").

to create regulatory cross-subsidies running from broadband providers (and their customers) to application and content providers. Neither theory has merit.

a. There Is No Market Failure.

The Commission expresses concern that its proposed ban on commercial QoS arrangements is necessary because, if such arrangements became common, the resulting "fees" might "drive some content, application, and service providers from the market." NPRM ¶ 69. On two levels, the economic logic here is difficult to discern. First, value-creating new products are introduced every day in markets across the economy, and when they are, companies in those and adjacent markets must often pay to avail themselves of the innovations. That is how all markets evolve. For example, when air mail became available for the shipment of goods, merchants paid for this expensive new service when their packages needed quick delivery. No regulator intervened to protect them from the extra expense on the theory that this value-additive new service posed a "collective action problem" because once *some* merchants began paying more for fast delivery, *other* merchants had to keep up.[248] Or, as Professors Farber and Katz put it: "No one would propose that the U.S. Postal Service be prohibited from [charging more for]

[248] The NPRM identifies another, equally implausible "collective action problem": a concern that "[a]lthough it might be in the collective interest of competing broadband Internet access service providers"—as opposed to application or content providers—"to refrain from charging access or prioritization fees . . . , it is in the interest of each individual access provider to charge a fee, and given multiple providers, it is unlikely that access providers could tacitly agree *not* to charge such fees." NPRM ¶ 69. The short answer is that, if this speculation were true, broadband providers would be taking the opposite side in this proceeding: They would be asking the Commission to adopt rules "protecting" them from themselves. They are not taking that position because they understand that it is in their interest and the interests of their consumers to allow market forces to drive consumer value.

Express Mail because a 'fast lane' service is 'undemocratic.' Yet some current proposals would do exactly this for Internet services."[249]

In any event, if the Commission banned fee-based QoS services offered by broadband providers, it would not in fact protect content and application providers from the need to pay "fees" to *someone* for high-quality delivery of their products to end users. To the contrary, as they are doing today, application and content providers would still need to spend immense sums on CDNs (or third-party CDN services) and other performance-enhancing technologies offered by other entities. Some of those alternative technologies may be less efficient than the QoS enhancements that broadband providers could offer, depending on the context.[250] And those alternatives might be simply incapable of supporting affordable delivery of certain content, such as real-time high-definition video streaming of popular events over the Internet, in which case the Commission's rule would deprive consumers of that content altogether. *See* Engineering Background §§ E.2, E.3, *supra*. In short, the no-QoS-agreements rule the Commission proposes would not create a money-saving truce among rival application and content providers. It would instead force them to pay just as much, if not more, for alternative QoS-enhancing techniques even when they are less efficient, and it would likely deprive them of the functionality needed to bring some new content and applications to consumers in the first place.

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[249] David Farber & Michael Katz, *Hold Off on Net Neutrality*, Wash. Post, Jan. 19, 2007, http://www.washingtonpost.com/wp-dyn/content/article/2007/01/18/AR2007011801508.html.

[250] *See* Engineering Background § E, *supra*. For the same reason, the Commission could not plausibly justify any "nondiscrimination" rule on the ground that it is needed to safeguard "social content" such as Wikipedia or, more generally, the "marketplace of ideas." *Cf.* NPRM ¶ 70. Again, moreover, the issue here is not whether broadband providers should be able to block applications or content or impose unilateral Internet "tolls," because the existing four principles of the *Internet Policy Statement* already address that concern. Finally, because (as discussed below) the proposed regulatory "solution" would impose upward pressure on end-user charges, and because it would deter some consumers from going online at all, that "solution" would itself detract from the value of "social content" by suppressing broadband adoption.

Moreover, by artificially restricting a broadband provider's ability to recover network costs from application and content providers, the Commission would necessarily impose upward pressure on the rates paid by ordinary broadband consumers, as Professor Marius Schwartz explains in his attached declaration.[251] Like newspapers and travel agents, broadband providers operate in a classic "two-sided" marketplace.[252] And like any other participant in a two-sided market, broadband providers must look to one side—or both—for cost-recovery. Different two-sided industries feature a wide variety of efficient cost-recovery schemes, hammered out through the free play of market forces. Today, many broadband providers recover essentially all of the costs of residential access networks from fees imposed on the subscribers to those networks. But this traditional cost-recovery model will become increasingly unsustainable as networks continue investing billions to accommodate the network demands imposed specifically by bandwidth-intensive applications and content that are used extensively by limited subsets of subscribers.

By prohibiting broadband Internet access providers from entering into agreements for enhanced service quality with application providers, the proposed no-QoS-agreements rule would require all broadband providers to recover *from consumers alone* all of the network costs of accommodating the bandwidth-intensive applications that cause bandwidth scarcity on access and aggregation networks—the very scarcity that makes QoS enhancements necessary in the first place. At least in the absence of metered per-packet pricing,[253] the burden would fall

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[251] Exh. 3, Schwartz Declaration, at 18.

[252] As discussed, significant portions of a modern broadband network are shared among all of the network operator's customers, including content providers and residential users. Although those customers can generally be divided *for purposes of any given Internet transaction* into application/content providers and eyeballs, that distinction is unstable over the long run and therefore cannot serve as the basis for a regulatory distinction with substantive consequences. *See* Engineering Background § D.3, *supra*; Discussion § III.A, *supra.*

[253] *Cf.* NPRM ¶ 137 (addressing possibility of metered pricing). As AT&T has previously explained, it is possible over the long run that the market will respond to network-management

disproportionately on *average* users of the network rather than the 20 percent of users who consume 80 percent of network resources through frequent use of unusually bandwidth-intensive content and applications.[254] Ultimately, then, this proceeding comes down to whether the government should displace market forces and obligate average consumers to bear network costs caused mostly by others, no matter what the inefficiency or unfairness of that result.[255]

That outcome would be not only inefficient and inequitable, but inimical to one of the central objectives of the Obama administration: bridging the digital divide. Because the no-QoS-agreements rule would exert upward pressure on end-user rates, it would also depress broadband subscribership on the margins, particularly among consumers who would prefer to pay low rates simply for basic broadband connectivity and do not wish to use QoS-needy,

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challenges by moving from today's flat-rated, all-you-can-eat pricing plans to more usage-sensitive pricing plans, which will recover more of the costs of unusually bandwidth-heavy applications from the consumers that use such applications. *See* AT&T Comments on Petitions of Free Press and Vuze, WC Docket No. 07-52, at 12-13 (Feb. 13, 2008). But this is only one possible approach to the problem of cost-recovery for shared and finite network resources, and regulators should not assume that it is the optimal solution for all networks at all times. The Commission certainly should not do what many advocates of net neutrality regulation propose: adopt broad-brush network-management prohibitions that would force up network costs across the board and force broadband providers to recover their costs either by raising prices for all consumers or by adopting usage-sensitive prices for Internet access.

[254] *See* Anna-Maria Kovacs, Regulatory Source Assocs., *Telecom Regulatory Note: FCC Broadband Update*, at 2 (Sept. 30, 2009) (summarizing a finding of the FCC broadband task force: "The 80/20 rule is alive and well in the broadband world. 1% of users account for 20% of bandwidth use, and 20% of users account for 80% of bandwidth used."); *see also* Sandvine, *2009 Global Broadband Phenomena*, *supra*, at 2 ("the top one percent of subscribers account for 25 percent of total Internet traffic"). Richard Bennett aptly describes this outcome as "an idealism tax on mainstream users." Bennett, *Designed for Change*, *supra*, at 25.

[255] Of course, application providers who pay fees to broadband providers for QoS enhancements might pass through some of those fees to the individual consumers that actually use the applications that benefit from those enhancements. But that outcome is economically efficient and pro-consumer: It makes each market actor internalize the costs that he or she individually causes. The alternative is to make each user pay the average costs of all users, which is inefficient and unfair in a world where 20 percent of users cause 80 percent of the traffic.

bandwidth-intensive applications in the first place. The Commission should have no illusions about this fundamental trade-off. The no-QoS-agreements rule would chill infrastructure deployment in areas that need it the most, and would also price many consumers out of the broadband market even where infrastructure is deployed. That is why former Chairman William Kennard has exhorted "[p]olicymakers [to] rise above the net neutrality debate and focus on what America truly requires from the Internet: getting affordable broadband access to those who need it."[256]

b. There Is No Basis for Cross-Subsidization of "Edge" Providers.

Lurking within the NPRM is a related but distinct rationale for imposing a "no-QoS-agreements" rule: a belief that the Commission should intervene not to prevent any *market failure*, as economists understand that term, but to create an *affirmative cross-subsidy* running from broadband providers (and their ordinary end users) to application and content innovators at the "edge" of the Internet.[257] This rationale pervades popular advocacy for net neutrality regulation. According to Larry Lessig, "the greatest innovation will come" from the edge rather than from the "dinosaurs" that build and operate broadband networks, and thus the "[d]inosaurs should die."[258] And Tim Wu would justify net neutrality regulation as "a subsidy to the creative and entrepreneurial at the expense of the passive and consumptive."[259] These calls for

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[256] William E. Kennard, *Spreading the Broadband Revolution*, N.Y. Times, Oct. 21, 2006, http://query.nytimes.com/gst/fullpage.html?res=9B0CE1DA163FF932A15753C1A9609C8B63.

[257] *See, e.g.*, NPRM ¶ 68 (if unregulated, market forces could "reduce the potential profit that a [content or application provider] can expect to earn and hence reduce the provider's incentive to make future investments").

[258] Lessig, *Future of Ideas*, *supra*, at 176.

[259] Robin S. Lee and Tim Wu, *Subsidizing Creativity Through Network Design: Zero-Pricing and Net Neutrality*, 23 J. Econ. Perspectives 61, 67 (2009).

subsidizing "edge" providers at the expense of ordinary users expose net neutrality rhetoric for what it is: an elitist movement posing as populism.

It is also an elitist movement without any coherent economic foundation. First, as discussed, the no-QoS-agreements rule might benefit *some* edge providers—those, like Google, that have established market dominance by building out their own capital-intensive CDNs—but it will not benefit *other* edge providers that wish to compete through alternative business plans. For example, it would not benefit content or application providers (including those in garages or dorm rooms) that view QoS arrangements with broadband providers as an efficient alternative to CDN functionality. Nor would it benefit the providers of products—such as real-time high-definition video streaming over the Internet—that may never see the light of day if the Commission prohibits broadband providers from providing QoS within access and aggregation networks.

Unsurprisingly, therefore, a number of application and content providers oppose the proposed no-QoS-agreements rule because they recognize that they can create more value for their consumers—and thus more revenue for themselves—if they make economically efficient and voluntary arrangements to obtain the QoS enhancements they need from broadband providers. For example, Microsoft and Yahoo! recently issued statements urging policymakers to exercise caution before imposing any form of net neutrality regulation to ensure, in the words of Yahoo!, that "that Americans have access to a world-class Internet."[260] As Microsoft explained, the Commission should "ensure that network operators are able to offer *last mile service enhancements and tiers of service*, either to consumers *or to online service providers*"—

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[260] Winter Casey, *Microsoft, Yahoo Weigh In On FCC's Proposed "Open Internet" Rules*, BroadbandCensus.com, Oct. 29, 2009, http://broadbandcensus.com/2009/10/microsoft-yahoo-weigh-in-on-fcc's-proposed-open-internet-rules.

i.e., should reject precisely the ban on QoS arrangements described in paragraphs 106 and 107 of the NPRM.[261] And Amazon.com's Paul Misener recently noted the need for similar flexibility for commercial QoS arrangements.[262]

Finally, as AT&T has previously explained,[263] it is no answer to say that broadband providers could supplement traditional flat-rated subscriber fees with more QoS-sensitive rate structures that, in whole or part, charge *subscribers* by application type or by specific QoS parameters. As a threshold matter, as with any other market where scarce goods must be efficiently allocated to their most valued uses, price signals are essential to the success of any prioritization scheme. In other words, it should be common ground that network providers must be able to charge *someone* for prioritization of particular packets. If *no one* could be expected to pay for prioritization, then—under a familiar tragedy-of-the-commons dynamic—*every* user would attach "high priority" packets to its headers, and no packets would receive any meaningful priority. Price signals are the only means of efficiently identifying high value latency-sensitive applications that *need* to be prioritized in order to realize their high value for consumers.

It would be inefficient and, indeed, unworkable to force broadband providers to deal directly with consumers in all instances to perform this allocation function. Consumers value simplicity in service plans, and to honor that preference, broadband providers can realistically offer and bill for only a limited range of service options. In contrast, the proliferation of performance-sensitive, high-bandwidth applications will require highly context-specific

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261 *See id.*

262 C-SPAN, *Institute for Policy Innovation Conference on Telecommunications Policy and Innovation*, video at 7:50 (Nov. 12, 2009), http://www.c-spanvideo.org/program/id/215284 ("[I]f network operators are deploying new technologies, new techniques, new capacity that allows them to provide new . . . revenue-making services, they ought to be allowed to—just so it doesn't degrade other traffic on the network.")

263 *See AT&T 2007 Net Neutrality Comments* at 77-78.

engineering judgments about (1) the precise QoS needs of each such application and (2) which network techniques will provide the most efficient solution for those needs. Because application providers are uniquely positioned to address those highly technical questions about their own applications, broadband providers can efficiently negotiate the details of QoS arrangements with application providers; but they could not feasibly negotiate the same arrangements with millions of individual consumers.

By way of analogy, when a consumer buys a product from an online retailer, the retailer (not the consumer) typically makes all of the necessary logistical arrangements with the shipper to deliver the product to the consumer. No one has ever suggested that the government, in the name of "shipping neutrality," should ban such retailer-shipper arrangements and force consumers to individually contract with shippers to retrieve products from retailers. Yet that is effectively what the Commission proposes to do here.

Finally, quite apart from these efficiency concerns, it would never be *sufficient* to negotiate these types of prioritization arrangements at the consumer level, because prioritization depends on packet-marking at or close to the point of a packet's origin. In other words, a given broadband provider and application/content providers would have to agree upon a standard for this purpose, and individual consumers could not feasibly play any role in the development or implementation of that agreed-upon standard. The proposed ban on business-to-business deals would interfere with that step of the process as well.

IV. IMPOSITION OF THE PROPOSED RULES ON WIRELESS CARRIERS WOULD IRRATIONALLY JEOPARDIZE INNOVATIVE WIRELESS BROADBAND SERVICES AND BUSINESS MODELS.

The proposal to extend net neutrality rules to wireless broadband services for the first time is the least supportable and most potentially damaging aspect of the NPRM. Both Congress and the Commission have long embraced the notion that wireless services should not be

subjected to intrusive regulation, and that hands-off policy has paid handsome dividends for consumers and the economy. Intense competition among wireless providers has led to lower prices, enormous capital investment, and fast-paced innovation as carriers strive to win new customers and keep existing ones.

That competition has likewise generated multiple business models for the provision of broadband wireless services, ranging from a protected and managed model to the unmediated model prevalent in the wireline market, to all types of special-purpose and highly customized services. From the perspective of consumers, this is ideal: They may choose among offerings suited to all their many diverse tastes and needs, and the marketplace continues to evolve in response to their demands. It would make no sense for the Commission to deny consumers this range of choices by dictating that all carriers must instead offer one homogenized model for the delivery of wireless broadband services.

Cementing such rules in place would be all the more indefensible given the remarkable flux in the wireless broadband marketplace. The mix of applications that wireless broadband customers use is changing daily, and soaring demand for wireless broadband is already testing the limits of available spectrum capacity. At the same time, the industry is in the midst of completing the transition to 3G and beginning the move up to 4G technologies. Ensuring a secure and high-quality mobile wireless network in the face of such challenges is a demanding and tricky endeavor. But as the records developed in the Commission's *Wireless Competition* and *Wireless Innovation* proceedings vividly confirm, wireless providers have responded to these challenges with vigor.[264] They have invested heavily in spectrum and new technology,

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[264] Notice of Inquiry, *Fostering Innovation and Investment in the Wireless Communications Market*, GN Docket Nos. 09-157, 09-51, FCC 09-66 (rel. Aug. 27, 2009) ("*Wireless Innovation NOI*"); Notice of Inquiry, *Implementation of Section 6002(b) of the Omnibus Budget*

experimented with new engineering practices and business models, and entered into creative arrangements with companies across the wireless ecosystem to deliver an ever wider and more innovative selection of applications, devices, service plans, and customer experiences.

To ensure the continued growth of this marketplace, and to protect consumers' interests in a robust and "open" wireless Internet, the Commission should be focusing on how to allocate more spectrum to the wireless broadband marketplace, not on saddling it with new regulations. In separate letters to the Commission, both the Department of Justice and NTIA recently stressed that "mak[ing] more spectrum available for broadband wireless services" is "a primary tool for promoting broadband competition," which in turn is the "surest way to deter undesirable conduct by incumbent broadband service providers."[265] Indeed, spectrum is the *most* essential need facing the industry today. The Commission cannot responsibly consider regulatory limitations on the operation of wireless broadband platforms before it has given the wireless industry the lifeblood it needs to develop those platforms fully in the first place.

Relatedly, the Commission cannot responsibly impose "openness" rules on wireless broadband services when it has barely begun the C Block experiment it designed in 2007 to assess whether such rules *harm* those services. Imposing such rules on non-C-Block licensees now would unlawfully depart from the Commission's prior determinations in the *700 MHz Order* (as explained in detail below), sow uncertainty throughout the industry, and grossly interfere with the investment-backed expectations of the many 700 MHz auction winners who

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Reconciliation Act of 1993, WT Docket No. 09-66, FCC 09-67 (rel. Aug. 27, 2009) ("*Wireless Competition NOI*").

[265] Ex Parte Letter from Larry Strickling, Dep't of Commerce, to Julius Genachowski, Chairman, FCC, GN Doc. No. 09-51, at 4 (Jan, 4, 2010); *see also* Ex Parte Submission of the U.S. Dep't of Justice, GN Docket No. 09-51, at 22 (Jan. 4, 2010) ("*DOJ Broadband NOI Ex Parte*") ("[M]ore spectrum would allow providers to increase the capacity and reliability of their offerings . . . [and] the increased capacity in the systems would help support new applications.").

paid the U.S. Treasury billions of dollars more for spectrum unencumbered by open-platform requirements. Those very same licensees have a key role to play in bringing next-generation wireless broadband to fruition—a process that would be inexorably chilled by the imposition of vague and cumbersome rules *on top of* the loss of billions of dollars. The Commission's chief priority at this point—and its duty as a steward for the public interest—is to facilitate the *development of* and *investment in* this critical marketplace, not to hobble it in myriad unforeseeable ways.

Commission intervention in the wireless broadband marketplace would be particularly indefensible given the absence of any market failure that could justify the attendant risks. To the contrary, the industry has refuted every prediction that it would suppress innovative services absent government intervention. Indeed, wireless carriers now actively promote the very features, services, and applications that regulation advocates claimed were endangered.

Nevertheless, the NPRM simply concludes, with little explanation, that it is necessary to extend the proposed net neutrality rules to wireless broadband providers. Wireless broadband is not just a "me-too" service that mirrors wired broadband services and can be swept blithely into the same regulatory regime. To be sure, the NPRM suggests that the rules might have to be tweaked to fit the wireless mold. *See* NPRM ¶ 154. But the technical and other differences between wireless and wireline networks and services are differences in kind, not merely degree. Even with substantial changes or a more "flexible," case-by-case approach, application of the proposed rules to wireless broadband services would risk significant and lasting damage. As Professor Reed and Dr. Tripathi explain in their attached declaration, wireless operators must contend with mobility, spectrum constraints, interference, and other unique issues in a dynamic

environment that is changing even more rapidly than its wireline counterpart.[266] In the face of these constraints and challenges, it is cold comfort for the Commission to promise that it may sometimes waive the broad prohibitions on conduct and business arrangements based on undefined, "reasonable network management" defenses.[267]

The Commission cannot know exactly how its proposal to overlay wireline-focused broadband rules on wireless carriers would affect innovation, investment, or consumer welfare. Even the carriers themselves cannot predict the full effect of these rules—which only underscores why it is so misguided for regulators to try to dictate the evolutionary path of a dynamic technological platform. But as the attached papers by Drs. Reed, Tripathi, Faulhaber, and Farber all emphasize, the challenges facing carriers will evolve along with changes in demand and technology, and carriers will need freedom to meet those challenges with innovative network design and operational choices and unique business arrangements and service offerings.[268]

No one—whether they are engineers, marketing gurus, operators, handset manufacturers, application and content providers, consumer advocates, or regulators—can predict which business models and engineering solutions will best meet consumers' diverse needs in this

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266 *See* Jeffrey H. Reed & Nishith D. Tripathi, *The Application of Network Neutrality Regulations to Wireless Systems: A Mission Infeasible*, § 3.2 and Table 3.1 (2010) (attached as Exh. 2) (listing unique challenges for wireless network management).

267 *See id.* at § 4.1 (discussing difficulties with application of a "reasonable network management" standard to wireless networks).

268 *See* Exh. 1, Faulhaber & Farber, at 30 ("The industry is moving toward new 4G systems which are even less well understood; because the market is tightly integrated, both applications and devices will change as these new systems come online. This greatly enhances the need for experimentation and flexibility"); Exh. 2, Reed & Tripathi, at 5 ("[T]he continuing evolution is itself a powerful reason for the FCC to hold off on new regulation. Much research and real world, 'on-the-fly' experimentation will be required to learn how to structure, operate and manage networks to meet quality of service needs in these new systems.").

dynamic environment. Yet one thing *is* clear: Subjecting the wireless industry to the proposed rules would preclude many service-enhancing business arrangements and practices altogether, undermine efforts to manage scarce spectrum resources, chill sensitive engineering and business decisions through endless regulatory second-guessing, and deter investment in new network technologies.[269] This would affirmatively harm consumers and thwart the Commission's stated goal of "promoting innovation, investment, research and development, competition and consumer choice, in order to support a thriving Internet and robust mobile wireless broadband networks." NPRM ¶ 157.

The Commission cannot responsibly go down this path, and it should instead shelve its proposal to apply net neutrality rules or principles to wireless broadband services. Rather than focus at this point on regulation of wireless broadband services, the Commission should continue to monitor those services as they develop and adopt measures that will help them grow. And, as discussed, it should not and cannot lawfully impose economic regulation on such services until after it has, at a minimum (1) supplied the marketplace with the new spectrum it needs, and (2) completed its C Block "openness" experiment and sought public comment on the results of that experiment.

A. The Wireless Marketplace Has Become a Model of Openness and Consumer Choice Without Regulatory Intervention.

As noted above, the NPRM makes clear that the Commission's goal in addressing wireless broadband is to "promot[e] innovation, investment, research and development, competition and consumer choice, in order to support a thriving Internet and robust mobile wireless broadband networks." NPRM ¶ 157. Notably, however, the NPRM cites no evidence

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[269] *See* Exh. 2, Reed & Tripathi, § 5 ("[A]pplying net neutrality principles to wireless networks would be a grave mistake and would cause irreparable harm to innovation, network performance, and user experience.").

of any market impediments to achieving these goals. And there are none. Intense competition already supplies consumers with a remarkable range of choices among wireless services, devices, and applications, and providers can be expected to continue investing and innovating in order to attract new users. In other words, the marketplace is thriving in precisely the ways the NPRM advocates, even though the net neutrality principles have *never* been applied to wireless services.[270] The facts thus cannot begin to support the extension of the proposed net neutrality rules to those services.[271]

First, the wireless broadband marketplace is intensely competitive. It not only offers a broadband alternative to wireline service for some customers; it is itself the focus of significant intra-modal competition. Already, "more than 90% of Americans live in areas with more than four 3G wireless broadband service providers."[272] According to CTIA, there are more than 140 separate wireless carriers and 43 non-facilities-based operators in the United States.[273] In large metropolitan areas, consumers have as many as 14 carrier choices, including five facilities-based wireless competitors.[274] Most smaller towns and cities have a dozen or more wireless carriers offering service, and almost *all* American consumers have a choice of at least three facilities-

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[270] *See, e.g.*, Second Report and Order, *Service Rules for the 698-746, 747-762, and 777-792 MHz Bands*, 22 FCC Rcd 15289, 15363 ¶ 202 n.463 (2007) ("*700 MHz Order*") ("[T]he Commission has not yet made a finding regarding whether to apply open access requirements to wireless broadband services generally, and in this Order, defers that determination to the appropriate pending proceedings.").

[271] *See* Exh. 1, Faulhaber & Farber, at 28 ("There is no argument that wireless broadband providers operate in anything other than a fully competitive market. . . . It is not only competitive, it is highly innovative. The broadband wireless industry is a textbook example of how competitive industries respond to customer demands.").

[272] Reply Comments of CTIA – The Wireless Association, GN Docket No. 09-51, at 2 (filed July 21, 2009).

[273] *See* Comments of CTIA – The Wireless Association, WT Docket No. 09-66, at 5 (filed Sept. 30, 2009) ("*CTIA Wireless Competition NOI Comments*").

[274] *See id.* at 7.

based providers.[275] The U.S. wireless industry is significantly less concentrated than that of any other OECD country.[276] And wireless providers continue to expand their networks, spending billions of dollars on spectrum, equipment, and network deployment. CTIA reports that for the twelve months ending June 2009, wireless providers reported capital investments of $19.5 billion (not including spectrum).[277] AT&T is currently expanding its 3G footprint and upgrading to HSPA 7.2—even as it prepares to deploy its 4G network.[278] And other carriers, both large and small, are making similar investments.[279]

Given the structure of the wireless marketplace, in which multiple carriers have invested billions of dollars for spectrum rights and in extensive facilities deployment, carriers have no choice but to compete fiercely to win customers and to prevent their existing customers from defecting to competitors. And the focus of their efforts is the exploding demand for wireless broadband Internet access. As of June 2009, there were more than 237 million web-capable devices on U.S. wireless networks, over 40 million smartphones and PDAs, and more than 10.8 million aircards, wireless modems, and netbooks.[280] Pew reports that 56 percent of Americans

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275 *See id.* at 7-8; *Thirteenth CMRS Competition Report*, 24 FCC Rcd at 6189 ¶ 2 (finding that more than 95 percent of the U.S. population was living in census blocks with at least three competing wireless carriers).

276 *See* Reply Comments of CTIA – The Wireless Association in GN Docket No. 09-66, at 10 (filed Oct. 22, 2009) ("*CTIA Wireless Competition NOI Reply Comments*").

277 *Id.* at 19.

278 *See* AT&T Press Release, *AT&T To Deliver 3G Mobile Broadband Speed Boost* (May 27, 2009), http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26835.

279 *See* Comments of AT&T in WT Docket No. 09-66, at 16-18 (filed Sept. 30, 2009) ("*AT&T Wireless Competition NOI Comments*").

280 *See* Reply Comments of CTIA – The Wireless Association in GN Docket Nos. 09-157 & 09-51, at 7 (filed Nov. 5, 2009) (citing *CTIA's Wireless Industry Indices: Semi-Annual Data Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry, Mid-Year 2009 Results* at 10).

have accessed the Internet wirelessly, while 19 percent do so on a daily basis.[281] Not surprisingly, global wireless data traffic is doubling *annually*.[282] And from June 2007 to June 2008 (the most recent period for which FCC data are available), wireless broadband additions far exceeded additions to other modes of broadband (ADSL, cable, and other) combined.[283] AT&T's own wireless network has experienced a 6,732% increase in data usage over the last 13 quarters.[284]

As providers in this robust marketplace have worked to satisfy demand and retain customers, several distinct service models have emerged and gained wide acceptance among different groups of consumers. For example, many wireless consumers prefer a secure, mediated broadband environment, where they can feel safe about the applications they use and confident that those applications will function well on their wireless devices. The AT&T iPhone model is based on this concept: It features applications that have been screened by Apple to meet certain criteria and that are optimized for use over the iPhone platform.[285]

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281 *Pew Study* at 3-4.

282 *See Surfing hertz*, Fin. Times, Dec. 1, 2009, http://uk.finance.yahoo.com/news/surfing-hertz-ftimes-96b9286f2ccc.html ("*Surfing hertz*") ("Nokia Siemens Networks estimated recently that global wireless data traffic is doubling annually and that it will reach 2,000 petabytes by 2011.")

283 *See* Ind. Anal. & Tech. Div., Wireline Competition Bureau, FCC, *High-Speed Services for Internet Access: Status as of June 30, 2008*, at Table 1 (July 2009).

284 *See* John Donovan, *2010 AT&T Developer Summit Presentation*, at slide 3 (Jan. 2010), http://www.att.com/Common/about_us/files/pdf/DevSummit2010Donovan.pdf.

285 Of course, this more "managed" environment includes over 100,000 applications, and customers can always leave the confines of the iPhone application environment through the built-in web browser, which provides full access to all compatible content, applications, and services on the unmediated Internet. *See* Apple, Press Release, *Apple Announces Over 100,000 Apps Now Available on the App Store*, Nov. 4, 2009, http://www.apple.com/pr/library/2009/11/04appstore.html.

In this managed environment, AT&T seeks to ensure that no third-party applications downloaded onto an AT&T-partnered device can introduce malicious code or other security or customer privacy threats into either the device or the network. As discussed above, AT&T works with third-party application developers to achieve this security. AT&T's devCentral program gives such developers (and in some cases, AT&T itself) an opportunity to test their applications for security and privacy concerns. Developers of "network-affecting" applications—*i.e.*, applications that require access to network resources, such as IP connectivity, SMS, MMS, etc., and can thus "infect" the network with code or access customer data via the network—are contractually bound to certify that their applications comply with the devCentral security and privacy guidelines. Once any testing and certifications are in place, AT&T "signs" the application, which clears it to be downloaded and used on AT&T-partnered devices. This "Code Signing" process is a critical part of a more "managed" or "mediated" wireless offering, and is an important differentiator for customers that have a particular interest in privacy and cybersecurity protections.

To be sure, other customers may prefer less actively managed models that allow them more independent customization of their wireless broadband experiences. As would be expected of a competitive market, devices and providers have emerged to satisfy that demand, such as the Google Android model.[286] And AT&T itself has just announced the launch of five new Android

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[286] T-Mobile and Verizon are offering Android-enabled devices, which allow customers to access an open and largely unmediated marketplace of unaffiliated third-party applications and services. *See* Ryan Paul, *Robot Invasion: Android and Google Voice coming to Verizon*, Ars Technica, Oct. 6, 2009, http://arstechnica.com/gadgets/news/ 2009/10/robot-invasion-android-and-google-voice-coming-to-verizon.ars. And there are many other variations: AT&T customers can select devices with operating systems from a wide variety of providers, including BlackBerry, Palm OS, iPhone OS, Windows Mobile, and the open source Symbian and Java systems. *See* AT&T Choice website, http://choice.att.com/developers/GettingStarted.aspx;

devices supplied by Dell, HTC, Motorola, and others. These devices will offer customers access to the "open" Android Market for applications—even while customers retain the option to access the more mediated AT&T App Center.[287]

In addition, most major providers today, including AT&T, also offer "bring your own device" options, allowing consumers to attach any compatible device to the wireless network.[288] Customers subscribing to this service can customize their handsets, download compatible applications, or access the Internet with no mediation by the carrier.[289]

In short, *without regulation*, consumers already enjoy the ability to connect any network-compatible handsets to the wireless broadband Internet—and to access the lawful content of their choice.[290] Google's newest venture, the Nexus One handset, vividly illustrates the openness and

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AT&T devCentral website, http://developer.cingular.com/developer/index.jsp?page=toolsTechOverview&id=800048.

[287] AT&T, Android Smartphones, http://www.wireless.att.com/cell-phone-service/cell-phone-sales/promotion/ces.jsp.

[288] *See* Saul Hansell, *Verizon Wireless Says "Bring Your Own" Device*, N.Y. Times Bits Blog, Nov. 27, 2007, http://bits.blogs.nytimes.com/2007/11/27/verizon-wireless-says-bring-your-own-device/. Indeed, AT&T does not require term agreements for consumers who take advantage of this option, which provides customers with additional flexibility. AT&T, Press Release, *AT&T Announces Third Annual CTIA Wireless Events to Encourage Development of Innovative Wireless Applications for Consumers and Businesses*, Mar. 18, 2008, http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=25332.

[289] Of course, these independent devices will not be closely integrated with AT&T's network, so they may not be able to take optimal advantage of certain resident network capabilities, such as visual voice mail. And customers using independent devices (as well as unmediated app stores or service options) lack the same type of security and privacy reassurances that the wireless providers can offer in a more mediated package. Wireless providers and manufacturers may and do exercise oversight to ensure network operability and security, but they do so more on an after-the-fact basis rather than by clearing and approving applications in advance. In any event, the key is that there is a *range* of options so that customers can select the option they most prefer.

[290] *See* Exh. 1, Faulhaber & Farber, at 28-29.

variability the market permits.[291] It also demonstrates the freedom of "edge" providers to leverage the wireless platform to offer their own services and devices, *without* regulatory oversight. The Nexus One can be purchased as an unlocked device that can be used with various carriers' compatible GSM systems, including AT&T's.[292] Customers interested in an Android phone preloaded with Google's search engine, with Google Voice, and with other Google applications, and who want the full flexibility to move among carriers, can take advantage of this option, and rely on Google rather than their wireless provider to shape their experiences.

Notably, even Google recognizes the importance of preserving different options for different customers: The Nexus One is also available as a T-Mobile-partnered phone. Customers can purchase the phone for a discount of $350 with a two-year service contract from T-Mobile.[293] Under that arrangement, presumably, T-Mobile takes on more responsibility for the customer experience and for integration between the phone and the network. And Google, as an "edge" provider, will profit from the availability of *both* service models, because it will be able to attract a wider range of customers to its phone and its resident apps.

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[291] *See* Google, Nexus One, http://www.google.com/phone.

[292] According to Google's website, Google apparently has not enabled the Nexus One to operate on AT&T's 3G spectrum. *See* Google, Nexus One Help, http://www.google.com/support/android/bin/answer.py?answer=166507. But consumers can use the Nexus One on other AT&T spectrum if they so choose. Dan Jones, *AT&T Wants Nexus One Users' Cash*, Light Reading's Unstrung, Jan. 7, 2010, http://www.unstrung.com/document.asp?doc_id=186464 ("'We have always allowed customers to bring their unlocked, compatible GSM devices, and we will sell them a plan,' an AT&T spokesperson [said]. "We can't, of course, guarantee how the device will perform since it hasn't been certified for use on the AT&T network.").

[293] According to Google, consumers who cancel their wireless plans prior to 120 days of continuous service are subject to a Google-imposed "Equipment Recovery Fee" of $350, which is "in addition to any early termination fees that may be charged by your chosen carrier . . . ." *See* Nexus One, Terms of Sale for Nexus One Device, http://www.google.com/phone/static/en_US-terms_of_sale.html. Customers who choose T-Mobile as their carrier are subject to a $200 early termination fee, which is pro-rated over the term of their contract. Customers who cancel their plan and return their phone within 14 days of purchase are subject to reduced charges, including restocking and/or refurbishing fees. Nexus One, T-Mobile Terms and Conditions, https://www.google.com/phone/static/en_US-tmobile_terms_conditions.html.

In addition to the various models that have evolved organically in the marketplace, the Commission also has established an additional business model by regulatory fiat: the "any application, any device" model imposed on the C Block 700 MHz spectrum, which requires all devices to be open to all applications. Notably, the Commission recognized that this requirement—and, by extension, any government-imposed "openness" requirement—could have drawbacks. It thus expressly declined to impose that model on *any other block of spectrum*:

> While the open platform requirement for devices and applications in the C Block holds the potential to foster innovation, we cannot rule out the possibility that such a requirement may have unanticipated drawbacks as well. Therefore, we think that *it is appropriate to impose the open platform requirement only on a limited basis*.[294]

As mentioned above and discussed further below, it would be unprincipled and unlawful for the Commission to ignore that warning now and impose a new variation of government-mandated "openness" on wireless broadband providers. First, the Commission has not even had the opportunity yet to evaluate the impact of its openness requirement on the C Block, so it has no basis for dismissing its concern about "unanticipated drawbacks." Moreover, other 700 MHz auction winners paid billions of dollars more to *avoid* the encumbrance of government-mandated openness, given the Commission's express promise to restrict those requirements to the C Block. The Commission cannot lawfully reverse course on the winning licensees from whom it accepted those billions in auction proceeds. *See* Discussion § VIII.B.4, *infra*.

But the point for the moment is that the Commission has no *need* to impose such requirements given the abundance of options that the wireless marketplace offers, including the C-Block model. Indeed, still more service models abound. Providers offer netbooks with full web-browsing capabilities that provide customers with access to all compatible Internet content,

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[294] *700 MHz Order*, 22 FCC Rcd at 15364 ¶ 205 (emphasis added).

applications, and services, and AT&T and other providers offer tethering plans, which permit customers to use certain wireless devices as wireless modems for a PC.[295] There also are an increasing variety of limited- or uni-purpose devices that allow limited-functionality Web access, such as the Amazon Kindle and a variety of other e-readers,[296] and the Garmin nüvi 1690, a portable navigation device that supports Google Local search and certain news-related feeds and listings.[297] AT&T also is working with device makers to bring to market specialized devices for personal navigation, home security, medical diagnostics and tracking, real-time gaming, and even networked picture frames that wirelessly connect to online albums and digital cameras.[298] Similarly, enterprise customers as well can choose among a wide variety of limited-purpose wireless broadband devices, such as those permitting remote monitoring of utility sites or vending machines, inventory tracking, or other "machine-to-machine" applications.[299]

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[295] *See, e.g.*, AT&T, *Answer Center*, *What is Tethering?*, http://www.wireless.att.com/answer-center/main.jsp?solutionId=KB102856&t=solutionTab.

[296] *See* Brandon Griggs, *Bold new e-readers grab attention at CES*, CNN Tech, Jan. 8, 2010, http://www.cnn.com/2010/TECH/01/08/ces.ereader/index.html ("Sales of e-readers doubled last year, and the Consumer Electronics Association, which stages CES, predicts they will double again in 2010.").

[297] Garmin, *nüvi 1690*, http://www8.garmin.com/buzz/1690/.

[298] *See, e.g.*, Erica Ogg & James Martin, *Emerging devices at AT&T Labs*, ZDNet Asia, Dec. 22, 2009, http://www.zdnetasia.com/photo_gallery/0,39067317,62059560,00.htm; AT&T, Press Release, *AT&T Launches Dedicated Certification Lab for Emerging Devices, Reinforces 'Open Innovation' Leadership*, Sept. 2, 2009, http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27080 (touting the opening of a "new lab [that] will serve as the hub for testing network compatibility, data performance and audio quality for a broad range of non-traditional, wirelessly-enabled devices.").

[299] *See* Comments of AT&T Inc., GN Docket Nos. 09-57, 09-157, at 105 (filed Sept. 30, 2009) ("*AT&T Wireless Innovation NOI Comments*"); *see also* AT&T, Emerging Devices, Partner with AT&T, Our Experience, http://www.att.com/edo/partner-with-att/our-experience.jsp ("Since 2005, AT&T has certified over 350 devices for use on our network. These devices include ruggedized form factors, eReaders, machine-to-machine solutions, and many others."); AT&T, Press Release, *AT&T to Offer Wireless Smart Grid Technology to Utility Companies*, Mar. 17, 2009, http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26613.

No public interest could be served by replacing this eclectic range of options with a homogenized marketplace based on a single, relatively unmanaged model of access. Nor is there any basis for the Commission to conclude that this "open" model would be more likely to enhance innovation and investment over the long run. Indeed, in recent years, the more managed iPhone model has been responsible for surges in wireless broadband adoption, robust application and content development, and responsive investment and innovation by competitors. Of course, over time, consumers may decide that they *prefer* a less managed option—such as one of the Android devices that exists today or devices that will use the C Block "open platform" model required by the Commission's 700 MHz experiment. If consumers uniformly prefer such options, the marketplace will drive all competitors toward an open, unmediated service model. But there is no reason for the *Commission* to make that choice for all consumers when the competitive marketplace can do so most efficiently. Rules *preventing* customers from choosing a more managed model cannot be defended as somehow *enhancing* consumer choice.[300]

In particular, every customer today already has an "open" option from AT&T and many other providers: As discussed, a customer who wants a *fully* unmediated wireless broadband experience—similar to the wireline desktop model—can bring her own compatible device to the network (including a netbook or laptop PC) and access lawful, compatible applications or content using her web browser. The availability of that option to all consumers who want it should be sufficient to satisfy every possible goal of the open Internet principles. Nevertheless, the proposed rules (NPRM, Appendix A §§ 8.5, 8.7, 8.9, 8.13) could be read to *prohibit* consumers from choosing (and providers from offering) any other type of arrangement—including arrangements that consumers demonstrably want, need, and widely use today. If that

[300] *See* Exh. 1, Faulhaber & Farber, at 29 ("Imposing wireless network neutrality is a regulatory-centric policy, not a customer-centric policy.").

is the cramped "neutrality" regime the Commission proposes to enforce, it would severely injure the wireless broadband ecosystem and the consumers who depend on and stand to benefit from it.

Commission intervention in this vibrant marketplace would be especially arbitrary given that there has not been even a single reported instance of the type of conduct that the proposed rules are purportedly designed to discourage. To the contrary, the dire predictions net neutrality advocates have made about the impending "innovation" calamity in the wireless broadband marketplace been proven false again and again. For example, just a few years ago, net neutrality advocates predicted that wireless providers would never "sell a Wi-Fi phone at any price" or permit VoIP over mobile phones.[301] Similarly, Skype told the Commission that "manufacturers are poised to equip handsets with Skype features but are reluctant to do so if such features threaten wireless carriers' established business model."[302] Yet today, without Commission intervention, *every* major wireless provider offers Wi-Fi-enabled handsets. Currently, AT&T alone offers sixteen such handsets and six Wi-Fi-enabled netbooks, not counting the new Android handsets AT&T just announced.[303] Further, every major wireless provider offers handsets that support VoIP over Wi-Fi and over 3G services.[304] In short, it is bad enough that the Commission's proposed "solution" for the wireless broadband marketplace would in fact do

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[301] *See* Wu, *Wireless Net Neutrality*, *supra*, at 24.

[302] Petition of Skype Communications S.A.R.L. to Confirm a Consumer's Right to Use Internet Communications Software and Attach Devices to Wireless Networks, RM-11361, at 13 (filed Feb. 20, 2007) ("*Skype Petition*").

[303] AT&T, *Cell Phones and Devices*, http://www.wireless.att.com/cell-phone-service/cell-phones/index.jsp.

[304] *See* Jim Dalrymple, *AT&T to allow VoIP iPhone apps on 3G network*, CNET News, Oct. 6, 2009, http://news.cnet.com/8301-13579_3-10368955-37.html.

serious harm by reducing consumer choice, but it is even worse that this harm would be imposed in the name of solving a problem that does not even exist.

B. Unique, Evolving Technological Features of Wireless Broadband Networks Would Render the Proposed Rules Particularly Damaging.

Imposition of the proposed rules on wireless broadband would also do concrete harm to wireless broadband services and networks. Even the Commission recognizes that there are critical "technological . . . differences" between the wireline and wireless broadband marketplaces that "justify differences in *how* we apply the Internet openness principles" to wireless broadband services. NPRM ¶ 154. But this is a dramatic understatement. Those differences make the rules such a poor fit, and such a bad idea, that they cannot be fixed by minor tweaks around the edges—just as a bad rule cannot be saved by a cumbersome waiver provision.[305]

The Commission itself has recognized that wireless broadband networks must contend with spectrum constraints, a shared "last mile" radio access network, interference sensitivity, and other concerns that make it far more challenging to provide wireless broadband than wireline service. *See* NPRM ¶¶ 157, 159. Wireless network providers also face unique technological requirements imposed by regulation, such as hearing aid compatibility and E-911 location requirements, that make provision of service a more complex endeavor. Further, as Professor Reed and Dr. Tripathi explain, wireless broadband technology and systems are still changing

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[305] *See ALLTEL Corp. v. FCC*, 838 F.2d 551, 561 (D.C. Cir. 1988)("The FCC cannot save an irrational rule by tacking on a waiver procedure. The very essence of waiver is the assumed validity of the general rule.") (internal quotation marks and citation omitted); *see also United States Telecom Ass'n v. FCC*, 359 F.3d 554, 571 (D.C. Cir. 2004) ("While a rational rule that would otherwise be impermissibly broad can be saved by 'safety valve' waiver or exception procedures, the mere existence of a safety valve does not cure an irrational rule."); *Alenco Commc'ns, Inc. v. FCC*, 201 F.3d 608, 622 (5th Cir. 2000) (the possibility of a waiver "cannot save a rule that on its own has no rational basis").

rapidly, as carriers first finish the deployment and upgrading of 3G technology and then move on to 4G and beyond.[306] Thus, even the nature of the technological challenges that wireless broadband providers will face is not yet clear—nor are there any clearly understood parameters for what type of "reasonable" network management may be necessary on maturing 3G networks or next-generation 4G networks.[307] The Commission is right to recognize the importance of wireless broadband, and the need to ensure that consumers can fully enjoy its benefits. But with the future evolution of wireless broadband still very much in flux, rules dictating *how* carriers must (or must not) provide this evolving service could lead to disaster.

1. The Shared, Spectrum-Dependent Nature of the Radio Access Network Creates Unique Challenges for Wireless Broadband Providers and a Pressing Need for Close Network Management.

Capacity and quality-of-service challenges for wireless broadband providers are particularly acute in the "last mile" radio access network, or "RAN." Even if wireless traffic is prioritized or otherwise accorded special treatment during transmission over the Internet backbone, it will still face a separate series of congestion and quality-of-service obstacles in the RAN—particularly in the "over-the-air" segment.

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306 *See* Exh. 2, Reed & Tripathi, at § 2.1.

307 *See id.* at § 4.1.

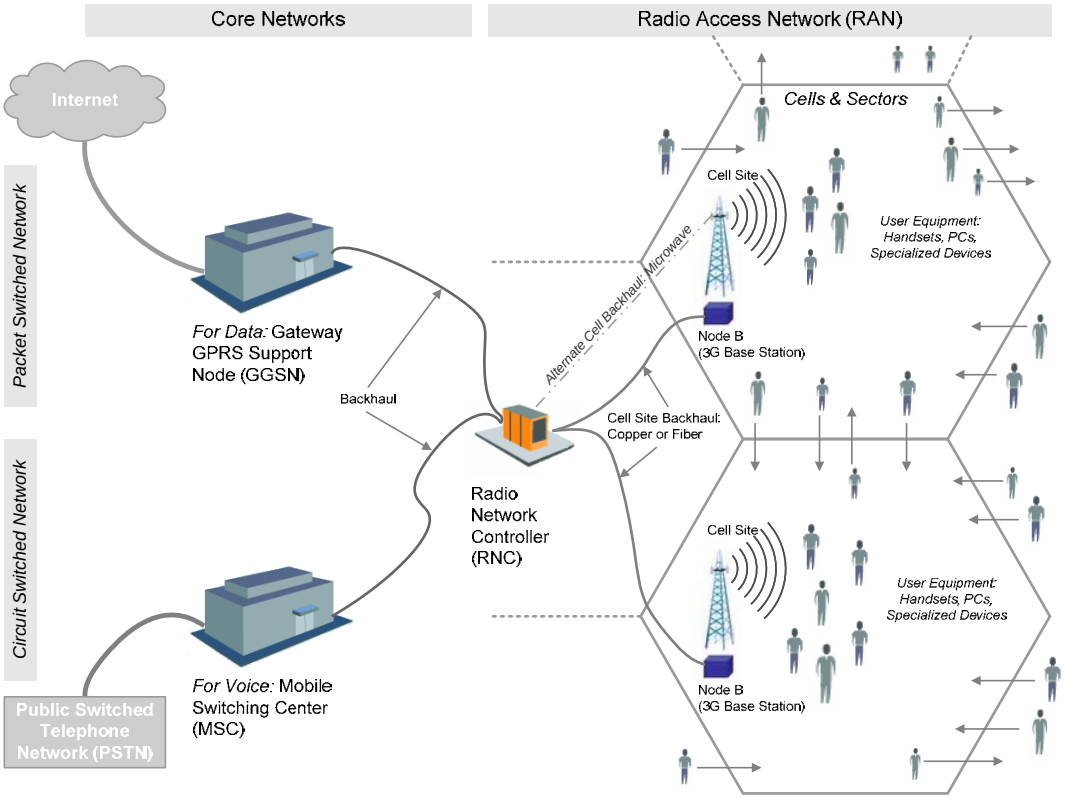

Figure 11: Approximation of the AT&T wireless 3G UMTS/HSPA network

As Professor Reed and Dr. Tripathi explain, the RAN consists of towers and cell sites and the hardware and software components that control them.[308] The RAN poses unique network management challenges. Spectrum in the RAN is shared among both users and cell sites; bandwidth can fluctuate based on interference and other issues; the number of users located in particular cells in the RAN and their dispersion within those cells at any given time is variable; and the spectrum available for use in the RAN is not infinitely (or even readily) expandable. These factors make it exceedingly difficult for carriers to ensure a constant supply of sufficient bandwidth to provide high-quality data transmission for broadband Internet access customers. Because of this, providers must have access to a range of dynamic network-management

308 *Id.* at § 2.2.

techniques to respond to or avert network failures or severe congestion—and also to ensure that customers can enjoy latency-sensitive applications even in this more challenging environment.

a. Wireless Broadband Providers Use a Shared Infrastructure to Serve a Dynamic User Base.

As the NPRM recognizes, *see, e.g.*, NPRM ¶¶ 159, 172, cell site capacity is dynamically shared so that each user can access the available bandwidth at the site. This means that one customer using a bandwidth-intensive application—a P2P file transfer application, or streaming video, for example—can degrade the quality of service experienced by other users on the cell.

At first blush, this may not seem like a challenge unique to wireless broadband, since other broadband last-mile infrastructure is likewise shared. But there are important differences. For one thing, RAN capacity (which, as we discuss below, is limited based on available spectrum), is shared among *any* subscribers (or roamers) who happen, *at any given moment*, to be in the area served by the cell site. This phenomenon can be highly variable, since users in motion are rapidly handed off from one cell to another. And as Professor Reed and Dr. Tripathi explain, a customer in motion may actually consume spectrum from several different cell sites at once, putting a major sudden strain on the network, particularly if the customer is using a bandwidth-intensive and performance-sensitive application like streaming video.[309] Thus, while a cable modem provider (for example) can build out enough capacity to serve a known and relatively stable number of users sharing the last mile in a given neighborhood, it is much more challenging for a wireless broadband provider to anticipate the maximum load of users in a given area, which may change rapidly in the course of a few hours or even minutes. Similarly rapid and unpredictable changes may occur in the geographic dispersion of users within a given cell.

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[309] *See* Exh. 2, Reed & Tripathi, at § 3.4.

For example, a cell in a less populous area—say, rural Woodstock, New York—might average only a hundred or so users at a time on a normal day, but traffic in that same neighborhood may peak suddenly to thousands or tens of thousands of users who show up to attend a concert, imposing unpredictable bandwidth demand—demand that would far exceed the cell's capacity to support data usage, in particular. Likewise, a major car accident on a sleepy road, a protest march, a labor demonstration, or a shopping surge before the holidays can dramatically change the amount of sharing in a given area—and the impact on every single user's broadband experience will be palpable. As Professor Reed and Dr. Tripathi illustrate, in such circumstances, and in the absence of close network management, even a single user of a bandwidth-intensive P2P application in a crowded cell could end up affecting dozens of other users.[310] And because users frequently (and unexpectedly) shift from one cell to another, the bandwidth-intensive user also could disrupt service for end users in a number of nearby cells.[311]

Wireless transmissions also may suffer because of, or require extra care based on, the environment through which they travel. Unlike transmissions on an insulated copper or fiber cable, transmissions via electromagnetic waves face many obstacles as they travel between cell towers. For example, they can reflect off or be blocked or attenuated by buildings and landforms. And different spectrum bands have different propagation characteristics. These features mean that, unlike wireline users, wireless consumers may experience changes in broadband speed and service quality as they move within a cell site, between cells, or between two different types of network (*e.g.*, from AT&T's 3G HSPA network to its 2G EDGE

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[310] *Id.* § 4.3 (discussing same phenomenon with respect to real-time video streaming). Because wireless voice service *is* prioritized, the P2P (or other data) application user would *not* interfere with the voice call, but would affect other data users. This illustrates again how essential network management is in a wireless environment. Without that prioritization, the P2P application could devastate voice calls as well, including emergency and other critical calls.

[311] *See id.* at § 3.4.

network).[312] Thus, active data sessions and calls must be carefully managed to sustain the level of service quality (and mobility) that customers have come to expect.

On top of this, available bandwidth can fluctuate because of interference from transmitters in the area—wireless microphones, for example, or unauthorized wireless boosters or repeaters.[313] Even a carrier's own signals can cause "multipath" interference when they reflect off buildings.[314] Indeed, the Commission has recognized that the interference created by the plethora of wireless devices now in use is one of the most significant interference challenges that has ever been faced.[315] As AT&T has demonstrated, an increase of just three decibels in interference can affect the network enough to require compensatory measures that increase network costs by *400* percent.[316]

If wireless providers were not fully empowered to manage their networks to address these performance challenges, interference with mobile broadband usage would not be the only

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312 *See id.* at § 3.1 (wireless networks have "performance-affecting differences that are due to the propagation channel as well as dynamic network management that is required to ensure adequate reliability and coverage in the face of constantly changing propagation and mobility issues").

313 *Id.*

314 *See id.* § 3.1 n.6.

315 As the Commission's Spectrum Policy Task Force concluded in 2002, "[t]he cumulative impact of the increasing volume and density of radio devices on the RF environment will challenge the Commission's current approaches to interference management." Spectrum Policy Task Force, *Report of the Interference Protection Working Group, Federal Communications Commission*, at 3 (Nov. 15, 2002), http://www.fcc.gov/sptf/files/IPWGFinalReport.pdf.

316 Comments of Cingular and BellSouth, ET Docket No. 03-237, at 8 n.23 (filed Apr. 5, 2004). *See also id.* at 17 ("[I]n modern, well engineered cellular/PCS systems, harmful interference will do more than simply disrupt a single phone conversation of a single user. Increased levels of interference will impact not only the call quality or data throughput, but can affect the entire cell and possibly even the network as a whole through a decrease in network capacity and coverage. It is well known in cellular system engineering principles that coverage, quality and capacity are inter-related and when one is affected then all are affected, thus reducing the overall performance and efficiency of the system.") (citing *WCDMA for UMS* (Harri Holma & Anti Toskala eds., 2000)).

harmful result. Mobile *voice*—including critical emergency services—would likewise suffer. That is not a concern with today's wireless technologies precisely *because* the network prioritizes voice service over data applications. In practice, to protect the quality of a voice call, the RAN will dynamically reduce throughput to devices that are engaged in data communications to ensure sufficient capacity to accommodate voice transmissions.[317] Data calls may be blocked or even dropped to allow sufficient resources for voice if the network is sufficiently congested. Providers are hard at work ensuring that such voice prioritization will still be possible in tomorrow's 4G networks, when *all* transmissions, including voice, will take the form of IP packets that appear to be "data." A rule that limited wireless carriers' flexibility to respond dynamically to the performance needs of voice packets on 4G networks, whether from a provider's own customers or from customers calling from other networks, could severely compromise the utility of wireless networks as platforms for voice calls (including emergency calls). Few results would more clearly *dis*serve the public interest.

In short, the wireless ecosystem is dynamic, intense, and complex, and wireless providers need to engage in close, ongoing network management to ensure basic day-to-day operation of the network in the face of unpredictable spectral and interference challenges.

b. Spectrum Constraints Pose Enormous Management Challenges.

Proponents of net neutrality regulation blithely insist that providers should address all network-congestion challenges simply by accelerating the expansion of bandwidth rather than relying on network-management techniques.[318] As discussed in the Engineering Background and

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[317] *See* Exh. 2, Reed & Tripathi, at § 3.3.

[318] *See, e.g.*, Ben Scott *et al*., *Why Consumers Demand Internet Freedom – Network Neutrality: Fact v. Fiction*, at 18 (May 2006), http://www.freepress.net/files/nn_fact_v_fiction_

in Section III above, that argument is meritless for any platform. But it is *especially* meritless in the wireless context, where the issue is not simply economic inefficiency, but concrete spectrum constraints that make infinite expansion of the network impossible. Spectrum "capacity is finite."[319] Wireless providers can obtain spectrum when it is auctioned (or in some cases, leased or sold in the secondary market), but unlike wireline providers, they are physically incapable of creating additional spectrum once that initial spectrum is exhausted. And notably, wireless providers start out with a handicap: Radio spectrum is capable of supporting significantly less throughput capacity than wireline infrastructure such as fiber or coaxial cable.[320]

U.S. wireless providers are the most efficient users of spectrum in the world,[321] and they continue to make extraordinary efforts to wring as much bandwidth as possible out of the limited spectrum they have been allocated.[322] But the Commission itself recognized four months ago

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final.pdf (insisting that network providers should simply "increase the bandwidth in the network to accommodate all providers on an equal basis.").

[319] *Surfing hertz*, *supra*.

[320] *See, e.g.*, Robert C. Atkinson & Ivy E. Schultz, *Broadband in America, Where It Is and Where It Is Going*, at 9 (Columbia Institute for Tele-Information, Nov. 11, 2009), http://www.broadband.gov/docs/Broadband_in_America.pdf ("*CITI Study*").

[321] *See* Ex Parte Communication of CTIA – The Wireless Association, GN Docket No. 09-51, at 16-17 (filed Sept. 29, 2009) (concluding that, with more than 660,000 subscribers served per megahertz of spectrum allocated, U.S. providers have an efficiency metric that is triple the efficiency of U.K. carriers, double the efficiency of Japanese carriers and more than six times the efficiency provided by Canadian wireless providers). *See also* Gerald Faulhaber & David J. Farber, *Innovation In The Wireless Ecosystem: A Customer-Centric Framework*, at 9 (Sept. 30, 2009) (attached to *AT&T Wireless Innovation NOI Comments*) ("[I]nnovation in the core network has made us a world leader in managing the scarce resource of spectrum and providing capacity to meet the world's most demanding customers.").

[322] AT&T alone has spent $38 billion in the last two years to upgrade its wireline and wireless networks, and spent roughly $18 billion in 2009 to, among other things, increase available bandwidth in its 3G network by deploying new cell sites, adding spectrum, and upgrading to HSPA 7.2 Mbps. *See, e.g.*, Andrew Berg, *Rinne: AT&T Ready for 4G Jump*, Wireless Week, Sept. 15, 2009, http://www.wirelessweek.com/News/2009/09/Rinne--AT-T-Ready-for-4G-Jump/; AT&T, Press Release, *AT&T to Make Faster 3G Technology Available in Six Major Cities This Year*, Sept. 9, 2009, http://www.att.com/gen/press-room?newsarticleid=

that, "even as the telecommunications industry works to improve spectral efficiency, usage of spectrum is growing at such a rate that without additional large blocks of spectrum the industry will not be able to keep up."[323] In the Chairman's own words, "the biggest threat to the future of mobile America is the looming spectrum crisis"—

> We are fast entering a world where mass-market mobile devices consume thousands of megabytes each month. So we must ask: what happens when every mobile user has an iPhone, a Palm Pre, a Blackberry Tour or whatever the next device is? What happens when we quadruple the number of subscribers with mobile broadband on their laptops or netbooks? The short answer: we will need a lot more spectrum.[324]

As the Department of Justice recently added, "there is no time to spare"—the Commission must "give priority to making more spectrum available."[325]

27068&cdvn=news&pid=4800. And CTIA reports that providers deployed over 25,000 additional cell sites between June 2008 and June 2009 alone—an increase of 11.5 percent over the prior year. *See CTIA Wireless Competition NOI Reply Comments* at 9.

[323] Public Notice, *Comment Sought on Spectrum for Broadband, NBP Public Notice No. 6*, GN Docket Nos. 09-47, 09-51, 09-137, DA 09-2100, at 4 (rel. Sept. 23, 2009) ("*NBP Public Notice No. 6*"). The Commission was referencing a statement by an Alcatel-Lucent executive, who said, "Although a lot of work is going on in my organization and in organizations [around] the globe to increase the efficient [use] of the spectrum and spectral efficiency . . . , fundamentally we're not going to be able to keep up with the growth rates that Kris [Rinne] talked about without more spectrum." Tom Anderson, Head of Architecture for Mobility, Office of CTO, Alcatel-Lucent, Remarks at the FCC Nat'l Broadband Plan Workshop, Technology/ Wireless, at 26 (Aug. 13, 2009), http://www.broadband.gov/docs/ ws_06_tech_wireless_transcript.pdf. See also Howard Buskirk, *Google Voice Probe Shows Changes Overtaking Wireless Industry, Gottlieb Says*, Commc'ns Daily, 2009 WLNR 18398530 (Sept. 16, 2009) ("Spectrum is the oxygen of the wireless world. Demand for more capacity is exploding and increased spectral efficiency can only do so much.") (*quoting* Bruce Gottlieb, Chief Counsel and Senior Legal Advisor for Chairman Genachowski).

[324] *Oct. 2009 Genachowski Remarks* at 4-5. *See also Key U.S. broadband official: More spectrum needed*, Reuters, Sept. 2, 2009, http://www.reuters.com/article/ idUSTRE5815BI20090902 (quoting Blair Levin's concession that "there is not enough" broadband spectrum available). *See also Wireless Innovation NOI* at ¶ 20 ("[A]s wireless is increasingly used as a platform for broadband communications services, the demand for spectrum bandwidth will likely continue to increase significantly, and spectrum availability may become critical to ensuring further innovation.").

[325] *DOJ Broadband NOI Ex Parte* at 22.

No one pretends that spectrum allocations can happen quickly. It takes years to bring new spectrum to market, even when there is widespread consensus on a reallocation.[326] During that time, as bandwidth consumption continues to grow, network operators will need more and more flexibility to address network congestion, security, and quality-of-service issues. The Commission should therefore not even consider strait-jacketing wireless providers with net neutrality requirements until ample new spectrum has been allocated, auctioned, and cleared for use. Indeed, as the comments of the Department of Justice and NTIA suggest, making such spectrum available may obviate the need for any regulation at all, because more spectrum will help increase broadband competition generally, thereby protecting consumer choice, and because the increased wireless capacity will "help support new applications."[327] The Commission should therefore defer even considering "neutrality" requirements for the wireless platform until it has made spectrum available and observed the impact on the marketplace once it has done so. And

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[326] For instance, an inquiry into broadband Personal Communications Services was initiated in June of 1990, but the first A and B Block licenses were not generally granted until almost 5 years later. *See* Notice of Inquiry, *Amendment of the Commission's Rules to Establish New Personal Communications Services*, 5 FCC Rcd 3995 (1990); Third Mem. Op. and Order and Further Notice of Proposed Rulemaking, *Implementation of Section 309(j) of the Communications Act – Competitive Bidding Narrowband PCS and Amendment of the Commission's Rules to Establish New Narrowband Personal Communication Services*, 10 FCC Rcd 173 (1994). The FCC proposed rules for AWS-1 in August of 2001, and the first licenses were not issued until the fourth quarter of 2006. *See* Notice of Proposed Rule Making and Order, *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems*, 16 FCC Rcd 596 (2001). In the 700 MHz band, the original rules were proposed in March, 2001, and, while some licenses were auctioned in 2002, the majority of the licenses were not auctioned until March of 2008. *See* Notice of Proposed Rule Making, *Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52- 59)*, 16 FCC Rcd 7278 (2001).

[327] *See* Exh. 1, Faulhaber & Farber, at 38 ("The market is ready to move toward higher wireless broadband speeds, but the FCC must enable this competition to happen by getting the spectrum into the market.").

at that point, it should also be able to draw conclusions from the C-Block experiment the Commission only just initiated in the *700 MHz Order*.

2. The "Reasonable Network Management" Exception, Whether Defined in Advance or Developed Through Ad Hoc, After-the-Fact Adjudication, Is Simply Unworkable for This Evolving Technological Platform.

Proponents of wireless net neutrality regulation dismiss the very real wireline/wireless differences and their undeniable implications by pointing to the NPRM's exception for "reasonable network management" and suggesting that "reasonableness" can be tailored to the wireless environment. This response is patently insufficient even as to congestion-management issues in wireline networks. It does not begin to resolve concerns about application of net neutrality rules in the wireless broadband context.

To begin with, as Professor Reed and Dr. Tripathi explain, a variety of network-management measures are a fundamental part of the day-to-day, minute-to-minute, *millisecond-by-millisecond* reality of operating a wireless network.[328] These measures are employed not in rare, emergency situations, as the NPRM seems to assume, but on a constant basis, as a core requirement of the network's operation. These include *call admission-control algorithms*, which admit or reject calls based on whether the network has sufficient resources to support it. Different rules may be used to make that determination depending on whether the call is a voice call or a data session, given the different resource requirements of these applications. Networks also employ *load-balancing algorithms*, which are designed to balance the load across multiple radio channels to improve network accessibility and overall network performance. A *handover or handoff algorithm* decides which sectors (*e.g.*, cell sites) should communicate with the user's device as the user moves from one sector to another.

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[328] *See* Exh. 2, Reed & Tripathi, at §§ 3.1, 4.1.

A *scheduling algorithm* also plays a critical and complex role in network resource management, especially in 3G and 4G wireless networks. Its main function is to allocate uplink and downlink resources to users in a cell to optimize network performance and user experience. The scheduling algorithm controls the throughput for a particular application, taking into account the available bandwidth, the amount of data, feedback from the user's device (*e.g.*, signal strength and signal to interference+noise ratio (SINR)), the user's bandwidth usage, and network-resource needs for *other* users and applications. The scheduling algorithm also addresses the need to resend certain packets if there was an error in the initial transmission (*i.e.* "redundancy") to improve the user's experience. Finally, a *power-control algorithm* influences the transmit power so that interference is minimized in the user's cell and in neighboring cells, and network and device performances are maximized.[329]

As noted, scheduling and call admission are an indispensable part of wireless network management. They illustrate that the net neutrality rules proposed in the NPRM were not written for, and are not suited for, the wireless broadband environment. In addition, wireless broadband providers occasionally must limit—and in some cases even preclude—certain applications that raise substantial network-management issues. For example, while AT&T permits tethering (*i.e.*, using a broadband-enabled handset to provide Internet connectivity for another device, such as a laptop computer), it does so only pursuant to a specific tethering plan, which allows it to at least make statistical predictions about the amount of tethering—and thus the increased bandwidth demand—that it can expect. And as we have previously explained to the Commission, AT&T has had to require that certain streaming video applications be reengineered for use over AT&T's

[329] *See id.* at § 3.3 (discussing these algorithms), *see also id.* at Figure 3.1.

3G network—and in some cases has had to limit them to the Wi-Fi network—because the bandwidth demands were too overwhelming.[330]

The NPRM can be read to suggest that all of these management techniques may be protected as "reasonable" network management. But as Professor Reed and Dr. Tripathi explain, the "reasonable network management" exception is particularly unworkable in the wireless context because there is no defined or static understanding of what the exception might permit.[331] They provide an instructive example: a wireless caller who uses a video application on a mobile basis and therefore consumes bandwidth from three different cell sites. This single customer might be consuming enough bandwidth to support 32 separate voice calls at *each* of the base stations. Without prioritization of voice, this one caller could block up to 96 voice calls; even with prioritization, that caller could block a variety of other non-prioritized data users. As Professor Reed and Dr. Tripathi ask: "What is 'reasonable' in this situation? Is it 'reasonable management' to maintain the video link since it was established before the [other] call requests? Is it 'reasonable management' to deny service to 32 or more users for the sake of one user?"[332] They explain:

> The point is that radio resource management and traffic prioritization is a complex issue, one that must be driven by unreliable propagation and limited bandwidth. The best design does the best job possible to satisfy aggregate customer

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330 For instance, as AT&T's letter explained, a proposed iPhone application from MobiTV and CBS was designed to stream live video and audio from the NCAA men's basketball tournament over Wi-Fi connections and AT&T's 3G network. After discussions between AT&T and Apple about potential network congestion problems, Apple worked with the developers to modify the application to deliver live video over Wi-Fi, while delivering live audio, still photos, and scores over AT&T's 3G network. *See* Letter from James W. Cicconi, AT&T, to Ruth Milkman, Chief, Wireless Telecommc'ns Bureau, RM-11361 & RM-11497, at 5 (filed Aug. 21, 2009), http://wireless.fcc.gov/releases/8212009_ATT_Response_FCC_iPhone_Letter.pdf.

331 *See* Exh. 2, Reed & Tripathi, at § 4.1.

332 *Id.* at § 3.2.

> satisfaction in the particular circumstances, which will differ from network to network, at different locations within networks, and with time.[333]

The new and dynamic nature of wireless broadband technologies would pose yet another challenge to wireless providers if the Commission adopts broad prohibitions tempered by an unpredictable "reasonable network management" exception. Providers launched 3G networks only in the last few years. The next few years will see the deployment of LTE 4G services in mobile wireless and wide-scale use of fixed wireless services as well. While the NPRM speculates that technological and congestion challenges might subside as networks make the transition from 3G to 4G because of greater spectral efficiency, *see* NPRM ¶ 172, precisely the opposite is true. The need for flexibility—and protection from regulatory second-guessing—will actually *increase* with the transition to 4G platforms. 4G users will have innovative general-purpose and special-purpose devices, some of which they will independently bring to the network. Developers will offer up new applications, content, and services for these new wireless devices and networks; the new networks will have new vulnerabilities; and the full management capabilities and limitations will not be known until the networks have been deployed, operated, and tested over time. In other words, the problems that may develop are unknown, the types of network management that may be needed are unknown, and the types of efficient network management that are even technologically *possible* are still largely unexplored.[334]

The challenges presented by new technology are readily illustrated by the issues that providers have faced in transitioning from 2G to 3G. For example, when AT&T converted its

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333 *Id.*

334 Even as providers transition to 3G and 4G, they will continue to support multiple generations of pre-existing technologies, at least for the foreseeable future. Accommodating several generations of technology at once creates additional network management challenges, and makes it difficult for providers to achieve optimal spectral efficiency.

850 MHz spectrum to 3G, it immediately experienced a 30 percent increase in traffic because the superior propagation characteristics of the repurposed spectrum expanded in-building 3G coverage, which led to an immediate increase in usage.[335] Similarly, this past November, hackers found a way to exploit "jailbroken" iPhones (iPhones that have been modified to permit the use of unauthorized software from sources other than Apple's application store).[336] By infecting these unprotected iPhones with a worm, hackers turned them into "bots" under their control, resulting in serious risk to AT&T's network.[337] Such phones may exhibit huge and harmful data usage rates without the awareness of their owners, and the problem is particularly difficult for users to address because—unlike infected PCs—these devices do not typically have the processing power or battery life to continuously run anti-virus programs to guard against such threats. Thus, progress and innovation presents many unpredictable new challenges. It also changes traffic patterns. As AT&T recently reported, social networking has become a huge, unanticipated driver of data traffic, as have mobile gaming applications available over the iPhone—developments that can affect when and where congestion occurs and what type of traffic management will be required to ensure sufficient capacity for all users.[338]

In short, if the Commission subjected wireless providers to a general ban on traffic differentiation, subject only to a safe harbor for certain pre-approved network-management

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335 Sue Morele, *AT&T chief addresses network problems in NYC, San Fran*, Fierce Wireless, Dec. 9. 2009, http://www.fiercewireless.com/story/ts-de-la-vega-addresses-network-problems-nyc-san-francisco/2009-12-09.

336 *See* Byron Acohido, *Worm turns iPhones into bots*, USA Today Technology Live Blog, Nov. 23, 2009, http://content.usatoday.com/communities/technologylive/post/2009/11/620002733/1.

337 *See id.*; *AT&T Broadband NOI Comments* at 146-147 (discussing botnets).

338 Lynnette Luna, *AT&T CTO defends mobile broadband network*, Fierce Broadband Wireless, Oct. 11, 2009, http://www.fiercebroadbandwireless.com/story/t-cto-defends-mobile-broadband-network/2009-10-11.

techniques, those techniques would quickly become obsolete, and providers would be hamstrung when presented with new challenges that require prompt adaptation. In an evolving platform, network management is both an ongoing experiment and a learning process. As Professor Reed and Dr. Tripathi note, "[m]uch research and real world, 'on-the-fly' experimentation will be required to learn how to structure, operate and manage networks to meet quality of service needs in these new systems."[339] At first, providers may feel compelled to restrict certain bandwidth-intensive applications because they present challenges that have not yet been considered, and because swift action is required in the short term to protect the network. In other words, it often will be impossible, despite what some net neutrality advocates suggest, to base network management decisions for an evolving platform on "objective evidence."[340] There often will be no such evidence that dictates how the network should respond to a new challenge, or that even identifies, in advance, what those challenges are.[341]

Thus, a wireless provider might decide, initially, that the only way it can protect shared bandwidth is to disable certain applications. But with time, it might be able to work with the application developer to create a more subtle network-management solution that accommodates the application. That is precisely what has begun to happen with P2P traffic, as network and application providers work together to reach compromise solutions that support more efficient use of network capacity. The fact that such evolution is possible, over time, does not mean that

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339 Exh. 2, Reed & Tripathi, at § 1.

340 *See* KC Claffy, UCSD/CAIDA, Presentation at FCC Open Internet Technical Advisory Workshop, at slides 18-20 (Dec. 8, 2009), http://openinternet.gov/workshops/docs/ws_tech_advisory_process/claffy%20fcc_bp_dec2009.pdf.

341 *See* Exh. 1, Faulhaber & Farber, at 31 ("Can we even imagine a standard of 'reasonableness' in this highly dynamic environment, in which different carriers use different protocols with different devices. . . . Whatever network management rules are applied, they cannot help but interfere significantly with the complex 'dance' needed to operate a modern wireless system.").

the decision to block the application in the first instance is or was "unreasonable." Indeed, what is "reasonable" will change based on the context, the technology, and different providers' capabilities.[342] Wireless broadband network management is, and will remain for the indefinite future, an ongoing learning process, with no uniform set of solutions.

Indeed, the best solutions to dynamic performance, security, and other issues may vary from network to network, from place to place, from time to time, and from service offering to service offering. For example, as noted above, in the type of mediated environment AT&T offers its customers, Code Signing is a critical management tool that allows AT&T to give its customers certain assurances about the security and privacy impact of applications that they download and use over their devices on AT&T's network. But in other, less mediated service models, this management tool is *not* employed. In the more freewheeling Android Market environment, for example, there is no equivalent to the Code Signing process, though there are procedures for after-the-fact remediation if and when a problem arises. In other words, there is no "benchmark" or consensus in this industry about what the "reasonable network management" process is or should be to protect even privacy and security. Yet both providers and customers would be poorly served if the Commission cast any doubt on the reasonableness of Code Signing or other techniques that allow a carrier to offer its customers a "safe zone." More generally, the

[342] For example, as discussed above, Japanese network providers worked together to develop accepted standards for packet shaping of P2P and other traffic that was imposing network costs and limiting service for other users. *See Japanese Shaping Guidelines* at 1 ("Packet shaping has been deemed reasonable to a certain extent from the viewpoint of stable network operation[.]"). In that context, this has been deemed to be an entirely "reasonable" form of network management, though surely net neutrality advocates here would contend otherwise.

Commission would disserve the public interest if it chilled *any* reasonable efforts to advance network security, in any of the service models available over the wireless Internet.[343]

3. The Rules Would Also Preclude the Natural Evolution of Wireless Networks and Foreclose Important Innovations.

Because wireless broadband platforms are evolving, premature and vague or overly restrictive Commission rules would not "preserve" some imagined "status quo" of wireless Internet access. Instead, those rules would harm the design and capabilities of *new* network platforms that have not yet been fully developed.

For example, LTE standards are being designed to permit certain network-prioritization and management capabilities over the RAN. The LTE Evolved Packet System (EPS) would allow packets to be routed from the packet data network (*i.e.*, the backbone) to the end user's equipment with various degrees of QoS that determine the priority of the relevant packets (including guarantees concerning minimum bit rate, maximum packet delay, and packet error

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[343] Finally, in the wireless context, there are entirely unique network management issues related to commercial Wi-Fi services offered in public locations. Though fixed (and unlicensed), Wi-Fi shares some of the network-management challenges discussed above, including spectral interference issues and the unpredictability of spikes in the number of users at any given site. But Wi-Fi is unique because multiple parties are involved in "providing" the service to end users: the Wi-Fi network operator (*e.g.*, AT&T) and the premises owner (Starbucks, Walmart, Marriott, Barnes & Noble, etc.). This has implications for how the Wi-Fi bandwidth must be "managed" and what can be accessed over it. In many Wi-Fi arrangements, for example, the premises owner arranges to reserve some of the Wi-Fi (or related backhaul) bandwidth for its own purposes (*e.g.*, credit card transactions, inventory systems). Similarly, for example, a hotel premises owner may direct that a higher percentage of the bandwidth be preserved for paying guests or conference room users versus hotel lobby visitors. A coffee shop might set parameters for what may be accessed over the Wi-Fi connection to establish, for example, a family-friendly environment (*e.g.*, no pornography, even if legal). These various network management, throttling, QoS, filtering and "blocking" measures are undertaken, of course, at the request of the premises owner as "customer," but the end user is *also* the customer. The NPRM does not acknowledge, let alone address, any of these issues. In all events, however, the unregulated proliferation of Wi-Fi services is delivering tremendous benefits to consumers and, just as with mobile wireless broadband Internet access, the Commission should not impose onerous net neutrality regulations on Wi-Fi providers.

rate) and the extent to which they are subject to preemption. However, an application's ability to benefit from the EPS QoS treatment may depend on whether that application uses a congestion control algorithm, and thus may require coordination between the application developer and the network provider.

Another development on the horizon is the deployment of IMS (IP Multimedia Subsystem) for use over the wireless broadband platform. As Professor Reed and Dr. Tripathi explain, the 3GPP (the 3G Partnership Project) standards body is in the process of specifying an IMS architecture that would facilitate the provision of IP-based offerings across all networks—wireless and wireline. The IMS system can recognize an application and signal the basic data rate and other requirements needed to support that service. Providers then employ a Policy & Charging Control system to enforce those requirements and any other QoS requirements necessitated in the particular carrier's network environment. The deployment of IMS would facilitate the provision of dynamic QoS within wireless broadband systems and standardized QoS *between* individual wireless provider systems or between wireless and wireline systems. Examples of QoS parameters that could be standardized include target delay, error rate, and type of service (guaranteed bit rate vs. non-guaranteed bit rate). Within individual systems, carriers could then use PCC to specify maximum data rates as well for different applications depending on network needs. But, as Professor Reed and Dr. Tripathi explain, "[s]tandard-setting and collaboration" for this architecture "are still in their early stages, and fully integrating IMS into wireless networks will take several years."[344]

Accordingly, there is little or no real-world experience with the new QoS capabilities that may be deployed in the wireless context, or with the network impact of employing such

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[344] *See* Exh. 2, Reed & Tripathi, at § 3.1.

capabilities. It would be unconscionable if the Commission were to kill these forward-looking technological developments before they have been fully deployed. But that would be a likely (even if unintended) consequence if, in the name of a so-called "nondiscrimination" ideal, the Commission prohibited broadband providers and application providers from entering into commercial arrangements to support these potential prioritization capabilities.

For example, one of the most important applications of QoS over the LTE network would be the ability to prioritize voice traffic to ensure that it is transmitted with a high assurance of quality even when competing for network resources with bandwidth-intensive applications. LTE networks will transmit *all* packets in IP, so without some means to identify and prioritize voice packets over those from other types of applications, the quality of voice service on mobile networks could suffer significantly. EPS QoS is therefore critical to ensure that customers will still enjoy high-quality voice service in addition to any other services they use or receive. But it may not be possible for wireless providers to develop this capability without partnering with other companies. Over the long term, the most efficient means for LTE providers to exchange traffic will likely be through "QoS peering" mechanisms that prioritize VoIP packets *between* different providers' networks.[345] This would require different LTE (and possibly also wireline) network operators to come together to agree on a common methodology for prioritizing voice traffic on an end-to-end basis. But such an arrangement could never be implemented if the resulting quality of service for the participating company were deemed to be unlawful "discrimination" against the packets of non-participating companies. And if there were a remunerative settlement process involved, the arrangement might also be deemed to violate the

[345] *See* Engineering Background § D.3, *supra* (discussing QoS peering). The alternative would be to convert the VoIP signal back to a legacy circuit-switched voice format for intercarrier interconnection, which is obviously not the solution the Commission should prefer over the long term.

NPRM's line-of-business restriction on paid QoS arrangements. In other words, the Commission's rules could unwittingly cut off the very solutions needed to transform the nation's wireless networks and create huge efficiencies for wireless voice communications. That result would be indefensible.

Chilling the development of wireless QoS capabilities could also interfere with the Administration's environmental and energy policies. For example, some observers have noted that guaranteed low-latency wireless transmission will be critical for the success of the Smart Grid: a "completely modernized electricity delivery system which monitors, protects and optimizes the operation of its interconnected elements from end to end."[346] Such a system will depend, in part, on the quality of wireless M2M transmissions from various sensors that communicate over the Internet. *Some* of these, like residential smart meters, will likely require no or relatively little special handling and can tolerate substantial latency.[347] But many sensors deployed within the electric grid itself, such as system fault monitors, "require continuous, high rate monitoring on the order of millisecond sampling resulting in throughputs of up to 5 Mb/sec and latencies in the tens of ms to allow for rapid detection of faults, with 5-6 cycles (80-100 ms) being the accepted fault detection times."[348] Similarly, "distribution optimization systems" need response times that are "less than a second."[349] As Garry Brown, Chairman of the New York Public Service Commission remarked last year, "Smart Grid networks need to be built for

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[346] V.K. Sood *et al.*, *Developing a Communication Infrastructure for the Smart Grid*, at 1 (undated), http://www.wireie.com/pdfs/Developing_a_Communication_Infrastructure_for_the_Smart_Grid.pdf ("*Developing a Communications Infrastructure*").

[347] *See, e.g.*, Exh. 2, Reed & Tripathi, at § 4.4.

[348] *Developing a Communications Infrastructure*, at 4.

[349] Garry Brown, Chairman, N.Y. Pub. Serv. Comm'n, *Panel Presentation: Grand Challenges of the Smart Grid General Electric*, Smart Grid Summit, Niskayuna, NY, at 2-3 (July 14, 2009), http://www.dps.state.ny.us/gbpresentations/gbGEPanelPresentationRemarks071409.pdf.

systems that may be deployed that are the least latency-tolerant, so that the system does not need to be upgraded to accommodate these in the future."[350] In other words, underlying transmission networks that support Smart Grid deployments should have the ability to guarantee low-latency transmissions—which means providers must be free to develop and deploy QoS technologies and services.

QoS arrangements in the LTE context (*i.e.*, EPS, IMS) could also allow carriers to offer other important services. For example, wireless providers could reliably supply "Data Priority Service" to the National Communications System to ensure prioritized transmission for government and other resource-critical data in times of emergency and network failure. Such capabilities might also allow the development of all sorts of high-quality gaming and real-time videoconferencing applications optimized for wireless broadband networks. Those applications are highly sensitive to latency and jitter, and QoS arrangements will thus be necessary to meet consumer needs and also to allow operators to ensure that such applications use bandwidth efficiently and avoid interference with higher-priority services. Finally, a Policy Enforcement Function in the EPS might be used to protect and preserve network resources by dynamically (and temporarily) throttling the data session of bandwidth-heavy users that are violating their service agreements or that may otherwise cause harm to the network or other users.[351]

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[350] *Id.* at 3; *see also* NARUC, *The Smart Grid: Frequently Asked Questions for State Commissions*, at 5 (May 2009), http://www.naruc.org/Publications/NARUC%20Smart%20Grid%20Factsheet%205_09.pdf; *Itron Perspective: How AMI Enables the Smart Grid* (Sept. 2008), http://www.greentechmedia.com/content/images/sponsored/resource_center/Itron-How-AMI-Enables-the-Smart-Grid.pdf ("The ability of portions of the distribution system to analyze operational parameters in real-time, and proactively take actions (switch re-configurations, etc . . .) to isolate faults and recover undamaged sections has the potential to greatly reduce average outage times. These types of applications require very low latency data and communications capabilities[.]").

[351] The NPRM specifically suggests (and we agree) that this is a form of reasonable network management. It notes that in an area experiencing congestion, "it may be reasonable for an

It is not clear that any of these potential technological developments would survive the application of the Commission's proposed rules to wireless broadband services. And that ambiguity, standing alone, could chill necessary and valuable network developments, even beyond those outlined here. To be sure, the Commission could address particular issues by exempting arrangements for voice or other specified traffic—but these are just a few examples of the risk of severe, unintended consequences from the proposed rules. There are countless others, many of which have not yet been identified, and which will become apparent only as the network and the services it makes possible continue to evolve. These are uncharted waters. It is unclear why the Commission believes it would advance the public interest for it to wade in, when the marketplace is functioning as well as it is, and when a misstep—which is a certainty here—could thwart the broadband goals of this Administration and this country.

C. Application of Net Neutrality Rules to Wireless Services Cannot Be Aligned with Distinct and Valuable Features of the Wireless Broadband Marketplace.

Because they were devised with wired broadband services in mind, the proposed rules are badly misaligned with the way the wireless broadband marketplace works. As a result, the rules could be read to imperil a range of existing, highly productive arrangements in the wireless broadband marketplace. Specifically, the NPRM provides no guidance on whether the no-blocking and nondiscrimination rules (among others) would preclude the many vertical relationships that flourish today among providers of wireless broadband networks, equipment, operating systems, and content and applications.

For wired broadband services, these different market segments tend to work independently from one another. Computer manufacturers and wireline broadband providers

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Internet service provider to temporarily limit the bandwidth available to individual users . . . who are using a substantially disproportionate amount of bandwidth until the period of congestion has passed." NPRM ¶ 137.

typically do not, and need not, confer and collaborate about new desktop models. Wireline broadband providers are not typically involved in dictating which web browsers their customers will use. IP-based application providers typically need little or no information from either computer manufacturers *or* broadband providers to introduce their offerings to end users. For end users, the resulting wireline "do-it-yourself" model has always been the *status quo*.

But the wireless broadband marketplace is quite different. In the wireless ecosystem, technical considerations make it far more efficient for providers to collaborate across these different market segments. As Professor Michael Katz has explained, "there is a need for coordination among component suppliers to ensure that the different complementary components of the system can, in fact, work together."[352] Carriers and manufacturers tend to collaborate in developing network standards, and then collaborate further to develop devices optimized to take advantage of the carrier's specific network features and upgrades. Close integration of the network and devices operating on the network can improve spectral efficiency and give the customer a superior experience.[353] Wireless providers may also arrange for the inclusion of certain technology on wireless devices. AT&T, for example, has arranged for Vlingo to include AT&T's speech-recognition technology in various speech-driving applications on a variety of smartphones, which will allow customers to use voice commands to send text messages and emails and to engage in various other tasks on their handsets.[354]

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[352] Michael L. Katz, *Public Policy Principles For Promoting Efficient Wireless Innovation And Investment*, ¶ 43 (Sept. 30, 2009), attached to *AT&T Wireless Innovation NOI Comments*.

[353] *See, e.g.*, Exh. 2, Reed & Tripathi, at § 1 ("The additional challenges posed by the wireless channel also necessitate close integration among network equipment, devices, and applications.").

[354] *See, e.g.*, Marin Perez, *AT&T, Vlingo Team For Voice Apps*, InformationWeek, Sept. 16, 2009, http://www.informationweek.com/news/personal_tech/smartphones/showArticle.jhtml?articleID=220000724. As explained by Vlingo's CEO, "Natural and unconstrained voice recognition user interfaces represent the next major breakthrough for the mobile industry as well

Collaboration takes other forms as well. AT&T has teamed up with Qualcomm and its MediaFLO subsidiary as well as handset manufacturers to facilitate the provision of certain video services to AT&T customers over AT&T-partnered handsets using broadcast spectrum rather than AT&T's 3G network.[355] More generally, manufacturers and network providers often arrange for certain applications to be offered "out of the box" as preloaded options on handsets. Network providers also offer their own application stores that feature third-party applications that have been tested and optimized for the provider's network; these sometimes involve fee-splitting arrangements between the application provider and the wireless carrier. As discussed further below, *see* Discussion § VI, *infra*, AT&T offers developers extensive information and support in order to facilitate the development of applications that can be used seamlessly on the AT&T network and over AT&T-partnered devices.

Network providers may also partner directly with third parties to offer integrated wireless device and service offerings. These range from the Amazon Kindle, which involves commercial

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as many other industries" and "[b]ased on our evaluation, we have seen significant accuracy and performance gains with Watson compared to other core speech technologies that will allow us to create a dramatically improved user experience." *Id. See also* FierceWireless, *AT&T and Vlingo to Bring Innovative Speech Recognition to Mobile Devices Worldwide*, Sept. 16, 2009, http://www.fiercewireless.com/press-releases/t-and-vlingo-bring-innovative-speech-recognition-mobile-devices-worldwide ("A leader in speech technology for decades, AT&T is a pioneer in voice-enabled services and has developed hundreds of voice applications deployed throughout our advanced telecommunications network. AT&T's Watson speech recognition technology includes the latest advances and innovations in the field of speech and language processing with a rich set of tools for custom development and adaptation of acoustic and language models. In addition to Watson, AT&T's suite of speech technologies also includes AT&T Natural Voices, an award-winning text-to-speech product that converts text into voice for a wide variety of applications.").

[355] Katie Fehrenbacher, *Mobilize: Qualcomm's Future in a Post-3G World*, Gigacom, Sept. 10, 2009, http://gigaom.com/2009/09/10/mobilize-the-future-of-qualcomm-in-a-post-3g-world/ ("Qualcomm has built a broadcast network (sending data from one to many, instead of one to one) based on its MediaFLO wireless technology, and it currently is working with carriers to offer mobile TV broadcast services. If there's anything that can overload 3G networks, it's cell phone users watching hours and hours of mobile video.").

arrangements between Amazon and its wireless broadband partners (Sprint and AT&T), to a wireless automobile diagnostic repair and roadside assistance service that AT&T offers together with an automobile company, to 3G-enabled GPS products that AT&T is offering to small businesses in partnership with a GPS device maker, to various wireless healthcare, Smart Grid, and other machine-to-machine devices and applications. The economic and technical viability of many of these new offerings may turn on novel business arrangements, new quality-of-service measures, and use or functionality limits—and on specialized financial terms and contractual conditions.

Any of these arrangements could be viewed as "discriminatory" in some respect or otherwise inconsistent with the proposed rules. Indeed, the NPRM itself seems to suggest that an application that is preloaded or downloadable onto a handset may be receiving "preferential" treatment over applications that a customer must reach on her own through a web browser.[356] Some might argue that the proposed rules prohibit a provider from offering any device that is not built on an entirely open, unmediated platform, since devices like Apple's iPhone that impose security and other restrictions on acceptable applications could be viewed by some as "blocking" or "discriminating against" rejected applications.

The ban on discrimination might even be read by some to prohibit a wireless broadband provider from reaching a commercial arrangement to provide connectivity to the next Amazon Kindle, since Amazon (the application provider) pays for broadband service that allows its customers to reach its preferred content and provides only limited access to other Internet sites. For the same reason, some might argue that AT&T is prohibited from offering the service

[356] NPRM ¶ 174 ("Does the quality of a user's experience with an application vary depending on whether the application is downloaded onto the user's device or whether it is accessed in the cloud using the device's Web browser?").

described above with respect to the Garmin GPS device. That broadband service is available only in connection with the specific GPS device in question and allows customers to reach only one pre-approved online search engine and certain pre-approved websites. Similarly, the prioritization required to ensure the effectiveness of certain Smart Grid sensors might be viewed as unlawfully "discriminatory." Or zealous advocates might insist that AT&T may not continue the work it is doing with partners to develop specialized IP-based wireless devices—like real-time gaming handsets and media players—since those will stand a chance of succeeding only if the applications can be sent and received with guaranteed quality of service.

In other respects, too, the rules proposed in the NPRM could threaten the type of collaboration that makes the wireless marketplace such a rich ecosystem. For example, would a provider be barred from working with a manufacturer and content and application providers to produce a child-focused device that blocks adult content, offers access to a limited universe of content sources, uses a mediated search function, and precludes non-approved e-commerce transactions? This type of offering would clearly serve the public interest—yet it would arguably violate the proposed net neutrality rules.

Of course, it would make no sense to prohibit any of these pro-consumer arrangements. The Commission should not prefer, and certainly should not mandate, barriers to collaboration among network providers, equipment manufacturers, and application providers. Doing so would likely produce technological chaos and economic inefficiencies. It would also interfere with "the emergence of niche and value-added service markets [such as] mobile healthcare, mobile e-Commerce, and location-aware services" that MIT economist William Lehr recently lauded as

the great promise of the wireless broadband medium,[357] and that the Obama Administration and Congress have identified as being among the nation's broadband priorities.[358] And, as discussed above, it would homogenize and depress what is now a vibrant marketplace, substituting a government-dictated service model for innovative differentiation and technological and operational experimentation. That would be a most unfortunate legacy for this Commission to leave for the next generation.

V. "REASONABLE NETWORK MANAGEMENT" SHOULD BE DEFINED BROADLY.

As the NPRM correctly recognizes, *see* NPRM ¶ 134, providers in the dynamic broadband marketplace must have flexibility to address evolving network-management challenges. Although, as just discussed, that is most obviously true for wireless broadband providers, it is also true for all broadband Internet access providers. First, network operators must stay one step ahead of ever-escalating traffic volumes and changing usage patterns. Just this year, for example, streaming video has begun to outstrip P2P as the most significant source of bandwidth consumption—with commensurate changes in peak usage times and congestion points.[359] And streaming video itself is now increasing at a rate of over 25 percent year after year, which will put new strains on the network.[360]

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[357] William Lehr, *Mobile Broadband and Implications for Broadband Competition and Adoption*, Broadband for America Whitepaper, at 1 (Nov. 19, 2009), http://www.broadbandforamerica.com/sites/default/themes/broadband/images/mail/LehrMobileandBroadbandCompetition.pdf.

[358] *See* Recovery Act, § 6001.

[359] *See* Rich Karpinski, *Real-time video surpasses P2P, creating new broadband "prime-time,"* TelephonyOnline, Oct. 26, 2009, http://telephonyonline.com/residential_services/news/real-time-video-p2p-1026/.

[360] *Viewing of Online Video Streams Up 26% in October*, NielsenWire, Nov. 19, 2009, http://blog.nielsen.com/nielsenwire/online_mobile/viewing-of-online-video-streams-up-26-in-october/.

As AT&T explained at the December 8, 2009, technical workshop, network management challenges go well beyond bandwidth and usage issues.[361] For example, network engineers must figure out how to route the highest volumes of traffic—and the most sensitive or urgent traffic—when confronted with hardware and network failures, including cable cuts, natural disasters, and other disruptions. There are on average more than 49,000 such failures *each month* over AT&T's U-verse, wireless, and DSL networks combined. Software bugs—more than 200 every month—can likewise disrupt service. Network engineers also must be able to ensure traffic flow during *planned* maintenance and network changes, which occur some 1.4 million times a month.

Perhaps the most pressing network management challenge of all is posed by ongoing cybersecurity threats. As the Government Accounting Office reported in November, "The growing connectivity between information systems, the Internet, and other infrastructures creates opportunities for attackers to disrupt telecommunications, electrical power, and other critical services," and "cyber exploitation activity has grown more sophisticated, more targeted, and more serious" in recent years.[362] GAO reported a *206 percent* increase in reported cybersecurity incidents between 2006 and 2008.[363] AT&T's network engineers report almost 39 million hacker indicators *each month*. The severity of these threats has led the GAO and the White House to stress the importance of private-sector engagement and investment in cybersecurity efforts—not just so that the private sector can respond to specific law enforcement requests, but

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[361] Presentation of Bill Smith, President, Local Network Operations, AT&T, at 10 (Dec. 8, 2009), http://openinternet.gov/workshops/docs/ws_tech_advisory_process/Bill%20Smith%20FCC%20Panel%20Discussion%20SLIDES%20120709.pdf.

[362] Statement of Gregory C. Wilshusen, Dir., GAO Info. Sec. Issues, & David A. Powner, Dir., Information Tech. Mgmt., *Cybersecurity: Continued Efforts Are Needed to Protect Information Systems from Evolving Threats*, at 5 (Nov. 19, 2009), http://www.gao.gov/new.items/d10230t.pdf.

[363] *Id.* at 5-6.

so that it can also continue protecting the nation's critical communications infrastructure on a daily basis.[364]

The importance of such private-sector engagement is starkly illustrated by the recent news reports about massive cyberattacks that apparently originated in China. These attacks exploited security flaws in e-mail attachments to "sneak into the networks of major financial, defense and technology companies and research institutions in the United States[.]"[365] The attackers targeted Google and 33 other companies and may have stolen significant intellectual property.[366] The attack leapfrogged more traditional cybersecurity attacks, which are "[u]sually . . . a group using one type of malicious code per target," and instead used "multiple types against multiple targets—but all in the same attack campaign. That's a marked leap in coordination."[367] To safeguard the network from such sophisticated attacks, providers need equally sophisticated tools and the flexibility to deploy them without fear of regulatory reprisal.

It is thus essential that the Commission maintain "reasonable network management" as a highly flexible exception to its Internet *principles*, and this exception would be even more important were the Commission to harden those principles into *rules*. The Commission should

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364 *See, e.g.*, Statement of David Powner, Dir., GAO Info. Tech. Mgmt. Issues, *National Cybersecurity Strategy; Key Improvements Are Needed to Strengthen the Nation's Posture*, at 10 (Mar. 10, 2009), http://www.gao.gov/new.items/d09432t.pdf; The White House Cyberspace Policy Review, *Assuring a Trusted and Resilient Information and Communications Infrastructure*, at iv (May 29, 2009), http://www.whitehouse.gov/assets/documents/Cyberspace_Policy_Review_final.pdf.

365 Ariana Eunjung Cha & Ellen Nakashima, *Google China Cyberattack Part of Vast Espionage Campaign, Experts Say*, The Washington Post, Jan. 14, 2010, http://www.washingtonpost.com/wp-dyn/content/article/2010/01/13/AR2010011300359.html.

366 Thomas Claburn, *Chinese Spy Agency Behind Google Cyber Attack, Report Claims*, Information Week, Jan. 14, 2010, http://www.informationweek.com/news/security/attacks/showArticle.jhtml?articleID=222300848.

367 Cha & Nakashima, *Vast Espionage Campaign*, *supra* (citing Eli Jellenc, head of international cyber-intelligence for VeriSign's iDefense Labs).

also clarify that this exception gives providers substantial latitude to safeguard their networks and protect consumers. Even if accompanied by amorphous "exceptions," broad prohibitions that can trigger significant penalties will obviously chill investment and innovation. Providers will be less likely to invest in cutting-edge network-management technology if they fear that an unpredictable regulator could latter strip that technology of its value by deeming its use "unreasonable." And such regulatory unpredictability could induce providers to respond with undue conservatism to new threats or challenges. As the Commission recognized in the NPRM, limiting providers' network-management incentives could therefore harm all users, eroding the very goals the principles are designed to protect. *See* NPRM ¶ 133.[368]

At the same time, the Commission should avoid any *narrow* or *limiting* definition of reasonable network management—and should thus reject proposals to define acceptable network practices in advance, whether at a broad or granular level. This is a dynamic industry with challenges and threats that continuously change.[369] No provider should be forced to consider, before acting, whether its solution to a crisis situation falls into some preapproved category of acceptable measures. Nor would any list of acceptable measures even keep pace with technology and fast-evolving network challenges.

For all these reasons, the NPRM is right to reject the *Comcast* "strict scrutiny" standard. NPRM ¶ 137. Cybersecurity concerns vividly illustrate the danger of that approach. No security technique is perfect, and some may have incidental effects on legitimate traffic—for example, a provider may temporarily block given ports to thwart denial-of-service attacks. If the Commission were to hamstring network operators with a "strict scrutiny" standard, it would

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368 *See* Exh. 1, Faulhaber & Farber, at 24-26.

369 *See id.* at 24 ("every congestion incident may pose new threats that have not been observed before").

succeed only in increasing the response time of network operators in taking action—particularly in the face of new, poorly-understood threats—and compromising the effectiveness of their response when it comes. Such regulation-induced conservatism would be a boon to hackers, terrorists, hostile militaries, and other bad actors, but disastrous for the public at large.

Instead, the Commission should clarify that network management is "reasonable" if it is rationally related to furthering a legitimate interest. This approach will not entirely eliminate the uncertainty that providers face, but it will at least allow some room to operate. The Commission also should make clear that it will consider the technology of the network and the services supported when assessing the reasonableness of a particular network-management practice.[370] And in all events, the Commission should create a *rebuttable presumption* that a network-management practice intended to address a legitimate provider interest—including, but not limited to, safeguarding consumers or networks and mitigating congestion—is reasonable, unless and until a complainant demonstrates otherwise.

Finally, as discussed in Section III, "reasonable network management" should also be construed to permit prioritization of packets associated with performance-sensitive applications over those associated with non-performance-sensitive applications. The NPRM appears to recognize this, suggesting that it would be reasonable to "implement[] a network management practice of prioritizing classes of latency-sensitive traffic over classes of latency-insensitive traffic (such as prioritizing all VoIP, gaming and streaming media traffic)." NPRM ¶ 137. The Commission should adopt that conclusion and clarify that such measures are not only benign and "nondiscriminatory," but necessary to the health of the Internet—as the IETF has long

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[370] *See* NPRM ¶ 137 ("What constitutes congestion, and what measures are reasonable to address it, may vary depending on the technology platform for a particular broadband Internet access service.").

recognized by building this functionality into the very structure of the Internet Protocol. *See* Engineering Background § D.2, *supra*.

VI. ANY TRANSPARENCY REQUIREMENT SHOULD BE TARGETED TO END-USER CUSTOMERS AND SHOULD APPLY ONLY TO CUSTOMER-USAGE-RELATED LIMITATIONS.

AT&T supports a principle favoring increased transparency about *customer-usage limitations* as *consumers* will experience them. As AT&T explained in its *Truth in Billing NOI* comments, transparent disclosures of the terms and conditions applicable to a customer's service are critical to create the conditions for genuine competition because they enable consumers to make educated choices based on real differences among service providers.[371] In this sense, transparency is already implicitly required by the fourth principle of the *Internet Policy Statement* (or the reworded version the NPRM proposes), which is designed to ensure consumers' continued access to meaningful competition. Under this principle, a broadband network operator can and should tell consumers, at an appropriate level of detail, about any material restrictions or limitations on their broadband Internet service so that they can make informed choices about which providers and service plans best meet their needs.

The Commission need not, however, dictate the precise categories of information that providers disclose, nor need it impose "standard labeling formats" or other detailed requirements. *See* NPRM ¶¶ 125, 126.[372] As AT&T further explained in the *Truth in Billing* context, existing

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[371] Comments of AT&T Inc., CG Docket No. 09-158, at 2, 34 (filed Oct. 13, 2009) ("*AT&T Truth-in-Billing Comments*") (citing Gerald R. Faulhaber & David J. Farber, *Innovation in the Wireless Ecosystem: A Customer-Centric Framework*, at 28 (submitted by AT&T in GN Docket Nos. 09-157, 09-51 as Attachment to Comments of AT&T Inc., GN Docket Nos. 09-157, 09-51 (filed Sept. 30, 2009)) ("[I]n order for competitive markets to fully realize their potential to empower customers, those customers need to have the information they need to make informed purchase decisions.")

[372] *See* Exh. 1, Faulhaber & Farber, at 15 ("cooperative solutions to disclosure issues are a preferred alternative").

competition is already effectively driving providers to adopt more and more transparent disclosure practices because such disclosures are essential for any provider to distinguish itself to a consumer base that is highly focused on provider practices.[373] Thus, in the absence of any Commission requirement, AT&T already clearly informs its customers in its Terms of Service about the *maximum* speed capabilities of its wireline broadband services, and the *minimum* speed floor of each tier of service.[374] AT&T also seeks to clearly explain limitations on amounts or types of service usage.[375] For instance, in its Quick Start Guide for wireless data devices such as Netbooks and aircards, AT&T describes the expected speeds for its networks, including the 3G BroadbandConnect network upload and download speeds, and the expected EDGE network speeds.[376] The AT&T Communication Manager allows customers to confirm which networks their wireless devices are operating on, as well as their signal strength.[377] This same trend is illustrated by HughesNet, which explains to its customers what its maximum and "typical" broadband speeds are, and which has disseminated a "fair access policy" that sets certain usage limits and then uses plain, comprehensive language to explain to consumers how those limits could affect the end-user experience.[378]

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373 *AT&T Truth-in-Billing Comments* at 4-31.

374 *See* AT&T High Speed Internet Terms of Service/att.net Terms of Use (attached to letter from James W. Cicconi, AT&T, to Chairman Kevin J. Martin and the Commissioners, FCC, WC Docket No. 07-52, at 2 (filed Sept. 11, 2008)).

375 *See, e.g.*, AT&T, Wireless Service Agreement, http://www.wireless.att.com/learn/articles-resources/wireless-terms.jsp (go to "Wireless Data Service Terms and Conditions").

376 AT&T Communication Manager software is available free from AT&T's website. *See* AT&T Communication Manager, http://www.wireless.att.com/businesscenter/solutions/wireless-laptop/software.jsp.

377 *Id.*

378 *See* HughesNet, Frequently asked Questions – Connection Speeds, http://www2.hughesnet.com/faqs/internet-connection-speeds.htm; HughesNet, Frequently Asked Questions – Fair Access Policy, http://www2.hughesnet.com/faqs/fair-access-policy.htm.

In short, providers on their own are doing precisely what the Commission might hope to achieve by regulatory fiat—they are disclosing relevant information to their consumers in clear and comprehensive terms. But they retain the flexibility to adjust those disclosures to include the information most relevant to their particular service—a flexibility they would lose if they had to march through required regulatory categories that may be irrelevant to a given service. Furthermore, providers now have an incentive to compete on the basis of the clarity and comprehensiveness of their disclosures. The Commission can thus best promote consumer interests and encourage the positive trends that are already developing in the industry by adopting a transparency *principle* while avoiding detailed *rules* unless evidence of a problem develops.

In addition, the Commission should not require or even encourage providers to disclose the *technical details* of their network-management techniques to the public. As the NPRM makes clear, the goal here is to encourage disclosures "that would effectuate the Internet principles" and, in particular, that "*consumers would consider relevant* in choosing a service provider or a particular service option." NPRM ¶¶ 121, 123 (emphasis added). Disclosure of actual network-management techniques would not serve those purposes. Consumers need to know what they can do with the service they purchase, how much of it they can use, what applications they can run, and what quality they can expect. To make informed choices on those issues, consumers do *not* need to know the technical details of how the provider manages its network—just as a consumer of cable television service does not need a tutorial from her local cable provider about the techniques the company uses to prevent unauthorized receipt of premium cable channels.

For the same reasons, the NPRM's proposal to require detailed network-management disclosures to *content and application providers* would be needless and counterproductive. Developers have no more need than consumers for detailed network-management information.[379] To be sure, content and application providers need to understand what consumers are permitted to do with their broadband services—*e.g.*, what types of usage limitations they face—so they can optimize their services. But the disclosures broadband providers offer to consumers will achieve that. The Commission's suggestion that there is some other category of "additional information [that] should be made available" to developers is simply mystifying, as is its reference to the 25-year-old CEI rules applied to the legacy telecommunications network. There are millions upon millions of Internet applications and services available today precisely because—as the NPRM recognizes virtually everywhere else—the Internet permits developers to introduce applications at the edge of the network *without* needing to coordinate with the providers who control the physical transmission layer.[380]

As discussed in Section IV above, developers seeking to optimize broadband applications for *wireless* use must contend with interference and propagation issues, a variety of transmission technologies, and several different wireless device operating systems and platforms. But these

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[379] Notably, the European Commission's "transparency" principle in its recently enacted Telecoms Reform law focuses *solely* on consumers:

> Better consumer information: Under the new telecoms rules, consumers will receive better information ensuring they understand what services they subscribe to and, in particular, what they can or cannot do with those communications services. Consumer contracts must specify, among other things, information on the minimum service quality levels, as well as on compensation and refunds if these levels are not met, subscriber's options to be listed in telephone directories and clear information on the qualifying criteria for promotional offers.

Europa, Press Release, *Agreement on EU Telecoms*, *supra.*

[380] Of course, application and content providers can always seek additional disclosure obligations and SLAs when they *do* contract directly with a broadband provider to obtain service (*e.g.*, transit or peering or AT&T's MIS, for example).

wireless-specific challenges also present no basis for regulatory intervention. Every major wireless broadband provider offers developers easily accessible instructions and tools for developing compatible applications—and has done so without Commission intervention. AT&T, for example, offers its devCentral site, which includes "deep technical resources to create successful devices and applications optimized for the AT&T network," along with a support feature to help answer "common and uncommon" questions and a forum for developers to exchange ideas.[381] The site offers information about emerging technology, currently certified solutions, and all platforms and operating systems in use on the network.[382] AT&T supports a community of more than 20,000 application developers via the devCentral portal; its Media Mall 2.0 offers more than 90,000 content options from more than 115 different providers; and customers can download an unlimited number of additional applications over the Internet.[383] Wireless manufacturers offer developers their own resources and development platforms. Indeed, there are over 100,000 applications developed for the iPhone alone.[384]

AT&T also just announced major new initiatives to support application development across all its platforms. It will be the first provider to offer technical support for developers via live chat, and it will significantly expand technical support for developers. AT&T will soon deploy the AT&T Sandbox, a virtual network environment for developers to test and evaluate applications, and the AT&T Developer Dashboard, a tool that will let developers track the status of their app once submitted to AT&T, support digital signing of business agreements with AT&T, allow developers to set prices for their apps, and provide performance metrics and

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381 AT&T, devCentral, http://developer.att.com/developer/index.jsp?page=why.

382 *Id.*

383 *See, e.g.*, AT&T, Media Kit: Choice, http://www.att.com/gen/press-room?pid=2575.

384 *See* Apple, Press Release, *Apple Announces Over 100,000 Apps Now Available on the App Store*, Nov. 4, 2009, http://www.apple.com/pr/library/2009/11/04appstore.html.

customer-satisfaction feedback.[385] Further, AT&T just announced a major new initiative with Qualcomm to standardize apps development by adopting BREW Mobile Platform for Quick Messaging Devices—texting-centric devices with full QWERTY keyboards.[386] AT&T has already launched a new software-development kit to help developers jumpstart the design of applications for this new platform.[387]

In sum, there is no "additional information" that developers need to ensure that they can "innovate and provide their products and services effectively to users." NPRM ¶ 127. Indeed, in stark contrast to the legacy telephone companies, broadband network providers are frequently at an information disadvantage. They must contend with any applications that their end users access over the network, and they must scramble to understand new applications that may be damaging the network, that consume large and unanticipated amounts of bandwidth, or that otherwise pose network-management or consumer privacy challenges.

Compelled disclosure of the technical details of network-management techniques would also be as harmful as it is needless because it could serve only one conceivable purpose: to facilitate network manipulation by third parties.[388] There is no surer way to compromise the

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385 *See* AT&T, Press Release, *AT&T Launches Major Initiative to Bring "Apps to All,"* Jan. 6, 2010, http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=30353.

386 *See id.*

387 *See* AT&T, Software Development Kit, http://www.att.com/sdk/.

388 The information is not necessary, as the NPRM seems to suggest, to ensure that consumer "watch dogs" can detect blocking or other practices. *See* NPRM ¶ 124. The few isolated instances of such conduct were detected through straightforward performance analysis techniques, *without* the Commission's imposition of disclosure requirements. In the Comcast case, for example, an Associated Press journalist and analysts from the Electronic Frontier Foundation ("EFF") *independently* ran such tests and made similar observations about Comcast's TCP reset techniques. And EFF's own website gives the consuming public step-by-step instructions on how to download and use Wireshark, a "network analyzer" program designed to detect this and similar network practices. *See* Electronic Frontier Foundation, *Packet Forgery by ISPs: A Report on the Comcast Affair* at 2 (Nov. 28, 2007), http://www.eff.org/files/eff_

integrity of a network than by broadcasting the technical details of how that network will be managed. A recent article coauthored by Sharon Gillete (now Chief of the Wireline Competition Bureau) and Jon Peha (now Chief Technologist) ticks through a variety of techniques that can be used to undermine network-management practices.[389] That article illustrates very effectively how compelled disclosure of specific techniques could threaten network management and security.[390] Indeed, as discussed below, even net neutrality advocate Google recognizes that opening up its own network algorithms could "allow people to 'game' our algorithms to manipulate search and ads quality rankings, reducing our quality for everyone."[391] To be sure, Google's lack of transparency affects its *customers* and thus *should* be addressed. But the point here is simply that even net neutrality advocates recognize that revealing too much management information can create grave service vulnerabilities.

On top of all these concerns, it would also be impracticable for network providers to make constant updates about the technical details of their network-management practices. Such practices can change on a monthly, weekly, or even an hourly basis as the Internet ecosystem evolves and new congestion challenges and security threats emerge. As discussed, this flux is especially pronounced on wireless networks, where the platforms themselves are still developing

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comcast_report2.pdf ("The Associated Press (AP) was apparently conducting similar experiments [to EFF's], and they subsequently brought the story to widespread public attention."); Seth Schoen, *Detecting Packet Injection: A Guide to Observing Packet Spoofing by ISPs* at 1 (Nov. 28, 2007), http://www.eff.org/files/packet_injection.pdf.

389 *See* William Lehr *et al.*, *Scenarios for the Network Neutrality Arms Race*, 1 Int'l J. of Commc'n 607 (2007), http://ijoc.org/ojs/index.php/ijoc/article/viewFile/164/89.

390 For example, if, as the Commission has suggested, QoS may be provided to an entire class of applications (*i.e.*, all VoIP traffic), and application-agnostic throttling may be reasonable in areas and periods of congestion, *see* NPRM ¶ 137, network operators should not be required to disclose information that could enable an application provider to subvert such measures.

391 Jonathan Rosenberg, *The meaning of open*, Google Public Policy Blog, Dec. 21, 2009, http://googlepublicpolicy.blogspot.com/2009/12/meaning-of-open.html.

and network management is especially dynamic. And network management information is sometimes *competitively* sensitive as well. A provider's ability to offer customers a highly secure and well-functioning network is a marketplace advantage, and providers should not be forced to disclose the often proprietary techniques they use to accomplish this. Disclosure would also create tension with providers' efforts to guard against cybersecurity threats both on their own and as partners with the U.S. government. Network engineers would face the impossible challenge of having to decide each time they employ a new management technique whether its disclosure would, or would not, create critical infrastructure vulnerabilities.[392]

Finally, the Commission should make clear that the principle of transparency extends beyond broadband providers.[393] Application and content providers should similarly be expected to disclose practices that may affect a consumer's use of his or her Internet access service. For example, the provider of a bandwidth-intensive application that will degrade any other services running simultaneously, or that may use up a significant percentage of customer's allotted bandwidth usage, should have to disclose these facts, which can affect the consumer's enjoyment of the "protections specified" in the NPRM as much as any broadband provider's network-management measures. *See* NPRM, Appendix A § 8.15. Similarly, despite Google's protests, a search provider functions as a significant Internet gatekeeper if its search algorithms block or downgrade certain content, and it should accordingly be required to make transparent disclosures to its consumers about its services. Surely there is *some* level of disclosure that Google can make about its approach to providing search results that informs consumers of their rights and reasonable expectations, without divulging the technological details of its service. Otherwise, as

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392 *See* Exh. 2, Reed & Tripathi, at § 4.5.

393 *See* Exh. 1, Faulhaber & Farber, at 1 ("We strongly support *customer-focused* transparency by *all* Internet firms, not just broadband ISPs") (emphasis added).

the NPRM explains, "[i]n the absence of disclosure . . . we have no way of knowing the full extent of these practices. Nor do users." NPRM ¶ 124.

VII. ANY RULES ADOPTED IN THIS PROCEEDING MUST BE APPLIED EVEN-HANDEDLY TO ALL INTERNET-BASED INFORMATION SERVICE PROVIDERS WITH MARKET POWER AND A GATEKEEPING ROLE.

AT&T supports the existing principles in the *Internet Policy Statement*, which are serving consumers well in their present form. There is no need to expand or codify those principles. If the Commission nevertheless does so, it should apply any such rules evenhandedly, not just to broadband Internet access service providers, but to any providers that (1) offer information services provided via broadband Internet access (*i.e.*, application and content providers), (2) have *market power*, and (3) serve a *"gatekeeper" role* that significantly influences how consumers experience the Internet. The NPRM gives short shrift to this notion, insisting that "the question of Internet openness at the Commission has traditionally focused on providers of broadband Internet access services." NPRM ¶ 101. But as Commissioner Copps rightly points out, the Commission "need[s] to recognize that the gatekeepers of today may not be the gatekeepers of tomorrow. Our job is not so much to mediate among giants as it is to protect consumers." *Id.*, Separate Statement of Commissioner Copps at 95.

If the Commission is convinced that there is some compelling need to "protect consumers" from "giants" who may stand as a barrier to the free and open Internet, it need not wait to find out who "tomorrow's" gatekeepers are. They exist today, and already have both the "technological capability to exercise control" over the Internet and "a financial incentive to do so"—the two ingredients that Commissioner Copps counts as creating "risk to our interconnected and independent Internet [that] is too great to take."[394] Beyond this, some of these gatekeepers

[394] *Id.* at 94. *See generally AT&T 2007 Net Neutrality Comments* at 85-91; Comments of AT&T, WC Docket No. 07-52, at 34-40 (filed Feb. 13, 2008); Letter from Robert W. Quinn, Jr.,

(unlike broadband Internet access providers) actually exercise substantial market power today, which makes their incentive and ability to exercise control over the Internet a significant public interest concern.

In particular, as emphasized by increasing numbers of Internet stakeholders and analysts, the Commission cannot responsibly address Internet "neutrality" without considering the significant role that search engines play in affecting consumers' access to online content, applications, and services—and online content, application and service providers' access to consumers. Or, in the words of a recent op-ed in the *New York Times*: "The F.C.C. needs to look beyond network neutrality and include 'search neutrality'" at the top of its regulatory agenda.[395] This view is increasingly shared by academics,[396] public interest organizations like "Searchneutrality.org,"[397] companies like Foundem and others that have seen their businesses

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AT&T to Sharon Gillett, Chief, Wireline Competition Bureau, FCC, WC Docket Nos. 07-52, 07-135 (filed Sept. 25, 2009) ("*Quinn/Gillett Letter*").

[395] Adam Raff, *Search, but You May Not Find*, N.Y. Times, Dec. 28, 2009, http://www.nytimes.com/2009/12/28/opinion/28raff.html.

[396] *See, e.g.*, Andrew Odlyzko, *Network Neutrality, Search Neutrality, and the Never-ending Conflict between Efficiency and Fairness in Markets*, 8 Review of Network Economics 40, 41 (Jan. 2009), http://www.dtc.umn.edu/~odlyzko/doc/net.neutrality.pdf (discussing likelihood that search neutrality is the problem looming behind net neutrality); Steven Weber, *It sounds like a great idea, but….*, Berkeley Blog, Nov. 4, 2009, http://blogs.berkeley.edu/2009/11/04/it-sounds-like-a-great-idea-but/ ("But if someone asked me in a very practical not theoretical sense, right now, today, where do I think the most troubling potential concentrations of market power are located, I'm pretty sure I wouldn't say Comcast, Verizon, ATT, and other network providers. I think I'd worry more [about] a different part of the broadband value chain—in particular the search function, where one company has a lot more market power on the face of it, than any one company has in the network per se. Why, then, aren't we talking about the government mandating 'search neutrality'? Why doesn't Google then have to treat all search results equally?").

[397] *See* Search Neutrality, http://www.searchneutrality.org.

plummet when "penalized" by powerful search engines,[398] and even grass-roots political groups who fear the growing oversight search engines may have over political speech.[399]

The growing interest in this issue reflects increasing discomfort with the substantial influence search engines wield over access to the Internet. As Professor Frank Pasquale testified before Congress in 2008, "search engines now constitute the dominant platform through which content producers and audiences can reach each other."[400] Accordingly, "[c]entralized control or manipulation by search engines may stifle innovation by firms relegated to obscurity. . . . Entrenched and well-established entities are more likely to have the resources necessary to induce search engines to manipulate results, and thus preserve their market dominance."[401] In contrast, "[n]ew entrants and smaller competitors may find themselves excluded or unable to reach public consciousness."[402]

In the words of the recent *New York Times* op-ed, when a search engine uses its algorithms to make competitors "disappear" or privilege itself or its business partners "through preferential placement," "incumbents are toppled, new entrants are suppressed and innovation is

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398 *See Foundem's Google Story*, Oct. 14, 2009, http://www.searchneutrality.org/foundem-google-story.

399 *See* Thomas Lowenhaupt, *Search Neutrality*, Connecting.nyc Inc., Dec. 29, 2009, http://www.coactivate.org/projects/campaign-for.nyc/blog/2009/12/29/search-neurality.

400 Frank Pasquale, *Internet Nondiscrimination Principles for Competition Policy Online*, Testimony before the Task Force on Competition Policy &Antitrust Laws of the House Comm. On the Judiciary, at 2 (July 15, 2008), http://judiciary.house.gov/hearings/pdf/ Pasquale080715.pdf.

401 *Id.* at 3.

402 *Id. See also* Nathan Cochrane, *Warning On Search Engines: No Competition Breeds Bias*, The Age, Oct. 22 2002, http://www.searchengines.com.au/search-engines-articles/2002/10/ 22/warning-on-search-engines-no-competition-breeds-bias/ ("[S]earch-engine companies . . . act as intermediaries between information sources and information seekers. Too few intermediaries spell trouble.").

imperiled."[403] In other words, search engines can and do affect the free flow of information on the Internet more than any broadband Internet access provider. Search engines have been described as "the Internet's gatekeepers, and the crucial role they play in directing users to Web sites means they are now as essential a component of its infrastructure as the physical network itself." [404] And more than any physical network provider, search engines pose concerns that the NPRM identifies as a potential basis for government intervention: They "determine the information . . . that customers access online"[405] through algorithms that highlight some information, favor certain websites, and even omit some sites altogether. As a result, they can "deter[] market entry in areas that would benefit consumers and damage[e] potential entrants."[406]

Just as search engines dominate the selection of winners and losers on the Internet, *one* search engine in particular—Google's—dominates the search engine market. Google's share of that market hovers around 71 percent, where it has been for many years.[407] A recent study notes

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403 Raff, *Search but You May Not Find*, *supra.*

404 *Id.*

405 Gregory Smyth, *The Importance of Search Engines*, InetAsia, http://www.inetasia.com/NewsandEvents/importance-of-search-engine.html (undated); *see also* Filippo Menczer *et al.*, *Googlearchy or Googlocracy?*, IEEE Spectrum, Feb. 2006, http://spectrum.ieee.org/telecom/internet/googlearchy-or-googlocracy ("The issue of bias resonates in the public debate on our growing dependence on search engines and on their social impact as gatekeepers of information. Is an information monopoly developing the same way as the software monopoly of the recent past? Is Google the next Microsoft? If search engines are the lens through which we see the world, transparency is a major concern, and any bias gets in the way. Our worries are heightened because search engines are secretive about their algorithms and, thus, their biases are subtle to detect.").

406 Dr. Eric Clemens, *What an Antitrust Case Against Google Might Look Like*, TechCrunch, Mar. 2009, http://www.techcrunch.com/2009/03/01/what-an-antitrust-case-against-google-might-look-like/. *See also* NPRM ¶ 8 (voicing concern that Internet access providers may discriminate against or favor certain traffic in ways that "negatively affect consumers, as well as innovators trying to develop" their own applications or content").

407 *See* Experian Hitwise, Press Release, *Google Receives 71 Percent of Searches in September 2009*, Oct. 6, 2009, http://www.hitwise.com/us/press-center/press-releases/google-searches-sept-09/; *Bing and Microsoft Gain, Yahoo! Loses Market Share*, Los Angeles SEO

that Microsoft and Yahoo!'s "combined search share still lags Google by a wide margin,"[408] and Google continues to *take* share from Yahoo! and Microsoft's Bing, despite their efforts to build a better product or form strategic alliances.[409] Google maintains that search competition is just "one click away."[410] But the fact that consumers theoretically *may* click through to an alternative search provider is meaningless when Google's market share demonstrates, year after year, that most do *not.* The search market is so concentrated that some have deemed it "a natural monopoly."[411]

Google maintains its entrenched monopoly position for several reasons. First, it has amassed a fiber-optic transmission network "so massive that several service provider specialists believe it could end up with one of the world's largest core transport networks, effectively building its own private Internet" and "controlling distribution of much of the world's Internet

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News, Nov. 24, 2009, http://losangelesseonews.com/bing-microsoft-gain-yahoo-loses-market-share/052. Indeed, one analyst opined that the HHI of the Internet search market is higher than the broadband industry's HHI would be even if there were only one telco and one cable company *nationwide*. *See* Scott Cleland, *Dismantling Google's reasons why NN should not apply to them*, Precursor Blog, May 16, 2007, http://www.precursorblog.com/node/398.

408 *See* comScore, Press Release, *comScore Study Highlights Challenges and Opportunities for Microsoft-Yahoo! Search Partnership*, Aug. 14, 2009, http://www.comscore.com/Press_Events/Press_Releases/2009/8/comScore_Study_Highlights_Challenges_and_Opportunities_for_Microsoft-Yahoo!_Search_Partnership.

409 *See, e.g.*, Jon C. Ogg, *Google Recaptures Lost Search Share Dominance*, 24/7 Wall St., Dec. 9, 2009, http://247wallst.com/2009/12/09/google-recaptures-lost-search-share-dominance-goog-yhoo-msft-iaci/; *Microsoft, Yahoo Announce Search Deal*, MSNBC, July 29, 2009, http://www.msnbc.msn.com/id/32193887/ns/business-us_business/.

410 *See* Tom Krazit, *Google Polishes Competition Charm Offensive*, CNET News, June 10, 2009, http://news.cnet.com/8301-1023_3-10262213-93.html ("Another point made by Google is that competitive search providers on the Internet 'are just a click away,' a phrase that has been repeated ad nauseum by Google executives since its goodwill tour began in May.").

411 James B. Stewart, *Google Is Best-Positioned to Dominate Online Ads*, SmartMoney.com, May 22, 2007, http://www.smartmoney.com/investing/stocks/google-is-best-positioned-to-dominate-online-ads-21301/ ("[S]urely the jury is now in on the fundamental question about Google's search business: It is a natural monopoly.").

traffic."[412] Second, Google's control over search is enhanced by its control over *search advertising*, which has been described (as noted above) as "the lifeblood of the digital economy: it helps support the content and services we all enjoy for free online today, including much of our news, search, email, video and social networks."[413] The Department of Justice has observed that Google is "by far the largest provider" [414] of search advertising, as well as search syndication, on the Internet.

Third, Google helps maintain its dominance in part by remaining decidedly non-transparent about how it affects consumers' experience. In its own words (as discussed above), "opening up the code [to our search and ads products] would not contribute to these goals [of Internet openness] and would actually hurt users. . . . Not to mention the fact that opening up these systems would allow people to 'game' our algorithms to manipulate search and ads quality rankings, reducing our quality for everyone."[415] Thus, by Google's own design, consumers have no basis to make any kind of informed choice when selecting their search provider, and may simply continue using Google based on habit or its preeminence in the search and online advertising markets.

Dominance in Internet search and search advertising combined with non-transparency can lead to "insidious" effects on consumers' experience of the Internet, as even Google's

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412 R. Scott Raynovich, *Google's Own Private Internet*, Light Reading, Sept. 20, 2005, http://www.lightreading.com/document.asp?doc_id=80968.

413 *Making Ads More Interesting*, *supra.*

414 *See* U.S. Department of Justice, Press Release, *Yahoo! and Google Inc. Abandon Their Advertising Agreement*, Nov. 5, 2008, http://www.justice.gov/atr/public/press_releases/2008/239167.htm ("The Department's investigation revealed that Internet search advertising and Internet search syndication are each relevant antitrust markets and that Google is by far the largest provider of such services, with shares of more than 70 percent in both markets.").

415 *See* Rosenberg, *The meaning of open*, *supra*.

founders have recognized.[416] Three years ago, observers already were asking whether, in the absence of "search neutrality" requirements, anything "would prevent [Google] from corrupting search results for its own benefit? . . . With an entire Web-universe structured to rely on a limited number of search engines, when does corruption sneak into the equation, and what do you do about it?"[417] In the intervening years, it has become clear that this concern goes beyond mere speculation: Google's algorithms unquestionably *do* favor some companies or sites, and the purpose of that favoritism appears in many cases to be Google's own (decidedly non-*neutral*) self-interest.

For example, Google has repeatedly abused its dominant gatekeeper position to choke off speech over the Internet and favor the political messages it supports over those of its opponents. According to one press account, "Google's top Washington lobbyist disclosed [in 2006] that the company had configured its search engine to return paid links that support Google's position on net neutrality after the entry of certain key words."[418] In late 2007, Google cited vague trademark concerns in support of its decision to block political advertisements by Senator Susan Collins that criticized the political advocacy group MoveOn.org, which supports

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416 *See* Sergey Brin & Lawrence Page, *The Anatomy of a Large-Scale Hypertextual Web Search Engine* at Appendix A (1998) (published at Seventh International World-Wide Web Conference, April 14-18, 1998, Brisbane, Australia), http://ilpubs.stanford.edu:8090/361/ "[A]dvertising funded search engines will be inherently biased towards the advertisers and away from the needs of consumers. Since it is very difficult even for experts to evaluate search engines, search engine bias is particularly insidious.").

417 John C. Dvorak, *A Threat to Web Search*, PCMag.com, Jan. 10, 2007, http://www.pcmag.com/article2/0,2817,2081168,00.asp.

418 *See 'Fiery Missives' and Other Emotional Tactics Driving Net Neutrality Debate*, Digital Straight Talk, June 14, 2006, http://www.digitalstraighttalk.com/2006/06/fiery_missives_and_other_emoti_1.shtml.

Google's net neutrality aims.[419] In 2008, Google blocked *Inner City Press*, which has been a vocal critic of the United Nations Development Programme (UNDP), from appearing in the Google News website shortly after Google entered into a partnership with the UNDP.[420] Only after other U.N. watchdog organizations objected did Google relent. Recently, a grass-roots political group in New York expressed concern that, without "search transparency," Google might "custom code[]" an opposition candidate's message or information "to screen land on page 13."[421] In other words, Google's dominance in this sphere directly threatens the NPRM's overarching objective to "preserve the Internet as a general purpose technology that supports wide open speech [and that can meet] community information needs." NPRM ¶ 76 (internal citations omitted).

Google has also blocked consumers' access to applications that interfered with its *financial* interests—highlighting the NPRM's concern that an Internet gatekeeper's "interests in maximizing profits may not always align with the [Internet openness] interests of end users and the public." NPRM ¶ 7. In 2009, for example, Google admitted to blocking a service that allowed customers to use the Google Talk chat program for free text-messaging. Google objected to the service because it allowed the application provider to impose costs on Google

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419 *See* Robert Cox, *Google bans anti-MoveOn.org ads*, Examiner.com, Oct. 11, 2007, http://www.examiner.com/printa-983100~Google_bans_anti-MoveOn.org_ads.html. Google reportedly claimed that it removed the advertisements because, by mentioning "MoveOn.org" by name, "they violated Google's trademark policy," even though "Google routinely permits the unauthorized use of company names such as Exxon, Wal-Mart, Cargill and Microsoft in advocacy ads.").

420 Michael Y. Park, *Journalist Who Exposes U.N. Corruption Disappears From Google*, Fox News, Feb. 18, 2008, http://www.foxnews.com/story/0,2933,331106,00.html.

421 Connecting.nyc Inc., *Search Neutrality*, *supra*.

without compensation.[422] Separately, government investigations in Europe suggest that Google is abusing its monopoly search position to exclude certain media sites unless they agree to its financial terms.[423] In a pending federal court proceeding, Google is accused of effectively choking off access to SourceTool.com, a competing search engine designed for businesses, by entering into exclusionary agreements and charging unreasonable prices for the company to be included in Google search results.[424] As noted above, Foundem, a vertical search company, complained that Google penalized Foundem in search results and Adwords, severely injuring Foundem's business. And in a powerful testament to the role that Google's search portal plays in picking Internet winners and losers, Foundem claims that when Google finally "de-penalized" Foundem in December of last year, Foundem's search hits increased by *10,000% overnight*.[425]

These concerns have intensified as Google acquires and partners with more and more content and application providers. Google admits that it gives priority ranking to its own content and applications, when, in its view, this "benefits users."[426] It also appears that Google's search

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422 Owen Fletcher, *Google Blocks Popular iPhone SMS App*, IDG News Service, Mar. 10, 2009, http://www.networkworld.com/news/2009/031109-google-blocks-popular-iphone-sms.html.

423 Philip Willan, *Italy opens antitrust investigation into Google News*, The Industry Standard, Aug. 27, 2009, http://www.thestandard.com/news/2009/08/27/italy-opens-antitrust-investigation-google-news. *See also Italy antitrust agency extends probe to Google Inc*, Reuters, Sept. 4, 2009, http://www.reuters.com/article/idUSL469043220090904 (reporting extension of investigation to Google Italy's U.S. parent company, Google, Inc.).

424 *See TradeComet.com LLC v. Google Inc.*, No. 09-01400 (S.D.N.Y. filed Feb. 17, 2009).

425 *See Foundem's Google Story*, *supra* (advocating "search neutrality" as a result of the "search penalty" Google allegedly imposed on Foundem's competing search engine.); *see also Foundem's Penalty Update*, Search Neutrality, Dec. 30, 2009, http://www.searchneutrality.org/foundem-google-story/foundem-google-penalty-update; Raff, *Search, but You May Not Find*, *supra.*

426 James Temple, *Google – from friend to foe?*, SF Gate, Dec. 7, 2009, http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2009/12/07/MNMF1AUFBM.DTL ("'Our goal as a search engine is to give users the info they're seeking as quickly as possible,' Google spokesman Adam

algorithm prefers "respected" or "authoritative" sites by granting them extra "rating points"—a measure that obviously biases how users access content and suppresses less established voices that seek to reach new generation of consumers.[427] For example, Google appears to have destroyed StudioBriefing.net, the blog version of the "longest-running entertainment-industry news publication on the Web,"[428] when it reportedly excluded it from Google search results. As *Studio Briefing* informed its readers, "without StudioBriefing.net being included in Google search results we cannot draw sufficient readers to remain viable. We are therefore left with no alternative but to shut down."[429]

Google also has used its control over powerful content sites such as YouTube (which Google owns) to affect which complementary products can be used even to *access* the Internet. As noted, YouTube has reportedly blocked access to its content by any video device unless the device manufacturer agrees to contract terms that require it to spend "seven figures" on advertising with YouTube.[430] And, as the provider of Google Voice, Google has unilaterally decided to block certain calls to rural areas to avoid paying high access fees.[431]

Kovacevich said. 'Sometimes that means embedding our own content . . . at the top of the page when it benefits users.'") (ellipsis in original).

427 *See* Scott Cleland, *Google's Search Engine Discriminates in Favor of New York Times—per Ken Auletta, "Googled" author*, The Precursor Blog, Nov. 11, 2009, http://www.precursorblog.com/content/googles-search-engine-discriminates-favor-new-york-times-ken-auletta-googled-author.

428 Lew Irwin, *We Have Been De-googled!*, IMDB, Nov. 28, 2009, http://www.imdb.com/news/ni1239504/.

429 *Id.*

430 Eliot Van Buskirk, *YouTube Blocks Non-Partner Device Syabas as Allegations Fly*, Epicenter, Nov. 20, 2009, http://www.wired.com/epicenter/2009/11/youtube-blocks-non-partner-device-syabas-as-allegations-fly/.

431 *Quinn/Gillett Letter*; *see also* Howard Berkes, *Google's Voice is Silent in Some Rural Areas*, Nat'l Public Radio, Nov. 2, 2009, http://www.npr.org/templates/story/story.php?storyId=114341718 ("Google Voice simply cut the cord to the area codes and local phone

In short, as Tim Wu—the Chairman of the Board of Free Press—has explained, preemptive regulations may be needed to "block discrimination by powerful applications providers."[432] AT&T agrees, to the extent that, like Google, those application providers have market power and "gatekeeper" influence over users' experience of the Internet. In time, the power of such gatekeepers may extend well beyond the search market. As cloud computing becomes more prevalent, the Commission should be as concerned as a growing number of analysts that "it could lead to dominance of a single service provider" whose "effective monopoly . . . could then become perceived as far more insidious than any of the 'walled gardens' or 'intelligent network[s]' that telcos would like to build."[433]

To be clear, AT&T contends that the four existing Internet principles, combined with general antitrust enforcement, are sufficient to govern *all* Internet-based services and

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exchanges generating excessive calls and long distance fees. And suddenly, Google Voice customers couldn't reach friends, family and businesses in those areas.").

[432] Tim Wu, *Why Have a Telecommunications Law? Anti-Discrimination Norms in Communications*, 5 J. Telecomm. & High Tech. L. 15, 46 (2006). *See also* Comments of the Consumer Federation of America, Consumers Union & Free Press, WC Docket No. 07-52, at 9 (June 15, 2007) ("The role of regulation should be to ensure that *strategically placed actors with market power* cannot undermine innovation *at any layer* of the platform.") (emphasis added); *id.* at 29 (urging Commission to "declare that *discrimination of any kind* . . . undermines competition among network providers, applications and service providers, and content providers") (emphasis added, quotation marks omitted); Jeff Chester, *Is The Open Internet Coalition About A Real Democratic Net—or One Safe for Data Collection and Interactive Advertising?*, Digital Destiny, May 25, 2007, http://www.democraticmedia.org/jcblog/?p=287 ("We are uneasy about the alliance between public interest groups and Open Internet Coalition members such as Google and Interactive Corp. (Ask.com). . . . [W]ithout rules governing Google's expansion, limits on data collection, a strong legal framework for privacy, and policies promoting meaningful open non-commercial civic space, the Internet will be 'open' in name only.").

[433] Odlyzko, *supra*, at 41; *see also* Maureen O'Gara, *Google's Power in Cloud Computing Could Lead to a "Repeat of Microsoft,"* OpenSource Magazine, Feb. 18, 2009, http://opensource.sys-con.com/node/847455 (noting Christine Varney's observation at the American Antitrust Institute that Google might use its hold on cloud computing to block companies from interacting with its applications).

applications. But the Commission cannot rationally regulate broadband access providers on the basis of *hypothetical* misconduct, while leaving search providers unregulated in the face of Google's market power, its gatekeeper capabilities, and its *actual demonstrated abuse* of both. If the Commission is convinced that those with the financial incentive and technical capability to affect Internet "openness" or "neutrality" must be regulated, there is no rational basis for it to draw the lines where it has proposed to do so. And, as we show below in Sections VIII.B and VIII.C of the Discussion, the arbitrariness of that line-drawing exercise could not survive scrutiny under either the Administrative Procedure Act or the First Amendment.

VIII. ADOPTION OF THE RULES PROPOSED IN THE NPRM WOULD BE UNLAWFUL.

For the reasons discussed, the Commission *should* not adopt the rules proposed in the NPRM. And for many of those same reasons, as well as the additional reasons discussed below, the Commission *may* not lawfully adopt such rules, specifically including any "nondiscrimination" or other public-utility-type regulations. To begin with, the Commission has no statutory authority to impose such rules on broadband Internet access providers, and indeed those rules would *conflict* with a number of the Communications Act's express provisions. The rules would also be arbitrary and capricious; they would violate the First Amendment rights of broadband, content, and application providers alike; and they would effect an unconstitutional taking of property without just compensation. In sum, the Commission cannot lawfully adopt the prescriptive regulations proposed in the NPRM, and it would mire itself and the entire Internet ecosystem in years of litigation if it tries.

A. The Commission Lacks Authority to Impose the Proposed Rules.

The FCC "literally has no power to act" absent a statutory delegation of authority.[434] The Commission plainly does not have *express* authority to impose its proposed "net neutrality" rules on the Internet; the Communications Act contains no provision that mandates or even specifically permits the adoption of such rules. Instead, the Commission relies on its so-called "ancillary jurisdiction," which gives it some power to regulate matters not expressly discussed in the Act. *See* NPRM ¶¶ 83-84. But the Commission has ancillary authority to act only when it can satisfy two distinct criteria: "(1) the Commission's general jurisdictional grant under Title I covers the subject of the regulations *and* (2) the regulations are reasonably ancillary to the Commission's effective performance of its statutorily mandated responsibilities."[435]

Here, the Commission likely has *subject matter jurisdiction* over Internet services, since Section 2 of the Communications Act gives it jurisdiction over "interstate and foreign communication by wire or radio and . . . all persons engaged . . . in such communication."[436] As discussed in Section VIII.A.2 below, however, the proposed regulations would fail the second prong of the analysis because they would not be reasonably ancillary to the effective performance of any of the Commission's statutorily mandated responsibilities. Just as important, the proposals would fail that prong for the independent reason that they *flatly contradict* specific provisions of the Act, as we discuss in the next section (and revisit in Section VIII.A.2).

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[434] *La. Pub. Serv. Comm'n v. FCC*, 476 U.S. 355, 374 (1986).

[435] *Am. Library Ass'n v. FCC*, 406 F.3d 689, 700 (D.C. Cir. 2005) (citing *United States v. Sw. Cable Co.*, 392 U.S. 157, 177-78 (1968)). *See also Nat'l Ass'n of Regulatory Util. Comm'rs v. FCC*, 533 F.2d 610, 612 (D.C. Cir. 1976) ("[E]ach and every assertion of jurisdiction . . . must be independently justified as reasonably ancillary to" a specific statutory responsibility).

[436] 47 U.S.C. § 152(a).

1. The Proposed Rules Contradict Specific Provisions of the Communications Act.

As the Supreme Court held in *FCC v. Midwest Video Corp.*,[437] the FCC's ancillary authority is cabined by the substantive provisions of the Communications Act, and it cannot assert such authority to act in a manner "antithetical to a basic regulatory parameter established" in the statute.[438] In other words, the Commission may not invoke its ancillary jurisdiction to adopt rules that either directly violate a provision of the Act or that conflict with a more general purpose expressed by the Act. In *Midwest Video II* itself, the Commission had invoked its ancillary authority to impose certain common-carrier-type obligations on cable providers on the theory that doing so was ancillary to its authority to regulate broadcasters.[439] The Supreme Court invalidated those rules on the ground that the Act specifically precluded the Commission from treating *broadcasters themselves* as common carriers. As the Court explained, that prohibition necessarily defeated any argument that the broadcast provisions of the Act gave the Commission ancillary authority to regulate *cable companies* as common carriers.[440]

Here, the *Midwest Video II* principles foreclose the Commission's invocation of ancillary authority in two respects. First, the Communications Act *directly prohibits* the Commission from imposing "nondiscrimination" or other common-carrier-type regulations on information service providers. Second, in any event, the Commission cannot exercise ancillary authority to subject information service providers to common-carrier-type regulatory burdens—here, an inflexible prohibition on any and all "discrimination," no matter how reasonable—that Congress has deliberately *refrained* from imposing on genuine common carriers since 1934 (except in

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437 440 U.S. 689, 700-02 (1979) ("*Midwest Video II*").

438 *Am. Library Ass'n*, 406 F.3d at 702 (internal quotation marks omitted).

439 440 U.S. at 702-09.

440 *Id.*

unique horizontal-competition contexts that are inapposite here, as discussed below). We address each point in turn.

Section 3(44) of the Act provides that "[a] telecommunications carrier shall be treated as a common carrier under this chapter *only* to the extent that it is engaged in providing *telecommunications services*[.]"[441] As the Commission has found—and as the Supreme Court has affirmed—a provider of broadband Internet access services is *not* providing a Title II "telecommunication service."[442] Instead, it is providing a distinct category of service defined by the Act as a Title I "information service."[443] Thus, while the Commission may treat a wireline provider as a common carrier when it offers telecommunications services, Congress expressly forbade the Commission from imposing any common-carrier-type rule on that provider when it offers either wireline or wireless broadband Internet access, because both are information services.[444]

The NPRM, however, proposes to impose precisely such common-carrier-type rules on providers of broadband Internet access. In particular, the proposed "nondiscrimination" rule and the similar obligations to accommodate all comers and support all devices embody the very

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[441] 47 U.S.C. § 153(44) (emphasis added). *See also Nat'l Cable & Telecomms. Ass'n v. Brand X Internet Servs.*, 545 U.S. 967, 992-93 (2005) ("*Brand X*") (noting the FCC's explanation that Congress, in the 1996 Act, captured the pre-1996 Act "distinction between basic and enhanced service" and the FCC's tradition of "*not* subject[ing] to common-carrier regulation those service providers that offered enhanced services over telecommunications facilities").

[442] *See, e.g.*, *Cable Modem Order*, 17 FCC Rcd at 4825, 4828-31 ¶¶ 44, 52-55; *see Brand X*, 545 U.S. at 986-1000.

[443] Report to Congress, *Federal-State Joint Board on Universal Service*, 13 FCC Rcd 11501, 11522-23 ¶ 43 (1998) ("The language and legislative history of both the House and Senate bills indicate that the drafters of each bill regarded telecommunications services and information services as *mutually exclusive* categories.") (emphasis added).

[444] *See* Declaratory Ruling, *Appropriate Regulatory Treatment for Broadband Access to the Internet Over Wireless Networks*, 22 FCC Rcd 5901, 5916, 5919-20 ¶¶ 40-41, 50-53 (2007) ("*Wireless Broadband Order*") (noting "Congressional intent to maintain a regime in which information service providers are not subject to Title II regulations as common carriers").

criteria of common-carrier regulation. Indeed, one of the first provisions in Title II of the Act—the regulatory framework governing common carriers—is the prohibition against "unreasonable discrimination."[445] The NPRM's proposed rules would thus directly violate Section 3(44), and the Commission obviously may not invoke its ancillary authority as an end-run around that prohibition.

In any event, even if Section 3(44) had never been enacted, the rules would still conflict with the Communications Act because they would subject *non*-common-carriers to a much more onerous form of common-carrier regulation than Congress deemed appropriate even for *true* common carriers in all relevant contexts. As discussed in Section III.A.2 of the Discussion above, traditional common-carrier regulation prohibits only "unjust and unreasonable" discrimination[446]—not *any* and *all* types of discrimination, some of which are entirely reasonable, efficient, and pro-competitive, as even the NPRM acknowledges. *See, e.g.*, NPRM ¶ 103. Indeed, the courts have held that wireless providers do not violate Section 202's ban on "unjust or unreasonable discrimination" when they sell the same service package to different customers at different prices depending on the outcome of individualized negotiations; in the competitive wireless marketplace, these types of customer-specific distinctions are rational and entirely defensible.[447] Section 628 of the Act—a nondiscrimination requirement adopted for the

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[445] 47 U.S.C. § 202(a); *see also Midwest Video II*, 440 U.S. at 700-02. The duties that the NPRM would impose to accommodate all comers and all devices have also been traditional components of the FCC's "common carrier" regulatory framework. *See, e.g.*, *Establishing Just & Reasonable Rates for Local Exchange Carriers*, 22 FCC Rcd 11629 (2007) (call blocking is an unjust and unreasonable practice under Section 201); *Use of the Carterfone Device in Message Toll Service*, 13 FCC 2d 420 (1968) (attachment of devices).

[446] 47 U.S.C. § 202(a) ("It shall be unlawful for any common carrier to make any unjust or unreasonable discrimination in charges, practices, classifications, regulations, facilities, or services[.]").

[447] *See Orloff v. FCC*, 352 F.3d 415, 420 (D.C. Cir. 2003), *aff'g Orloff v. Vodafone AirTouch Licenses LLC d/b/a Verizon Wireless*, 17 FCC Rcd 8987 (2002).

non-competitive legacy cable marketplace—likewise provides that its prohibition on discrimination does not apply to "establishing different prices, terms and conditions to take into account actual and reasonable differences" in costs, economies of scale, savings, "or other direct and legitimate economic benefits."[448]

The only context in which the Commission has imposed more absolutist nondiscrimination requirements is in connection with the 1996 Act's unbundling rules, applicable to monopoly-era telephone networks under Sections 251/252 and 271/272.[449] But those requirements have focused on forcing ILECs to cooperate with their *rivals* in the local exchange market and reflect Congress's determination in 1996 that the ILECs held monopoly power over bottleneck facilities that could be used to impede entry by competitive telecommunications providers.[450] Those provisions are thus obviously inapposite to regulatory proposals that, like those proposed in the NPRM, would apply to *non*-monopolists in *competitive* markets and would focus not on *horizontal* relationships between providers and their direct rivals, as the 1996 Act does, but on *vertical* relationships between a broadband provider and providers of *complementary* applications and content.

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448 47 U.S.C. § 548(c)(2)(B)(ii), (iii).

449 47 U.S.C. §§ 251-52, 271-72. *See, e.g.*, Notice of Proposed Rulemaking, *Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers; Implementation of the Local Competition Provisions of the Telecommunications Act of 1996; Deployment of Wireline Services Offering Advanced Telecommunications Capability*, 16 FCC Rcd 22781, 22813-14 ¶ 71 (2001) ("The Commission has previously concluded that Congress intended for the term 'nondiscriminatory' in section 251 to impose a more stringent standard for prohibiting discrimination than the 'unjust and unreasonable discrimination' standard in section 202 of the Act.").

450 *See, e.g.*, *id.* at 22782 ¶ 1 ("Recognizing that incumbent LECs control some bottleneck facilities, Congress adopted section 251 of the 1996 Act in order to permit competitors to overcome the obstacles posed by that control."); *United States v. AT&T*, 552 F. Supp. 131, 142-43, 160-65, 171-72 (D.D.C. 1982) ("*MFJ*") (discussing broad nondiscrimination requirements imposed in response to the anticompetitive behavior and market power of AT&T).

Just as important, the proposed "nondiscrimination" rule is *even more draconian* than the strict nondiscrimination requirement applied in those contexts because, as noted above, it amounts to a line-of-business restriction: It bans broadband providers not only from "discriminating" among content providers, but from *selling QoS enhancements to such providers in the first place*. Such line-of-business restrictions have always been rare in our economy, and they are typically imposed only upon hard evidence that *specific monopolists*—such as the pre-divestiture Bell System—have *abused their monopoly position* to suppress competition.[451] Here, there is obviously no such evidence. To the contrary, the subjects of the proposed line-of-business restriction are not monopolists, but participants in a competitive market; AT&T and other broadband Internet access providers have not engaged in anticompetitive conduct; and the Internet access market is overwhelmingly more competitive today than it has ever been.

In the *Comcast* appeal pending in the D.C. Circuit, the Commission has cited dicta in the Supreme Court's *Brand X* decision to suggest that, despite all these considerations, the *Brand X* Court somehow blessed the Commission's exercise of ancillary jurisdiction over broadband Internet access services.[452] That argument is implausible. The Commission points in particular to the Court's comments that "the Commission has jurisdiction to impose . . . regulatory obligations under its Title I ancillary jurisdiction," and that "the Commission remains free to impose special regulatory duties on facilities-based [Internet service providers] under its Title I

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[451] *MFJ*, 552 F. Supp at 223-24. As discussed in Section III of the Discussion above, the Commission's "nondiscrimination" proposal resembles the line-of-business restriction temporarily imposed in the *Computer I* regime, which barred providers of "basic" telecommunications services (*i.e.*, local exchange carriers) from providing "enhanced" (data-processing) services—and which was appropriately abolished by the Commission in the mid-1980s, even though the BOCs continued, at that point, to operate in a monopoly environment. *See Computer II Final Decision*, 77 FCC 2d ¶¶ 282-85.

[452] *See* Brief for Respondents, *Comcast Corp. v. FCC*, No. 08-1291, at 31 (D.C. Cir. filed Sept. 21, 2009).

ancillary jurisdiction."[453] But those dicta are not even relevant to the Commission's authority to impose the rules at issue. At most they can be taken to support a claim that the Commission has Title I *subject matter jurisdiction* over Internet services, in the sense that such services involve interstate communications by wire or radio. And the Commission may indeed be able to exercise that jurisdiction to impose *some* "special regulatory duties" on Internet access providers. But the question here is whether, in the teeth of Section 3(44) and the flexibility of the nondiscrimination requirement of Section 202(a), the Commission may impose the particular regulatory duties proposed in the NPRM, including a rigid "nondiscrimination" rule that is starkly more onerous than Section 202(a). And that, of course, is a question that was not before the Supreme Court in *Brand X* and that the Court did not remotely purport to answer.[454]

2. The Statutory Provisions That the Commission Cites Do Not Provide Any Support for Its Assertion of Ancillary Jurisdiction.

Quite apart from their affirmative conflict with provisions of the Communications Act, the proposed rules would independently fall outside the scope of the Commission's ancillary authority because they are not "reasonably ancillary to" the Commission's performance of any express statutory duty. In particular, none of the provisions the NPRM cites (*see* NPRM ¶¶ 83-87) creates a statutory duty that the proposed rules could possibly serve; to the contrary, some of the cited provisions are actually inconsistent with the substance of the Commission's proposed regulations.

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[453] *Id.* (citing *Brand X*, 545 U.S. at 976, 996).

[454] Indeed, the Court repeatedly referenced the fact that the Commission had not yet decided "*whether*, pursuant to its ancillary Title I jurisdiction, to require cable companies to allow independent ISPs access to their facilities." 545 U.S. at 1002 (emphasis added).

a. Section 230 of the Communications Act—47 U.S.C. § 230.

The Commission suggests that the proposed rules are reasonably ancillary to its duties under Section 230 of the Act, *see* NPRM ¶ 84, but that argument necessarily fails because the Commission *has* no duties under that provision. No part of Section 230 gives the Commission power to perform any function at all. Its substantive provisions bestow immunity from civil liability on providers of Internet access service and other similar services, and nothing about those provisions suggests that the Commission has any role in implementing them. And in the absence of any responsibilities under Section 230, the Commission cannot rely on that section to justify its exercise of ancillary jurisdiction. Section 230*(b)* in particular does no more than set forth "the policy of the United States."[455] And as the D.C. Circuit has explained, an exercise of ancillary authority is not valid merely because it advances a "'valid communications policy goal and [is] in the public interest'"; it must also ensure the effective performance of a function specifically delegated to the FCC.[456]

Just as important, the proposed rules would affirmatively *contradict* the policy set out in Section 230. That provision takes a *deregulatory* approach to Internet service providers. After noting that the Internet and related services "have flourished, to the benefit of all Americans, with a minimum of government regulation,"[457] Congress commands that it "is the policy of the United States" for the Internet to continue to develop "*unfettered* by Federal or state regulation."[458] Indeed, the Commission has consistently noted that regulation of the Internet

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455 47 U.S.C. § 230(b).

456 *Motion Picture Ass'n of Am. Inc. v. FCC*, 309 F.3d 796, 806 (D.C. Cir. 2002) ("*MPAA*").

457 47 U.S.C. § 230(a)(4).

458 *Id.* § 230(b)(2) (emphasis added).

would "directly contravene Congress's express directives in sections 706 and 230 of the Act that [such] services . . . not be subject to such regulation."[459]

The NPRM suggests that the Commission can draw relevant authority from the Section 230 policy to "encourage the development of technologies which maximize user control over what information is received" when using the Internet.[460] But that language plainly refers to technologies that permit users to *block* offensive content, such as "blocking and filtering technologies that empower parents to restrict their children's access to objectionable or inappropriate online material."[461] And in any event, it is unclear how the proposed line-of-business restriction could be said to help consumers control the information they receive; if anything, the QoS-enhancing arrangements that the rule would prohibit would enhance consumers' ability to receive high-quality content.

The proposed rules also are in tension with Section 230(c)(2), which expressly protects Internet service providers' ability to take "any action . . . in good faith to restrict access to or availability of material that the provider . . . considers to be obscene, lewd, lascivious, filthy, excessively violent, harassing, or otherwise objectionable, whether or not such material is constitutionally protected."[462] The Commission's proposed rules would appear to conflict with this provision by significantly narrowing the broad latitude Congress provided, since they would allow Internet service providers to rely on the "reasonable network management" exception only

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[459] Mem. Op. & Order, *Petition for Declaratory Ruling That pulver.com's Free World Dialup Is Neither Telecommunications Nor a Telecommunications Service*, 19 FCC Rcd 3307, 3319 ¶ 19 n.69 (2004).

[460] NPRM ¶ 53 n.122 (quoting Section 230(b)(3)); *id.* ¶ 84 (citing Section 230(b) more generally as a basis for jurisdiction).

[461] *See* 47 U.S.C. §§ 230(b)(4), (c)(2)(B), (d). *See also* NPRM ¶ 53 n.122 (discussing Sections 230(b)(3) and (b)(4) together).

[462] 47 U.S.C. § 230(c)(2)(A).

to restrict access to "*unlawful*" content. *See* NPRM ¶¶ 16, 96, 139. In other words, the proposed rules would deprive network providers of their statutory right to limit access to *lawful* content that is violent or harassing, for example. It could also interfere with their ability to protect against copyright violations, since effective efforts to police intellectual property rights cannot rely solely on ex-post responses to individual, already-adjudicated violations. As Congress recognized in adopting Section 230, in order "to promote the continued development of the Internet . . . and other interactive media," Internet access providers need latitude and flexibility to adopt various measures to protect users, content owners, and their own network services without the threat of liability that the rules proposed in the NPRM would now create.[463]

b. Section 706(a) of the Telecommunications Act of 1996—47 U.S.C. § 1302(a).

The Commission's reliance on Section 706 of the Telecommunications Act is equally unavailing. The agency has acknowledged that Section 706 does not give the FCC any substantive authority; rather, it is a statement of general policy that serves as a guide for interpretation of other provisions of the Act.[464] And as discussed above, the courts have made clear that the Commission does not have ancillary authority to enforce mere policy. Policy may *guide* the Commission's actions, but it cannot provide a substitute for the statutory authority required to undertake the action in the first place.

In any event, as with Section 230, the rules proposed in the NPRM would affirmatively contradict the *deregulatory* policy set out in Section 706(a). That section instructs the Commission to encourage the deployment of advanced services through "regulatory forbearance

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[463] *Id.* § 230(b)(1).

[464] Mem. Op. & Order, *Deployment of Wireline Services Offering Advanced Telecommunications Capability*, 13 FCC Rcd 24012, 24044, 24046-48 ¶¶ 69, 74-77 (1998).

. . . or other regulating methods that remove barriers to infrastructure investment."[465] Indeed, the Commission has recognized that regulating wireline broadband access networks would have a "negative impact on deployment and innovation" and thus would violate "Congress' clear and express policy goal [in Section 706] of ensuring broadband deployment, and its directive that we remove barriers to that deployment."[466] And, as discussed above, the intrusive and burdensome regulations proposed in the NPRM would discourage investment in and deployment of broadband facilities.[467] For all these reasons, the proposed rules cannot be reasonably ancillary to Section 706.

c. Section 201(b) of the Communications Act—47 U.S.C. § 201(b).

The Commission argues that Section 201(b) "gives the Commission specific authority 'to prescribe such rules and regulations as may be necessary in the public interest to carry out the provisions of th[e] Act.'" NPRM ¶ 84. But that is of little utility to the Commission here, because Section 201(b) merely gives the Commission authority to adopt regulation to address a *substantive provision* of the Act.[468] As discussed, the proposed rules are not in that category. Moreover, when read in context with the rest of Section 201, which focuses entirely on the common-carrier services regulated in Title II of the Act, Section 201(b) suggests that the Commission's authority under that section is limited to *common-carrier* services. The proposed rules, which regulate information services, are plainly not "reasonably necessary" to the Commission's effective performance of its duties to regulate common-carrier services under

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465 47 U.S.C. § 1302(a).

466 *See Wireline Broadband Order*, 20 FCC Rcd at 14877-78 ¶¶ 44-45.

467 *See* Engineering Background § B.2, *supra*; Discussion § III.A.2, *supra*; *see also AT&T 2007 Net Neutrality Comments* at 71-74.

468 *See, e.g., AT&T Corp. v. Iowa Utils. Bd.*, 525 U.S. 366, 377-81 (1999).

Section 201(b), particularly given Congress's unambiguous ban on common-carrier treatment of information services in Section 3(44).

d. Title III of the Communications Act—47 U.S.C. § 301, *et seq*.

Although the NPRM suggests generally that Title III gives the Commission authority to act here, it does not identify the specific provision in that Title on which it seeks to rely. While in other contexts, the Commission has suggested that Section 303(r) gives it ancillary authority, that provision, like Section 201(b), simply authorizes the Commission to "[m]ake such rules and regulations and prescribe such restrictions and conditions, not inconsistent with law, *as may be necessary to carry out the provisions of this chapter*[.]"[469] In other words, some other provision of the Act must provide the specific statutory basis for the Commission's action.[470] Yet, as shown, no such statutory basis exists here.

The same is true of Section 332(a),[471] which simply directs the Commission to consider whether its otherwise authorized actions will increase competition, improve spectral efficiency, or serve other public interest goals—but which does not create a substantive duty for the Commission. And in any event, the considerations of Section 332 cut *against* the Commission's proposed rules, since, as discussed, the rules would impede wireless competition, frustrate providers' efforts to achieve spectral efficiency, and undermine the public interest.

The proposed rules also would conflict with Section 326, which provides that the Commission has no authority to censor "radio communications or signals transmitted by any radio station" and that "no regulation or condition shall be promulgated or fixed by the

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469 47 U.S.C. § 303(r) (emphasis added).

470 *See MPAA*, 309 F.3d at 806 ("The FCC must act pursuant to delegated authority before any 'public interest' inquiry is made under § 303(r).").

471 47 U.S.C. § 332(a).

Commission which shall interfere with the right of free speech by means of radio communication."[472] By precluding wireless carriers from exercising any editorial discretion over content or the way in which they choose to deliver it, the Commission's proposed rules *will* interfere with providers' free speech rights and thus are inconsistent with the Act.

e. Other Statutory Provisions Cited in the NPRM.

In the NPRM's ordering clauses and in the Initial Regulatory Flexibility Analysis, the Commission cites Sections 257, 503, and 1 of the Communications Act, implying that these may provide an additional legal basis for the proposed rules. *See* NPRM ¶ 185; *id.* at Appendix C ¶ 6. But none of these sections provides the authority that the Commission needs.

Section 257 requires the Commission to conduct periodic proceedings to identify and eliminate "market entry barriers . . . in the provision and ownership of telecommunications services and information services," and directs the Commission to "promote . . . policies and purposes . . . favoring diversity of media voices, vigorous economic competition, technological advancement, and promotion of the public interest, convenience, and necessity."[473] But the provision specifically instructs the Commission that any regulation it adopts to pursue these objectives must be premised on "its authority under this chapter (*other than this section)*."[474] In other words, Congress expressly disclaimed any intention of expanding the Commission's authority through this provision. Like Sections 230 and 706, the aims of Section 257 can be implemented only through means granted to the Commission in *other* sections of the Act. In any event, as discussed above, adoption of the proposed rules would *create* rather than eliminate

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472 47 U.S.C. § 326.

473 47 U.S.C. §§ 257(a), (b).

474 *Id.* § 257(a) (emphasis added).

market barriers, would inhibit "vigorous economic competition," and would stifle "technological advancement."

Section 503 of the Act concerns rebates of Title II regulated rates, and forfeitures, neither of which is relevant here.[475] Section 503(a) bars the offering of "a rebate or offset against the regular charges for transmission of [wire or radio] messages *as fixed by the schedules of charges provided for in this chapter*."[476] Because the charges for Internet access and all other Internet-related transmission services (*e.g.*, backbone peering, transport, CDN services), are not "fixed by [a] schedule[] of charges" under the Act, Section 503 does not apply. And to the extent that the Commission means to rely on Section 503(b), that is equally irrelevant. That provision gives the Commission power to impose forfeitures for violations of its rules and orders[477]—not to adopt new rules or orders.

Nor does Section 1 of the Communications Act[478] grant the Commission authority to act here. That section is best understood as a grant of subject matter jurisdiction to the Commission; the specific obligations and powers the Commission has with respect to those subject matter areas are set forth in other, substantive provisions of the Act. "While that section does set forth worthy aims toward which the Commission should strive, it has not heretofore been read as a general grant of power to take any action necessary and proper to those ends."[479] Accordingly, the courts have expressly rejected Title I—including Section 1—as a sufficient basis for jurisdiction in itself: "Title I is not an independent source of regulatory authority; rather, it

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475 47 U.S.C. § 503.

476 *Id.* § 503(a) (emphasis added).

477 *Id.* § 503(b).

478 47 U.S.C. § 151.

479 *Nat'l Ass'n of Regulatory Util. Comm'rs v. FCC*, 533 F.2d 601, 614 n.77 (D.C. Cir. 1976).

confers on the Commission only such power as is ancillary to its specific statutory responsibilities."[480] In any event, the Commission's proposed rules would not advance Section 1's goal of making available "a rapid, efficient, Nation-wide, and world-wide" broadband network, since they will undermine incentives for broadband investment.[481]

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[480] *California v. FCC*, 905 F.2d 1217, 1240 n.35 (9th Cir. 1990); *see also Sw. Bell Tel. Co. v. FCC*, 19 F.3d 1475, 1479 (D.C. Cir. 1994) (citation and quotation marks omitted) (the Commission's authority under Title I "is restricted to that reasonably ancillary to the effective performance of [its] various responsibilities under titles II and III of the Act").

[481] In the *Comcast Order*, the Commission stated that the measures adopted in that order would further Section 1's goal of ensuring "reasonable charges" for communications services. Mem. Op & Order, *Formal Complaint of Free Press and Public Knowledge Against Comcast Corporation for Secretly Degrading Peer-to-Peer Applications; Broadband Industry Practices Petition of Free Press et al. for Declaratory Ruling that Degrading an Internet Application Violates the FCC's Internet Policy Statement and Does Not Meet an Exception for "Reasonable Network Management,"* 23 FCC Rcd 13028, 13037 ¶ 16 (2008). Specifically, it noted: "[I]f cable companies such as Comcast are barred from inhibiting consumer access to high-definition on-line video content, then . . . consumers with cable modem service will have available a source of video programming (much of it free) that could rapidly become an alternative to cable television. The competition provided by this alternative should result in downward pressure on cable television prices, which have increased rapidly in recent years." *Id.* And to be sure, the Commission has authority over cable television prices. *See* 47 U.S.C. § 543. But this theory is implausible. First, it would prove far too much and would be insusceptible to any limiting principle. E-mail and instant messaging likely have affected telephone service rates by helping decrease demand for traditional telecommunications services; the same is true for even non-interconnected VoIP. As the communications industry transitions to a new generation of IP-based services, the Commission could seek to justify almost *any* type of regulation of *any* information service based on the same type of attenuated impact on the charges for traditional communications services. Thus, this rationale would implausibly empower the Commission to impose common-carrier regulation (including rate regulation) on nearly *any* information service. And this argument fails for another reason as well: By prohibiting prioritization arrangements, the proposed rules would actually make it more difficult for IP-based providers to offer high-quality video and voice services. This would have a *negative* effect on video and voice competition. It would deter investment in these services by, for example, forcing providers of video services to rely on CDN providers rather than ISP-based prioritization—and would potentially raise prices for consumers of these services. *See* Engineering Background, §§ D, E, *supra*; Discussion § III.B.6, *supra*. Thus, the Commission cannot rely on its authority over these services in *support* of its proposed net neutrality rules.

B. It Would Be Arbitrary and Capricious for the Commission to Adopt the Rules Proposed in the NPRM.

As discussed in detail above, the Commission's proposed rules are irrational and unsupported by evidence. For the same reasons, they would be arbitrary and capricious and therefore unlawful under the Administrative Procedure Act. The proposals in the NPRM disregard prior Commission decisions without explanation; they are unmoored from any competitive analysis of the market they propose to regulate; they purport to solve a "problem" that has never been shown to exist; and they treat similarly situated parties differently without justification.[482]

1. Adoption of the Proposed Rules Would Constitute an Unjustified Departure from the Commission's Prior Orders.

As discussed above, the Commission has repeatedly concluded that regulation of Internet access services is not only unnecessary, but inconsistent with the Communications Act's pro-competitive goals.[483] Accordingly, it has adopted a "long-standing national policy of nonregulation of information services."[484] The Commission has based its minimally regulatory

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[482] The proposed rules would be unjustifiable and unreasonable—and thus a violation of the APA, the Communications Act, and the First Amendment—for all of the reasons discussed in previous sections of these comments and in our prior submissions in WC Docket No. 07-52. The identification of certain deficiencies in the present section is not meant to be exhaustive, and AT&T incorporates by reference in this legal discussion any and all rationales it has presented elsewhere concerning why the Commission should reject these and similar rules.

[483] *See, e.g.*, *Cable Modem Order*, 17 FCC Rcd at 4802 ¶ 5 ("[B]roadband services should exist in a minimal regulatory environment that promotes investment and innovation in a competitive market."); *Wireline Broadband Order*, 20 FCC Rcd at 14855 ¶ 1; *Wireless Broadband Order*, 22 FCC Rcd at 5901, 5902, 5908-14 ¶¶ 2, 18-34 (adopting a "a minimal regulatory environment for wireless broadband Internet access service that promotes our goal of ubiquitous availability of broadband to all Americans"); Mem. Op. & Order, *United Power Line Council's Petition for Declaratory Ruling Regarding the Classification of Broadband over Power Line Internet Access Service as an Information Service*, 21 FCC Rcd 13281, 13285-90 ¶¶ 7-15 (2006), *aff'd*, 483 F.3d 570 (8th Cir. 2007).

[484] Mem. Op. & Order, *Vonage Holdings Corp.; Petition for Declaratory Ruling Concerning an Order of the Minn. Pub. Utils. Comm'n*, 19 FCC Rcd 22404, 22416-17 ¶ 21 (2004). As noted

approach in large part on the fact that the market for broadband Internet access is competitive and becoming more so. In a series of orders stretching back seven years, the Commission has found that "the broadband Internet access market today is characterized by several emerging platforms and providers, both intermodal and intramodal, in most areas of the country"[485] and that "many consumers have a competitive choice for broadband Internet access services."[486] The Commission also has determined that the market for Internet access services is "an emerging and rapidly changing marketplace"[487] and that "[c]ontinuous change and development are likely to be the hallmark of the marketplace for broadband Internet access at both the retail and wholesale levels over the next several years."[488] And in light of this competition (among other factors), the Commission has repeatedly recognized that regulation of Internet access services is both unnecessary and inappropriate.

The Commission cannot walk away from these precedents and adopt a heavily regulatory framework for Internet access services without providing a "reasoned analysis" for its abrupt

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above, even the legacy telephone monopoly regulation that lingered until 2005 applied only to the underlying *transport* services offered by telecommunications carriers, *not* the finished services that include Internet access (or other information services). *See* Discussion § I, *supra*.

485 *Wireline Broadband Order*, 20 FCC Rcd at 14856 ¶ 3. *See also Cable Modem Order*, 17 FCC Rcd at 4802 ¶ 6 ("[R]esidential high-speed access to the Internet is evolving over multiple electronic platforms, including wireline, cable, terrestrial wireless and satellite. By promoting development and deployment of multiple platforms, we promote competition in the provision of broadband capabilities.").

486 *Wireline Broadband Order*, 20 FCC Rcd at 14879 ¶ 47.

487 *Id.*

488 *Id.* at 14884 ¶ 56. *See also Wireless Broadband Order*, 22 FCC Rcd at 5908 ¶ 17 ("Wireless broadband technologies and the business models for their deployment continue to evolve at a rapid pace. There have been significant technical advances in recent years, and more are anticipated over the next few years."); *Cable Broadband Order*, 17 FCC Rcd at 4819 ¶ 32 ("The technologies and business models used to provide cable modem service are also complex and are still evolving.").

change of heart.[489] Yet the NPRM provides no such analysis. It fails even to *acknowledge* the Commission's prior findings about the competitiveness of the Internet access market, or the implications of those findings, much less explain why those no longer hold. As the Supreme Court recently declared in *Fox*, an agency is required to "display awareness that it is changing position" and cannot "depart from a prior policy sub silentio or simply disregard rules that are still on the books."[490] The NPRM's approach raises the concern that "prior policies" are being "casually ignored" rather than deliberately and rationally changed—an approach that the courts have declared falls far short of "reasoned decision making."[491]

For example, the D.C. Circuit recently held that the Commission may not simply replace the market-power test it has long used to make forbearance determinations without providing "a satisfactory explanation [of the new approach] when it has not followed such approaches in the past."[492] The court rejected the Commission's new market-power test based on its determination that the Commission had failed to "justify its departure from its precedent."[493] That holding is informative here. Again, the NPRM contains *no* analysis whatsoever of competition in the broadband Internet access market. That is inexplicable—and indefensible—given the role that

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489 *See Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 57 (1983); *Williams Gas Processing-Gulf Coast Co. v. FERC*, 475 F.3d 319, 326 (D.C. Cir. 2006); *Wisc. Valley Improvement v. FERC*, 236 F.3d 738, 748 (D.C. Cir. 2001) ("[A]n agency acts arbitrarily and capriciously when it abruptly departs from a position it previously held without satisfactorily explaining its reason for doing so."); *AT&T Corp. v. FCC*, 236 F.3d 729, 737 (D.C. Cir. 2001) (in cases where the FCC "has failed . . . to explain the path that it has taken, we have no choice but to remand for a reasoned explanation") (quoting *Tex Tin Crop. v. EPA*, 935 F.2d 1321, 1324 (D.C. Cir. 1991)).

490 *FCC v. Fox Television Stations, Inc.*, 129 S.Ct. 1800, 1811 (2009).

491 *Ramaprakash v. FAA*, 346 F.3d 1121, 1124 (D.C. Cir. 2003); *see also Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 852 (D.C. Cir. 1970).

492 *Verizon Telephone Companies v. FCC*, 570 F.3d 294, 304 (D.C. Cir. 2009).

493 *Id.* at 304-05.

this issue has previously played in the Commission's decisions concerning how and whether to regulate this precise set of services.

Certainly, if the Commission *had* performed any sort of market analysis, it could have come to only one reasonable conclusion: The market *is* competitive, and has become only more so since the Commission last examined it. As discussed above, cable broadband providers and their telco competitors are engaged in intensive, head-to-head competition that results in a constantly high rate of churn. In addition, wireless broadband Internet access has become a vibrant part of the marketplace and a true competitive threat, serving as an alternative for a host of wireline broadband applications. And beyond the mere number of competitors, many other factors demonstrate the competitiveness of the marketplace. There are more applications and content providers than ever before, some of which have customer bases many times the size of any broadband provider's customer base; broadband penetration figures continue to climb; broadband speeds are rising; and broadband prices are dropping. *See* Discussion § I.A, *supra*. Finally, as explained in Sections B.3 and C of the Engineering Background above, the NPRM's analysis altogether ignores another set of highly relevant markets: the global and indisputably competitive markets for the delivery of content and applications—markets in which content and application providers often dwarf broadband providers in size and negotiating leverage.

In other words, the predictions and findings on which the Commission relied in deregulating broadband just a few short years ago apply with even more force today. The Commission's unexplained determination that it may draw a different conclusion from the same facts, or that it need not even ask and answer the same highly relevant questions, is the epitome of arbitrary and capricious decisionmaking.[494]

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[494] *See State Farm*, 463 U.S. at 56-57; *Williams Gas*, 475 F.3d at 326.

2. It Would Be Arbitrary and Capricious for the Commission to Adopt an Industry-Wide "Solution" to a Non-Existent Problem.

As noted, in place of any type of market-power analysis, the Commission bases its entire proposal here on two isolated and voluntarily-resolved incidents over the course of fifteen years (*Madison River* and *Comcast*) and on the pure speculation that Internet service providers *might* engage in more of the same behavior as well as other conduct entirely unrelated to those two incidents.[495] None of this is a defensible basis for the invasive regulatory intervention proposed here.

Under the APA, "[p]rofessing that an order ameliorates a real industry problem but then citing no evidence demonstrating that there is in fact an industry problem is not reasoned decisionmaking."[496] Indeed, "'a regulation perfectly reasonable and appropriate in the face of a given problem may be highly capricious if that problem does not exist.'"[497] Further, the courts have repeatedly held that one or two isolated incidents do not a problem make. In *Fox TV Stations v. FCC*, for example, the D.C. Circuit noted:

> [T]he Commission has not shown a substantial enough probability of discrimination to deem reasonable a prophylactic rule as broad as the cross-ownership ban, especially in light of the already extant conduct rules. A single incident since the must-carry rules were promulgated—and one that seems to

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495 *See, e.g.*, NPRM ¶ 47 (citing *Comcast* and *Madison River* examples).

496 *National Fuel Gas Supply Corp. v. FERC*, 468 F.3d 831, 843 (D.C. Cir. 2006); *see also Cincinnati Bell Tel. Co. v. FCC*, 69 F.3d 752, 760 (6th Cir. 1995) ("What we do demand, however, is that the FCC provide at least some support for its predictive conclusions.").

497 *ALLTEL Corp. v. FCC*, 838 F.2d 551, 561 (D.C. Cir. 1988); *City of Chicago v. Federal Power Comm'n*, 458 F.2d 731, 742 (D.C. Cir. 1971) ("[R]eview would be a relatively futile exercise in formalism if no inquiry were permissible into the existence or nonexistence of the condition which the Commission advances as the predicate for its regulatory action. A regulation perfectly reasonable and appropriate in the face of a given problem may be highly capricious if that problem does not exist.").

> have been dealt with adequately under those rules—is just not enough to suggest an otherwise significant problem.[498]

Moreover, an agency's inability to identify more than a couple of isolated incidents over a long period indicates, if anything, the *absence* of any problem that could justify adoption of industry-wide, prophylactic rules. As the D.C. Circuit has explained, an agency may not fashion "an industry-wide solution for a problem that exists only in isolated pockets. In such a case, the disproportion of remedy to ailment would, at least at some point, become arbitrary and capricious."[499]

The remedy proposed here is particularly disproportionate, because (1) there is good reason to believe that the two incidents cited by the Commission *are not* evidence of a looming industry-wide problem, and (2) even if they were such evidence, the "nondiscrimination" rule the Commission proposes would be an illogical solution in any event.

First, the two incidents—the only two documented "problems" to arise since broadband was introduced more than a dozen years ago—were resolved in the absence of rules. Again, moreover, nothing has changed in the Internet ecosystem to make such "problems" more likely to arise in the future.[500] It is particularly telling that pro-regulation advocates—the same advocates whose commentary the NPRM cites with approval—have predicted for many years that a failure to regulate would harm the Internet, and *they have always been wrong*. *See* Discussion § I, *supra*. To reiterate a key example: Despite dire predictions that they would never do so, all major wireless providers now offer Wi-Fi-enabled devices—in AT&T's case, sixteen such devices. *See* Discussion § IV.A, *supra*.

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498 280 F.3d 1027, 1051 (D.C. Cir. 2002).

499 *Associated Gas Distributors v. FERC*, 824 F.2d 981, 1019 (D.C. Cir. 1987).

500 *See* Engineering Background § D.2, *supra*; Discussion § III, *supra*.

This and similar record evidence clearly reflects a trend toward greater choice, and thus the Commission would be hard-pressed to explain to a reviewing court why *this* time, threats about the end of the Internet as we know it really *are* plausible. That is especially so considering the weakness of the economic analysis on which the Commission relies in concluding that there is a need for intervention in the market, discussed in detail above. In particular, the Commission's analysis entirely fails to consider the importance of a fact that the Commission itself discusses in the NPRM (at ¶ 64): The value of the Internet increases—for the network provider along with everyone else—when there are more complementary services being offered over the network provider's platform.[501] This fact gives providers every incentive to invite and support the broadest array of third-party application, content, and service providers, not to block them—and that incentive is reinforced by robust competition among Internet access providers.

Second, even if the "problem" identified by the Commission were a legitimate concern, the "solution" offered in the NPRM would not be an appropriate means of addressing it. As noted in Section I.C of the Discussion above, the *Madison River* and *Comcast* incidents involved the blocking or degradation of an application, and the *existing* principles of the *Internet Policy Statement* fully address such conduct already. Thus, the broad, new nondiscrimination rule proposed by the Commission—and in particular its implementation as a line-of-business restriction—would be unnecessary to address conduct like the incidents the Commission cites.[502]

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[501] *See* Discussion § III.B.2, *supra* (discussing internalization of complementary externalities). The D.C. Circuit recognized a similar phenomenon with respect to cable video programming: "If an MVPD refuses to offer new programming [from unaffiliated providers], customers with access to an alternative MVPD may switch." *Time Warner Entm't Co. v. FCC*, 240 F.3d 1126, 1134 (D.C. Cir. 2001).

[502] *See Fox TV Stations*, 280 F.3d at 1051 (rejecting new rule where misconduct was "dealt with adequately under" pre-existing rules).

But the nondiscrimination rule *would* bar ongoing, pro-consumer arrangements that are helping, today, to facilitate the promises of convergence over the Internet.

In sum, the problem that the proposed rules are designed to address does not exist; there is no reason to think that it *will* exist (and good reason to think that it will *not*); and the overbroad rule that the Commission proposes as a remedy is not even targeted to specifically or effectively address the alleged problem.

3. The Commission's Proposed Rules Impose Vastly Different Obligations on Parties That Are Similarly Situated.

The NPRM suggests that the Commission's rules are likely to apply only to Internet service providers. *See* NPRM ¶ 101 & n.223. But as discussed above, other stakeholders in the Internet ecosystem have both the technological capability and the economic incentive to serve as "gatekeepers" to the "open" Internet—and enough market power to make this a significant concern. For example, major search engines determine whether end users see certain content or applications, and can effectively block or degrade the access of content or application providers to end users, and Google has indisputable market power in search—buttressed by market power in search advertising. *See* Discussion § VII, *supra.*

The NPRM suggests that the Commission may ignore these Internet gatekeepers because the net neutrality debate has focused primarily on broadband access providers in the past. *See* NPRM ¶ 101 & n.223. But the Commission cannot defend its irrational approach here by noting that it has adopted that same irrational approach in the past. As the D.C. Circuit has explained, "Where an agency applies different standards to similarly situated entities and fails to support this disparate treatment with a reasoned explanation and substantial evidence in the record, its

action is arbitrary and capricious."[503] The distinction that the Commission proposes to draw here would be especially arbitrary and capricious when the evidence reveals—as discussed above—a far more significant trend and risk of "neutrality"-related misconduct by stakeholders *other* than broadband access providers.[504]

4. The Commission's Proposed Approach to Wireless Services Would Be Particularly Arbitrary and Capricious.

Applying the Commission's proposed rules to wireless Internet access services would be even more unlawful than applying them to wireline services. As discussed above, wireless broadband is intensely competitive both inter- and intra-modally; wireless broadband services face fundamental radio network management challenges that make the rules a particularly bad fit; and there is absolutely *no* evidence of net neutrality violations in the wireless broadband marketplace. *See* Discussion §§ IV.A & IV.B, *supra*. Moreover, the record shows that the wireless marketplace has been moving in the direction of more choice without *any* government intervention. As discussed above, it is arbitrary and capricious and therefore unlawful for an agency to adopt a rule to solve a problem that does not exist—especially a burdensome rule that involves a significant risk of harm. It would be particularly arbitrary and capricious for the Commission to impose such a rule in the wireless context, when the agency has *acknowledged* that spectrum constraints pose a very real problem for wireless providers—a problem that in the

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503 *Burlington N. & Santa Fe Ry. v. Surface Transp. Bd.*, 403 F.3d 771, 777 (D.C. Cir. 2005). *See also, e.g.*, *Transactive Corp. v. United States*, 91 F.3d 232, 237 (D.C. Cir. 1996) ("A long line of precedent has established that an agency action is arbitrary when the agency offered insufficient reasons for treating similar situations differently."); *Airmark Corp. v. FAA*, 758 F.2d 685, 692 (D.C. Cir. 1985) (vacating agency orders regarding exemptions from noise regulations because the agency's treatment of different entities was "grossly inconsistent and patently arbitrary").

504 As discussed above, the Commission similarly cannot defend its proposal to require broadband access providers to adopt "transparent" consumer use disclosures without also requiring application and content providers to disclose how their services will impact an end user's Internet access experience.

short term can be mitigated *only* through the very network management practices that the Commission's net neutrality rules would invalidate in order to solve a non-existent problem.

The proposal to apply net neutrality rules to wireless broadband services is unlawful for an equally important reason as well. Just two years ago, in the 700 MHz proceeding, the Commission decided to impose unique, "any application, any device" requirements on *one* block of spectrum—the C Block. In imposing this new "open platform" model, which required all handsets to be open to all applications, the Commission recognized that moving in this direction could have drawbacks. It therefore expressly declined to impose that model on any other block of spectrum:

> While the open platform requirement for devices and applications in the C Block holds the potential to foster innovation, we cannot rule out the possibility that such a requirement may have unanticipated drawbacks as well. Therefore, we think that *it is appropriate to impose the open platform requirement only on a limited basis*.[505]

The Commission concluded that limiting this new experiment to C-Block licensees would "allow both the Commission and industry to observe the real-world effects of such a requirement."[506]

In other words, the Commission specifically recognized that government-mandated open access rules for wireless broadband might well be a bad idea; that such rules might do more harm than good; that such rules might subvert the public interest; and that the only responsible course of action would therefore be to *study* these questions based on real-world results of a limited experiment before considering the imposition of similar rules on any other spectrum. Yet now, before service over the C Block has even begun, and without having answered *any* of these points or concerns, the Commission blithely proposes to impose net neutrality rules on the entire wireless industry. Indeed, it does so without even referencing the risks it recognized in the C

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505 *700 MHz Order*, 22 FCC Rcd at 15364-65 ¶ 205 (emphasis added).

506 *Id.*

Block context, and without explaining why it no longer needs information about the real-world effects of that experiment.

No court would consider this reasoned decisionmaking. When there is "striking incongruity between" an agency's earlier findings "and the regimen adopted in the final rule," and where, even worse, the agency has simply and "inexplicably ignore[d]" its prior findings, the courts have been quick to find that the agency action "cannot stand."[507] And, as noted above, the Commission may not simply "ignore factors and reasoning it has previously . . . found controlling," at least without the "adequate explanation" that is palpably absent and likely unavailable in this case.[508] "An agency's failure to come to grips with conflicting precedent constitutes 'an inexcusable departure from the essential requirement of reasoned decision making.'"[509]

Finally, the proposed policy reversal would be unlawful because it would defeat the investment-backed expectations of the many companies that bid on *other* 700 MHz spectrum. Those carriers' bids appropriately assumed the C Block was the sole subject of the Commission's experiment with *any* type of "open platform" rules for the wireless industry. The result was a stark disparity in the relatively low per-POP bids for C Block spectrum and the much higher bids for other 700 MHz spectrum that was *not* equally encumbered.[510] Indeed, at

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[507] *Advocates for Highway & Auto Safety v. Fed. Motor Carrier Safety Admin.*, 429 F.3d 1136, 1139-1140 (D.C. Cir. 2005).

[508] *New York Cross Harbor R.R. v. Surface Transp. Bd.*, 374 F.3d 1177, 1183 (D.C. Cir. 2004).

[509] *Ramaprakash v. FAA*, 346 F.3d 1121, 1125 (D.C. Cir. 2003) (quoting *Columbia Broad. Sys. v. FCC*, 454 F.2d 1018, 1027 (D.C. Cir. 1971)).

[510] *See, e.g.*, George S. Ford, Thomas M. Koutsky & Lawrence J. Spinak, *Using Auction Results to Forecast the Impact of Wireless Carterfone Regulation on Wireless Networks*, Phoenix Center Policy Bulletin No. 20, at 13 (May 2008) ("[W]e predict the Upper C block should have sold for approximately $7.9 billion . . . . The actual price for the block was about $4.75 billion,

the time, AT&T made clear that it paid much higher prices for its 700 MHz B Block spectrum specifically *because* such spectrum came "[w]ith fewer costly and complex regulations" and thus offered "the certainty and flexibility needed to move faster in rolling out new mobile technology and more customer choices in devices and applications[.]"[511] The Commission may not now change the rules of the game and impose open access rules that would massively devalue the spectrum for which AT&T and other winning bidders paid billions of dollars.[512] That would be so grossly unfair as to constitute a violation not only of the APA but of basic due process principles.[513] As the D.C. Circuit has recognized, a reviewing court must "start from the intuitive premise that an agency cannot, in fairness, radically change the terms of an auction after the fact" and thus, under the APA, a "rule might still be arbitrary and capricious if . . . it is sufficiently unfair" to some auction participants.[514] To proceed with the Commission's proposed

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which suggests that the open access regulations trimmed $3.1 billion from the winning bids, or nearly a 40% loss in revenues. These calculations imply that because of the open platform mandate, the Upper C block licenses were nearly 40% less valuable than they would have been if those regulations had not been in place.").

[511] AT&T, Press Release, *AT&T Acquires Key Spectrum To Set Foundation For Future Of Wireless Broadband, More Choices For Customers; Company Acquires High-Quality B-Block Spectrum in FCC Auction to Bolster Spectrum Position; Auction Strategy Complements Recent Aloha Partners Acquisition to Give AT&T the Ability to Deliver Next-Generation Wireless Services*, Apr. 3, 2008; http://www.att.com/gen/press-room?pid=4800&cdvn= news&newsarticleid=25428; Dianne See Morrison, *AT&T Trumpets Its "Unencumbered" B Block Spectrum Win*, mocoNews.net, Apr. 4, 2008, http://moconews.net/article/419-att-trumpets-its-unencumbered-b-block-spectrum-win/.

[512] In all, the 700 MHz auction yielded more than $19 billion—more than any previous auction. The C Block accounted for only $4.74 billion of that total. *See* Federal Communications Commission, *Auction 73: 700 MHz Band*, http://wireless.fcc.gov/auctions/ default.htm?job=auction_summary&id=73; Kelly M. Teal, *700MHz: Verizon Wins C Block, FCC De-Links D Block*, xchange, Mar. 20, 2008, http://www.xchangemag.com/hotnews/ 700mhz--verizon-wins-c-block--fcc-de-links-d-.html.

[513] *See U.S. Airwaves v. FCC*, 232 F.3d 227, 235 (D.C. Cir. 2000). *See also AT&T Wireless Innovation Comments* at 119-121.

[514] *U.S. Airwaves*, 232 F.3d at 235.

bait-and-switch would not only violate auction winners' rights, but put billions of dollars of the public fisc at risk.[515]

C. The Proposed Rules Would Violate the First Amendment.

Though the Commission describes its proposals as a means of facilitating the free exchange of ideas on the Internet, the proposed rules would in fact violate the First Amendment rights of Internet service providers and content and application providers alike.

1. The Commission's Rules Would Violate the Free Speech Rights of Internet Service Providers.

Providers of Internet access service, just like providers of cable service, are First Amendment speakers.[516] They may include original content in their offerings; they may engage in the editorial organization of content; and they may provide tailored offerings aimed at certain

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[515] The Commission seeks to distance itself from this possibility by insisting that there are relevant differences between its current proposal and the C Block open platform framework. NPRM ¶ 169. And there *are* some differences between the C Block regime and the net neutrality rules the Commission now proposes to apply to *all* wireless broadband spectrum. The principal one is the requirement that *every* device be open to *every* application, which goes beyond what is required by the Commission's Internet principles. Those principles, if applied to wireless in the future, would presumably be satisfied by allowing consumers to "bring their own devices" for use with the provider's broadband Internet access service to enable the downloading of any applications and content compatible with the device and consistent with the provider's lawful terms of service. Any other reading would have the perverse effect of reducing consumer choice because, as discussed in Section IV of the Discussion above, it would deny consumers the *option*, which many prefer, to choose a more managed wireless environment. But neither this distinction nor the distinction the Commission identifies (the handset unlocking requirement) is even remotely sufficient to justify the tremendous upcharge the Commission collected for supposedly unencumbered B Block 700 MHz spectrum—as compared to the supposedly *uniquely* encumbered C Block spectrum.

[516] *See Turner Broad. Sys., Inc. v. FCC*, 512 U.S. 622, 636 (1994); *Comcast Cablevision of Broward County, Inc. v. Broward County, Fla.*, 124 F. Supp. 2d 685, 690-93 (S.D. Fla. 2000) (broadband Internet access service provider was speaker for purposes of First Amendment). Indeed, the D.C. Circuit has recognized that essentially any rule regulating carriage of content on cable systems is subject to at least intermediate scrutiny. *See, e.g.*, *Time Warner Entm't Co. v. FCC*, 93 F.3d 957, 966 (D.C. Cir. 1996); *Time Warner Entm't Co. v. FCC*, 240 F.3d 1126, 1129-30 (D.C. Cir. 2001).

subscriber groups.[517] And there is no question that the proposed rules would affect the First Amendment rights of broadband Internet access providers. Because the rules would compel ISPs to carry the messages of *all* content and application providers, bar editorial discretion, preclude ISPs from entering into arrangements that would allow them to provide high-quality content, and make it more expensive for ISPs to speak by necessitating capacity upgrades, the rules would be subject, at a minimum, to intermediate First Amendment scrutiny.[518]

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[517] AT&T clearly is a First Amendment speaker in its capacities as an Internet service provider and content provider, and the Commission's proposed rules would unquestionably constrain AT&T's ability to tailor its service offerings to provide the best mix of content and value for its subscribers. First, AT&T owns and provides a wide variety of Internet content that is available over its own and other service providers' networks. For example, AT&T offers consumers two distinct Internet-based video services that focus, respectively, on entertainment programming (http://entertainment.att.net/tv) and sports programming (http://fanzone.att.net/). AT&T also owns Yellowpages.com, a leading Internet source for searchable directory listings. Moreover, as noted above, the default home page for AT&T's wireline Internet access service is "powered by Yahoo!" and includes a variety of Yahoo!-provided content, such as weather, sports, news, games, and videos. *See* Discussion § III.A.1, *supra.* The Commission's rules might preclude any or all of these arrangements because AT&T's selection of featured content arguably involves "discrimination" in favor of such content and against content from other entities. In all these respects, the proposed net neutrality rules would implicate AT&T's First Amendment rights as an Internet service provider to shape the nature and content of its service offerings.

[518] *See Turner*, 512 U.S. at 636, 653-662 (applying intermediate scrutiny to must-carry statutory provisions and noting that the provision of "original programming" or the exercise of "editorial discretion" triggers First Amendment protection); *Miami Herald Publ'g Co. v. Tornillo*, 418 U.S. 241, 256-58 (1974) (invalidating state statute requiring newspaper to afford political candidates a right to reply, free of cost, to editorials attacking their official records or personal character, and noting that the mandated replies "tak[e] up space that could be devoted to other material the newspaper may have preferred to print. . . . [A]s an economic reality, a newspaper can[not] proceed to infinite expansion of its column space to accommodate the replies that a government agency determines or a statute commands the readers should have available"); *id.* at 258 ("Even if a newspaper would face no additional costs to comply with a compulsory access law . . . the Florida statute fails to clear the barriers of the First Amendment because of its intrusion into the function of editors."); *Time Warner*, 240 F.3d at 1129 (applying intermediate scrutiny to ownership restrictions and recognizing that cable operators "exercise[] editorial discretion in selecting the programming that [they] will make available to [their] subscribers, and are entitled to the protection of the speech and press provisions of the First Amendment") (internal quotation marks and citations omitted).

Intermediate scrutiny is more exacting than baseline APA "arbitrary and capricious" review.[519] To satisfy the intermediate scrutiny standard, the Commission must show that its rules "further[] an important or substantial government interest . . . unrelated to the suppression of free expression" and that "the incidental restriction on alleged First Amendment freedoms is no greater than is essential to the furtherance of that interest."[520] Courts have interpreted the intermediate scrutiny test as a two-part analysis, requiring a court first to "determine whether the regulation materially advances an important or substantial interest by redressing past harms or preventing future ones" and second, to decide "whether the regulation is narrowly tailored to serve that interest."[521] The rules proposed in the NPRM would satisfy neither part of this test.

a. The Rules Proposed in the NPRM Fail the First Part of the Intermediate Scrutiny Test.

There is little doubt that the preservation of an open and free Internet is an "important or substantial government interest."[522] But the Commission must do more than merely point to a substantial interest in order to satisfy the first part of the intermediate scrutiny test. It must also demonstrate that its proposed regulation of speech would actually "further" that interest "by redressing past harms or preventing future ones."[523] And this is a demanding standard. The Supreme Court has explained that when the FCC "defends a regulation on speech as a means to . . . prevent anticipated harms, it must do more than simply 'posit the existence of the disease

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519 *Fox Television Stations, Inc. v. FCC*, 280 F.3d 1027, 1041 (D.C. Cir. 2002) ("[I]intermediate scrutiny . . . is more demanding than the arbitrary and capricious standard of the APA.") (internal quotation marks omitted).

520 *Turner*, 512 U.S. at 662.

521 *Satellite Broad. & Commcn's Ass'n v. FCC*, 275 F.3d 337, 355-56 (4th Cir. 2001).

522 *Turner*, 512 U.S. at 662.

523 *Id.*; *Satellite Broad. & Communications Ass'n*, 275 F.3d at 355-56.

sought to be cured.' It must demonstrate that the recited harms are real, not merely conjectural, and that the regulation will in fact alleviate these harms in a direct and material way."[524]

As discussed above, the Commission has identified no genuine problem to be solved. It can point to only two isolated incidents—both of which were resolved voluntarily—and it offers no evidence supporting its prediction that there is significant risk of future harm. This lack of evidence forecloses the proposed rules under the Administrative Procedure Act, as described above—but it is even more obviously fatal from a First Amendment perspective. As the Supreme Court has made clear, "the mere assertion of dysfunction or failure in a speech market, without more, is insufficient to shield a speech regulation from the First Amendment standards[.]"[525] For this reason, the D.C. Circuit has not hesitated to reject FCC rules that affect speech where "the Commission has failed entirely to determine whether the evil the rules seek to correct is a real or merely a fanciful threat."[526] As that court has explained, when seeking to regulate speech, the FCC must build "a record that convincingly shows a problem to exist," and where "there is no evidence of any urgent need for preventive action," the agency is not entitled to the "benefit of the doubt."[527]

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524 *Turner*, 512 U.S. at 664. *See also Edenfield v. Fane*, 507 U.S. 761, 770-71 (1993) (the burden to show that the state interest is advanced by the regulation on speech "is not satisfied by mere speculation or conjecture; rather, a governmental body seeking to sustain a restriction on commercial speech must demonstrate that the harms it recites are real and that its restriction will in fact alleviate them to a material degree"); *Interactive Digital Software Ass'n v. St. Louis County*, 329 F.3d 954, 959 (8th Cir. 2003) (quoting *United States v. Playboy Entm't Group, Inc.*, 529 U.S. 803, 822 (2000)) ("[w]here first amendment rights are at stake, the Government must present more than anecdote and supposition" as a justification for burdening speech).

525 *Turner*, 512 U.S. at 640.

526 *Quincy Cable TV, Inc. v. FCC*, 768 F.2d 1434, 1463 (D.C. Cir. 1985) (internal quotation marks omitted).

527 *Home Box Office, Inc. v. FCC*, 567 F.2d 9, 50, 37 n.60 (D.C. Cir. 1977).

b. The Rules Proposed in the NPRM Also Fail the Second Part of the Intermediate Scrutiny Test.

The second part of the intermediate scrutiny test requires the Commission to demonstrate that the "restriction on alleged First Amendment freedoms" caused by the proposed rules "is no greater than is essential to the furtherance of" the Commission's interest in promoting a free and open Internet.[528] The Supreme Court has explained that this part of the test requires a finding "that the means chosen do not 'burden substantially more speech than is necessary to further the government's legitimate interests.'"[529]

The NPRM fails this test as well. The proposed "solution" is much broader than necessary to solve the "problems" identified by the Commission. Again, the two incidents cited by the Commission were quickly and voluntarily remedied under the *existing policy regime*. The Commission has failed to explain why that regime—supplemented by case-by-case enforcement of existing antitrust and consumer-protection laws—is somehow insufficient to prevent any similar harms that the Commission believes might develop in the future. In any event, the two cited incidents relate to *blocking*—conduct that bears no relationship to the line-of-business restriction that the Commission proposes in the guise of a draconian "nondiscrimination" rule. Indeed, such a rule would have been utterly ineffective to prevent such misconduct. *See* Discussion § I.C, *supra*. The NPRM's separate speculation about other types of "problems" that *might* evolve someday in the future is untenable even as a theoretical matter, for the reasons discussed in Section III of the Discussion above. And in any event, the NPRM nowhere explains how, even if that theoretical speculation were plausible, it could justify the imposition of prophylactic rules *now* rather than in the future, if and when any problem actually arises.

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528 *Turner*, 512 U.S. at 662 (quoting *U.S. v. O'Brien*, 391 U.S. 367, 377 (1968)).

529 *Turner*, 512 U.S. at 662 (citing *Ward v. Rock Against Racism*, 491 U.S. 781, 799 (1989)). *See also Time Warner*, 240 F.3d at 1130 (same).

Nor, as a matter of remedy, could the Commission explain how categorical bans on "discrimination" and business-to-business QoS arrangements could be necessary to protect the Internet. As discussed above, in nearly every other context where the Commission has been concerned about discrimination, it has limited its prohibitions to *unjust* and *unreasonable* discrimination. The Commission has made no showing that would explain why it is essential that its ban here also extend to economically efficient *differentiation*, so that an ISP is prohibited from reaching individually tailored deals concerning the way that it transmits different content or applications. Nor has the Commission explained why providers may not enter into *commercial arrangements* with content or application providers that involve high-quality presentation of their offerings.

Finally, the proposed rules would also be unlawfully underinclusive in that they would not reach content-delivery networks, search providers, and other service providers that likewise have an effect on the free flow and accessibility of information on the Internet. Regulation of speech "can violate the First Amendment by restricting too little speech, as well as too much."[530] For example, in *City of Cincinnati v. Discovery Network, Inc.*, the Supreme Court invalidated a ban on newsracks containing "commercial handbills," but not on newsracks containing newspapers, because there was not a "reasonable fit" between the government's stated interest in aesthetics and the means chosen by the government to further that interest.[531] The Commission's

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[530] *National Fed'n of the Blind v. FTC*, 420 F.3d 331, 345 (4th Cir. 2005).

[531] 507 U.S. 410, 416-19 (1993). *See also Rubin v. Coors Brewing Co.*, 514 U.S. 476, 488 (1995) (law prohibiting disclosure of alcoholic strength on beer labels, but not in advertising or on wine or liquor labels, prevented material advancement of asserted interest in limiting so-called alcoholic-beverage "strength wars"); *Florida Star v. B.J.F.*, 491 U.S. 524, 540-41 (1989) (law prohibiting disclosure of identity of victim of sexual offense in any "instrument of mass communication," but permitting disclosure by other means, does not satisfactorily serve asserted interest in privacy); *Arkansas Writers' Project, Inc. v. Ragland*, 481 U.S. 221, 232 (1987) (provision conferring tax exemption upon religious, professional, trade, and sports journals, but

proposal to impose burdensome speech limitations on Internet service providers, while neglecting to impose any regulation at all on other parties who pose an equal or even greater threat to the "openness" of Internet, renders the Commission's proposed rules fatally underinclusive and thus inconsistent with the First Amendment.

2. The Commission's Proposed Rules Would Impermissibly Restrict the Free Speech Rights of Content and Application Providers.

The Commission's rules would also violate the free-speech rights of content and application providers (including AT&T itself) that may seek to enter into prioritization and enhancement arrangements with ISPs in order to improve the quality of their offerings and ensure that their "speech" is heard in a certain manner and by the widest audience possible. These "speakers" may want to offer commercial services, entertainment content, or even political speech—and they may determine that an arrangement with an ISP (such as a multicasting arrangement) is the least expensive way to get their message to the most people with the highest quality and assurance. Indeed, as noted above, Microsoft, Yahoo!, and Amazon have all expressed an interest in having the ability to enter into service-enhancement arrangements with broadband access providers; content providers seeking to provide their content in exceptionally secure ways to avoid copyright infringement might have a similar interest in reaching special types of transmission arrangements. Yet under the rules proposed in the NPRM, content and application providers would be precluded from reaching such a deal under any circumstances. Instead, they would be required to speak no differently from any other speaker on the Internet.

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not general interest magazines, did not adequately serve interest in encouraging fledgling publications); *Smith v. Daily Mail Publ'g Co.*, 443 U.S. 97, 104-05 (1979) (statute punishing newspaper disclosure of identity of juvenile offender, but allowing disclosure through other media, did not accomplish stated purpose of preserving juvenile's anonymity).

The NPRM makes clear that its preclusion of enhanced speech arrangements is designed to ensure that *other*, "unenhanced" voices on the Internet are heard; in the Commission's view, this will ensure the broadest possible diversity of ideas on the Internet.[532] But as the Supreme Court has made clear, "the concept that government may restrict the speech of some elements of our society in order to enhance the relative voice of others is wholly foreign to the First Amendment. . . . The First Amendment's protection against governmental abridgement of free expression cannot properly be made to depend on a person's financial ability to engage in public discussion."[533] Similarly, the Court has noted that "control[ling] the volume of expression by the wealthier, more powerful corporate members of the press in order to 'enhance the relative voices' of smaller and less influential members . . . contradicts basic tenets of First Amendment jurisprudence."[534]

Indeed, suppressing or encumbering some speech in order to ensure a diversity of other viewpoints constitutes government promotion of some types of *content* at the expense of others. As the Supreme Court has recognized, "the State's asserted interest in exposing appellant's customers to a variety of viewpoints is not—and does not purport to be—content neutral."[535] And content-based speech regulations are deemed "presumptively invalid" and subjected to the

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532 *See, e.g.*, NPRM ¶¶ 75-78 (discussing relationship between regulation and diversity of ideas); *id.* ¶ 116 ("Would any burden on access providers' speech be outweighed by the speech-enabling benefits of an open Internet that provides a non-discriminatory platform for the robust interchange of ideas?"); *see also* Statement of Commissioner Clyburn at 103 (discussing "[a]n open Internet" as "the great equalizer").

533 *Buckley v. Valeo*, 424 U.S. 1, 48-49 (1976). *See also Meyer v. Grant*, 486 U.S. 414, 424 (1988) (same); *Tornillo*, 418 U.S. 241.

534 *First Nat'l Bank of Boston v. Bellotti*, 435 U.S. 765, 791 n.30 (1978).

535 *Pacific Gas & Elec. Co. v. Public Util. Comm'n*, 475 U.S. 1, 20 (1986). *See also Turner*, 512 U.S. at 677 (O'Connor, J., concurring and dissenting in part) ("Preferences for diversity of viewpoints . . . make reference to content."); *Tornillo*, 418 U.S. at 256-58.

highest level of First Amendment scrutiny.[536] In order to satisfy the strict scrutiny standard, the Commission must demonstrate that its rules are narrowly tailored to achieve a compelling government interest.[537] For all the reasons set forth above, however, the proposed rules—which do not survive *intermediate* scrutiny—certainly could not survive strict scrutiny.[538]

The Commission's proposed prohibition on enhancement of content and application providers' speech would violate those entities' free speech rights for another reason as well. As the Supreme Court has explained, "[t]he First Amendment protects [the speaker's] right not only to advocate their cause but also to select what they believe to be the most effective means for so doing."[539] Indeed, "[t]he First Amendment mandates that we presume that speakers, not the government, know best both what they want to say and how to say it."[540] In the same way that the First Amendment precludes the government from adopting even a content-neutral *ban* on the use of megaphones (as opposed to a time, place, or manner restriction), the Commission cannot

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536 *Davenport v. Washington Ed. Ass'n*, 551 U.S. 177, 187-88 (2007).

537 *See, e.g.*, *Playboy Entm't Group*, 529 U.S. at 813.

538 This same strict scrutiny standard also could be triggered by the restrictions that the Commission's rules impose on the speech of ISPs. In *Turner*, the Supreme Court noted that the intermediate scrutiny standard applied because the must-carry rules were *not* content-based restrictions; here, by contrast, the Commission has justified its net neutrality rules on the ground that they promote a diversity of viewpoints and level the playing field for all speakers. *Compare Turner*, 512 U.S. at 658 ("*Buckley* thus stands for the proposition that laws favoring some speakers over others demand strict scrutiny when the legislature's speaker preference reflects a content preference."), *with id.* at 655 (distinguishing the must-carry rules from content-based restrictions by noting that the former "do not grant access to broadcasters on the ground that the content of broadcast programming will counterbalance the messages of cable operators").

539 *Meyer*, 486 U.S. at 424 (invalidating statute prohibiting payment of circulators of initiative petitions). *See also Riley v. Nat'l Fed'n of the Blind*, 487 U.S. 781, 790-91 (1988) ("[T]he government, even with the purest of motives, may not substitute its judgment as to how best to speak for that of speakers and listeners . . . .").

540 *Riley*, 487 U.S. at 790-91 (invalidating limitations on professional solicitors for charitable contributions, and rejecting the "premise that charities' speech must be regulated for their own benefit").

ban whole categories of business-to-business QoS arrangements needed to provide enhanced or priority services.[541] In fact, even if the Commission's rules could be viewed as merely *restricting* the use of such services (and not banning them altogether),[542] the Commission would need to demonstrate that those rules survive intermediate scrutiny.[543] As discussed above, the Commission cannot do so here.

D. The Takings Clause Bars the Commission from Adopting the Rules Proposed in the NPRM.

The Fifth Amendment's Takings Clause provides that "private property" shall not "be taken for public use, without just compensation."[544] The Commission's proposed rules would violate this command because they would effect an uncompensated taking of private property.

1. Adoption of the Proposed Rules Would Constitute a Physical Taking of Internet Service Providers' Property.

The rules proposed in the NPRM would result in physical occupation of Internet service providers' networks. By forcing providers to carry unwanted data on their physical facilities, and to build out more bandwidth capacity in order to support third-party providers' data, the rules would require Internet service providers to surrender their property for third-party use without an opportunity for just compensation.

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541 *Ward*, 491 U.S. at 790-91 (holding that content-neutral restrictions on the volume of concert loudspeakers implicate the First Amendment). *See also Riley*, 487 U.S. at 790 n.5 (a "statute regulating *how* a speaker may speak directly affects that speech") (emphasis added).

542 Although the rules might allow such services to be provided so long as they constitute "reasonable network practices" and are offered free of charge, this does not suffice to remedy the significant First Amendment infirmities of the Commission's rules. As the Supreme Court has recognized, a rule violates the First Amendment if it would lead to "chill and uncertainty" that might "encourage [speakers] to cease engaging in certain types of" speech or arrangements. *Riley*, 487 U.S. at 794.

543 *Ward*, 491 U.S. at 791.

544 U.S. Const. amend. V.

It is well established that the Takings Clause precludes the government from compelling a party to allow physical occupation of its property without just compensation.[545] And this constitutional protection has been applied in the communications context to invalidate Commission orders requiring service providers to permit third parties to make use of their physical facilities without just compensation. In *Bell Atlantic Telephone Cos. v. FCC*, for example, the D.C. Circuit explained that "[t]he Commission's decision to grant [competitive access providers] the right to exclusive use of a portion of the petitioners' central offices directly implicates the Just Compensation Clause of the Fifth Amendment, under which a 'permanent physical occupation authorized by government is a taking without regard to the public interests that it may serve.'"[546]

Even if Internet service providers have no intention of excluding lawful traffic based on content, the Commission's proposed rules would require them to build out more capacity solely to support data that they might otherwise carry through intelligent quality-of-service arrangements. Thus, these additional facilities would be dedicated exclusively to others' data. Beyond this, there might be contexts where an ISP determines that certain traffic must be blocked—permanently or temporarily—either for network management purposes,[547] or because the provider wants to provide a tailored service (such as a child-friendly wireless smartphone offering, or a GPS device with basic Internet search capabilities). And as the Supreme Court has

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545 *See, e.g.*, *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419, 426 (1982).

546 24 F.3d 1441, 1445 (D.C. Cir. 1994) (quoting *Loretto*, 458 U.S. at 426).

547 The proposed exclusion for reasonable network management is no answer: The *Commission* is the final arbiter of what constitutes "reasonable" network management, and if its assessment differs from that of the provider, the ISP will be forced to carry the problematic application or content against its will.

held, "[t]he right to exclude others is generally one of the most essential sticks in the bundle of rights that are commonly characterized as property."[548]

The inability to "exclude" would have the most burdensome implications in the wireless context, where spectrum is tightly constrained. Being forced to carry bandwidth-intensive applications, for example, could "occupy" all of a wireless provider's available spectrum in a particular geographic area. Wireless carriers have paid billions for the right to use their spectrum, and they have a protectable interest in that spectrum during their period of exclusive use. As the Third Circuit has held, "[t]he Communications Act itself seems to imply the existence of a limited property right in an FCC license once it is granted. Section 301 states that no license is to be 'construed to create any right, *beyond the terms, conditions, and periods* of the license.' 47 U.S.C. § 301 (emphasis added). We think this section implies the creation of rights akin to those created by a property interest limited only by the 'terms, conditions and periods of the license.'"[549]

2. Adoption of the Proposed Rules Also Would Effect a Regulatory Taking.

The proposed rules also stand to effect a *regulatory* taking of Internet service providers' property. Whether an administrative action impermissibly takes property turns on the three factors set out in the Supreme Court's decision in *Penn Central Transportation Co. v. City of New York:* namely, the economic impact of the regulation; the extent to which the regulation

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548 *Ruckelshaus v. Monsanto Co.*, 467 U.S. 986, 1011 (1984) (internal quotation marks omitted).

549 *In re Atlantic Bus. & Cmty. Dev. Corp.*, 994 F.2d 1069, 1074 (3rd Cir. 1993). *Cf. United States v. General Motors Corp.*, 323 U.S. 373, 374-75, 378 (1945) (reasoning that the Takings Clause "is addressed to every sort of interest the citizen may possess").

interferes with legitimate investment-backed expectations; and the character of the governmental action.[550]

The Commission's proposed rules would have a severe economic impact on Internet service providers like AT&T.[551] As an initial matter, they would gut the economic value of several lines of business and render them unprofitable. In particular, the rules would interfere with Internet service providers' freedom to use their property to engage in the quality-of-service business, which represent a significant and growing industry in the Internet marketplace. The rules would limit AT&T's ability to earn a return from the substantial investment it has made in physical infrastructure, spectrum, and technology, and it could deprive AT&T of ongoing revenue streams from the QoS services it provides today.

Further, the rules' prohibition on various activities would severely undermine AT&T's and other ISPs' investment-backed expectation of freedom from precisely this type of common-carriage regulation.[552] As discussed above, in order after order the Commission has expressed an intention to impose only minimal or *no* regulation on Internet access services, and the Commission's orders have been affirmed by the courts. *See* Discussion § VIII.B.1, *supra.* AT&T and its shareholders have invested billions in broadband networks with the reasonable expectation that broadband Internet access services—which the Commission has decisively concluded should remain unregulated (*see* Discussion § I.A, *supra*)—would *remain* free of regulation. Yet the Commission's proposed rules would render such investments unprofitable. Moreover, application of the net neutrality rules to *wireless* broadband services would further compound the problem. As discussed above, the Commission announced in the *700 MHz Order*

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550 438 U.S. 104, 124 (1978).

551 *Id.*

552 *Id.*

that it would not impose any "openness" requirements on wireless providers until after conducting its "open platform" experiment *exclusively* in the 700 MHz C Block. *See* Discussion § VIII.B.4, *supra.* Extending net neutrality obligations to non-C-Block licensees, after inducing them to pay *billions of dollars more* for their spectrum based on the assurance that they could *avoid* such obligations, would constitute a clear interference with legitimate investment-backed expectations.

Finally, as discussed above, the Commission's rules constitute a physical invasion of the networks of Internet service providers.[553] Although the Supreme Court has explained that the key elements of the regulatory takings analysis are "the magnitude of a regulation's economic impact and the degree to which it interferes with legitimate property interests,"[554] a regulatory takings claim is stronger when the challenged regulation "amounts to a physical invasion" and does not "merely affect[] property interests through 'some public program adjusting the benefits and burdens of economic life to promote the common good.'"[555] Here, the Commission's proposed rules *do* constitute such an invasion, and thus all three elements of the *Penn Central* test are met here. Accordingly, adoption of the Commission's rules would constitute a regulatory taking.[556]

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553 *Penn Central*, 438 U.S. at 124.

554 *Lingle v. Chevron U.S.A. Inc.*, 544 U.S. 528, 540 (2005).

555 *Id.* at 539 (quoting *Penn Central*, 438 U.S. at 124).

556 Finally, the proposed rules would also effect a "confiscatory" regulatory taking. As discussed (*see* Engineering Background § D.1, *supra*), maintaining the quality and reliability of service that consumers expect in the face of increased Internet traffic volumes will require Internet access providers to engage in the prioritization of some classes of traffic, such as VoIP or streaming video. Yet the proposed rules prohibit Internet access providers from prioritizing content or charging content and application providers for the additional costs necessary to assure quality of service. In essence, the rules would require providers to engage in the relevant prioritization business for free, since the only other choice—no prioritization at all—is not an option, for reasons we have discussed. Moreover, the solution proposed in the NPRM—that

CONCLUSION

For the foregoing reasons, the Commission should retain the existing four principles but not harden them into prescriptive rules; it should add neither a rule nor a principle resembling the strict "nondiscrimination" rule proposed here; it should adopt a "transparency" principle but orient it to the information consumers need to make informed choices among providers; and it should allow the wireless broadband marketplace to continue evolving unimpeded by regulatory intervention.

Respectfully submitted,

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providers begin charging end users more depending on the applications they choose—would be untenable from both a business and administrative perspective. *See* Discussion § III.B.6.b, *supra*. Using regulation to force a business to operate a service at a loss, as the proposed rules would do here, is an unconstitutional taking. *See Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591, 603 (1944) (holding that the return on the regulated service "should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital"). Moreover, it is of no constitutional import that providers can charge for other Internet services; regulations that force a provider to offer even one service unprofitably violate the Takings Clause. *See Brooks-Scanlon Co. v. R.R. Comm'n*, 251 U.S. 396, 399 (1920) ("The plaintiff may be making money from its sawmill and lumber business but it no more can be compelled to spend that [profit] than it can be compelled to spend any other money to maintain a railroad for the benefit of others who do not care to pay for it.").