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A LAYERED MODEL FOR INTERNET POLICY

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INTRODUCTION

It has been clear for some time that the Internet will challenge the regulatory and business models governing communications in the US.[1] When Internet usage was miniscule compared to traditional services such as circuit-switched voice, such conflicts could safely be swept under the rug. Those days are over. With over 130 million North American Internet users[2] and Internet protocol (IP)-based offerings competing directly with traditional services, the time for a coherent Internet policy framework is fast approaching.

This paper describes what such a framework might look like. Rather than mechanically applying outmoded categories to novel converged services, regulators should reformulate communications policy with the Internet at the center. Tactical steps will be necessary to avoid disruptions during the transitional period. Beyond that, the best place to start is with the technical architecture of the Internet itself, which differs in important ways from that of traditional telecommunications and broadcast networks. The horizontal service and geographic classifications that have governed communications regulation since the passage of the Communications Act of 1934 should be reconceived in terms of vertical layers. Different policy approaches should be used for each layer, and regulators should turn their attention from pricing to the openness of interfaces between layers and competing services.

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[1] *See, e.g.*, Kevin Werbach, **Digital Tornado** (Federal Communications Commission Office of Plans and Policy Working Paper No. 29), March 1997, available at http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp29pdf.html (Digital Tornado); David Isenberg, "The Rise of the Stupid Network," available at http://www.rageboy.com/stupidnet.html (Stupid Network). This paper focuses on the particulars of communications policy in the US. However, the Internet is a global phenomenon. Specific rules differ from country to country, but the basic framework described herein is equally relevant elsewhere.

[2] US Department of Commerce, **Digital Economy 2000** (June 2000) at 8.

Communications policy as a subset of Internet policy

There are two ways to think about the application of communications regulation to the Internet. The first is to parse existing laws and regulations, then figure out how Internet-based services fit into those frameworks. Where tensions arise and the answer is not obvious, the Federal Communications Commission (FCC) and Congress attempt to extend the existing rules to cover the new Internet services in a reasonable way. Policy normally gets made in this manner. The other option is to start from the policy goals that undergird the legal structure, and from an understanding of the technological changes that the Internet heralds. This latter approach is the only way to achieve appropriate results when, as is the case with the Internet, the new services fundamentally undermine the assumptions of the current regulatory structure.

The Internet is going to swallow telecommunications. Data traffic is growing much faster than voice, and promises to dominate capacity demands on all major networks (if it doesn't already).[3] All current and future communications switching and transport systems are digital, which means that at the basic technical level voice and data are interchangeable. A voice network cannot comprehend data, except as unintelligible noise, but a data network sees voice as simply a form of data with certain encoding and quality-of-service characteristics. Over the past several years, policy-makers have begun to acknowledge that the networks of the future will be data networks that carry voice, video and other services, rather than service-specifics networks jury-rigged to pass data traffic.[4] Yet there is a necessary corollary that is rarely articulated: communications policy will be a subset of Internet policy, rather than the reverse.

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[3] For a survey of available data about Internet traffic growth rates, *see* K.G. Coffman and Andrew Odlyzko, "Internet Growth: Is There a 'Moore's Law' for Data Traffic?" (preliminary version), available at http://www.research.att.com/~amo/doc/internet.moore.pdf.

[4] *See, e.g.* speech by Reed Hundt to IEEE Hot Chips symposium, "The Internet: From Here to Ubiquity," (August 26, 1997), available at http://www.fcc.gov/Speeches/Hundt/spreh742.html ("We need a data network that can easily carry voice, instead of what we have today, a voice network struggling to carry data.").

To date, the FCC has followed a policy of "unregulation" towards the Internet.[5] This approach has fostered the growth of pro-competitive and innovative new services, but it also left many essential questions unanswered.[6] For example, the FCC has never ruled on whether phone-to-phone IP telephony providers must contribute to universal service funding, whether Internet backbone providers are bound by common-carrier non-discrimination obligations, or whether broadband Internet services over cable infrastructure is subject to any of the rules governing telecommunications carriers or cable operators. It has wisely chosen to avoid premature initiation of rulemaking proceedings, and has recognized the dangers of regulatory intervention in competitive, fast-moving markets. It is true that some questions are best left un-asked, at least for a period of time. At some point, though, the costs in regulatory uncertainty and market distortions of not asking – and answering – those questions will exceed the benefits of a "hands-off" policy.[7]

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[5] *See* Jason Oxman, **The FCC and the Unregulation of the Internet** (Federal Communications Commission Office of Plans and Policy Working Paper No. 31), July 1999, available at http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp31.pdf (Oxman working paper).

[6] For example, the legal status of IP telephony was formally brought before the FCC more than four years ago in the so-called ACTA petition. *See* America's Carriers Telecommunication Association (ACTA) Petition for Declaratory Ruling, Special Relief, and Institution of a Rulemaking relating to the provision of interstate and international interexchange telecommunications service via the "Internet" by non-tariffed, uncertified entities, RM 8775 (March 4, 1996). The Commission has yet to formally define the status of such services in a rulemaking proceeding.

[7] For example, if the unregulation of the Internet means the regulatory treatment and pricing of functionally identical services depends solely on the protocols that carriers employ, those carriers will have incentives to build services around the regulatory categories rather than normal business considerations. This does not mean that the FCC should always seek to ensure a "level playing field," because sometimes the status of the company providing the service justifies differential treatment. *See infra* pp. tk. Given the choice, regulators should err on the side of deregulation, but they should regularly reassess the balance.

THE EXISTING REGULATORY FRAMEWORK

Before discussing the future of communications policy, it's useful to understand its past.[8] The particular tensions the Internet creates derive from the deep structure of the current regulatory framework.

Horizontal categories

Communications policy has traditionally been organized around horizontal divisions between service categories and between geographic regions. The Communications Act of 1934 (1934 Act) began with a catch-all jurisdictional grant to the FCC in Title I, then defined two basic regulated categories: Title II common carriers (wireline voice telephone companies) and Title III users of radio spectrum (radio communications and subsequently television broadcasters).[9] Over time, new services arose that didn't fit the existing paradigm – most prominently cable television services that were both wired and broadcast. In response, the Commission and Congress simply created new horizontal categories with different rules.[10] The 1934 Act also divided communications along geographical lines. The FCC has jurisdiction over interstate services, while state public utility commissions and local authorities oversee intrastate communications.

This model presumes that regulators can assign every service to a specific category. A company can provide two different services, such as a Bell Operating Company that owns cellular licenses in addition to offering wireline telephony. Or an offering may be split geographically, such as basic telephone service, which includes state-regulated

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[8] For a more thorough treatment, see Oxman working paper, *supra* note 5.

[9] *See* 47 USC 151 et seq.

[10] The organization of the FCC into subject-area Bureaus, and the introduction of new Bureaus such as Cable Services, tracks this framework. When it comes to its operational structure, the FCC appears to recognize that the horizontal model isn't appropriate for the coming Internet era. The Commission's proposed restructuring calls for the Bureau structure to be revamped. See "A New FCC for the 21st Century: Draft Strategic Plan," August 12, 1999, available at http://www.fcc.gov/21st_century/draft_strategic_plan.pdf.

local service and FCC-managed interstate access. Different rules simply apply on each side of the line. In the era of analog networks, this model was relatively easy to implement, as each service had discrete physical plant and outputs. For example, telephone networks carried voice, while over-the-air television networks carried broadcast video. Companies that controlled the physical infrastructure also controlled the service definitions, and were generally granted *de jure* or *de facto* monopolies within a defined area. The post-*Carterphone* deregulation of telephony, culminating in the court-ordered breakup of AT&T, gave end-users and competitive carriers the ability to plug into the network in new ways. These new participants, however, simply inhabited new, easily-defined horizontal categories.

The introduction of computers into communications networks challenged the horizontal model.[11] Data services, such as store-and-forward voice mail or value-added networks (VANs) like Compuserve, began to operate *on top of* the voice network. The companies that offered these services were not providing phone service, yet they were delivering something to customers over regulated communications networks. How to classify these services under the horizontal model?

To resolve this conundrum, the Commission launched the Computer Inquiries.[12] In essence, the Computer Inquiries added a new horizontal category, enhanced services, carved out of the existing Title II rules.[13] Over two decades, the Commission struggled to refine its framework for enhanced services, particularly with regard to the provision of those services by incumbents (especially pre-divestiture AT&T, then the Bell Operating Companies). When the FCC developed the interstate access charge system, for example, it defined enhanced service providers (ESPs) as end-users, thus not subject

[11] Digitalization came to wireline telephone networks much sooner than to wireless (which only changed over in the last five years or so) and broadcast (which has only begun to switch to digital television). Telephone networks are also relatively ubiquitous and inherently bi-directional, which made them the preferred platform for most computer-driven applications. Consequently, existing policies for hybrid communications and computing services primarily apply to telecommunications.

[12] *See* First Computer Inquiry, 7 FCC 2d 11 (1966).

[13] The basic/enhanced distinction made its first appearance in *Computer II*, but it drew on concepts the Commission had earlier articulated in *Computer I*. *See* Oxman working paper, *supra* note 5.

to per-minute access charges.[14] This "ESP exemption," first enacted in 1983, has been the subject of vigorous debate and lobbying ever since.

The Telecommunications Act of 1996 (1996 Act) changed many things, but it retained the horizontal model of communications policy. The FCC's basic/enhanced distinction was effectively codified in the 1996 Act's split between "telecommunications" and "information service":[15]

> The term "telecommunications" means the transmission, between or among points specified by the user, or information of the user's choosing, without change in the form or content of the information as sent and received.[16]
>
> The term "information service" means the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications...."[17]

When the 1996 Act was signed, the Internet and the World Wide Web were already a factor in public consciousness, but were far less significant than they are today. Moreover, the 1996 Act culminated several years of legislative effort, much of which occurred before the Internet existed in its present form. Consequently, the 1996 Act mentions the Internet only once, in the "Communications Decency Act" (CDA) restrictions on indecent online content.[18] Thought it was designed to modernize communications law and involved the

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[14] *See* MTS and WATS Market Structure, 97 FCC 2d 682, 711-22 (1983).

[15] *See* Federal-State Joint Board on Universal Service, Report to Congress, CC Docket No. 96-45 (April 10, 1998) (Stevens Report), at 16-25.

[16] 47 USC 153 (43).

[17] 47 USC 153 (20).

[18] The CDA was later struck down by federal courts. *See* Reno v. ACLU, 521 U.S. 844, 117 S. Ct. 2329, 138 L. Ed. 2d 874 (1997).

most sweeping revisions since 1934, the 1996 Act simply did not contemplate the radical changes the Internet is bringing to the communications world.

What to do about the Net?

Absent clear Congressional guidance, the FCC has had to formulate its own Internet policy within the legal constraints of the 1996 Act. The Commission managed to avoid imposing traditional telecommunications regulation on Internet-based services through a careful process of decisions and non-decisions. When commercial Internet service providers (ISPs) began offering service in the early 1990s, they were classed as ESPs and therefore not subject to regulated pricing or other obligations. That distinction become more difficult to defend as services such as Internet telephony and streaming video bearing close resemblance to traditional regulated offerings came into existence.

The basic problem is that the hermetically-sealed categories at the core of the horizontal approach are foreign to the Internet. Unlike traditional communications networks, the Internet was not developed to provide a particular kind of service. It was created to interconnect networks (hence the name Inter-net). When the goal is universal connectivity, networks cannot be distinguished on the basis of services, physical infrastructure or geographical location. Tautologically, the Internet is made up of all interconnected networks that can carry the Internet protocol (IP).[19] IP was deliberately designed as a lowest-common-denominator, so that a service such as the World Wide Web can run over everything from Sun workstations on corporate networks to smart mobile phone handsets to television sets using digital cable set-top boxes. And IP is a packet-switching protocol, meaning that information is broken into small "packets" that are independently routed to their destination without defining specific connection paths in advance.[20]

[19] Private IP-based networks are known as intranets.

[20] *See* Digital Tornado, *supra* note 1, at 17-18.

SQUARE PEGS IN ROUND HOLES

Because of its unique characteristics, the Internet creates problems for the dominant horizontal categorization approach. Reciprocal compensation and broadband open access provide two examples of the tensions that arise.

Reciprocal compensation

Under the 1996 Act, local exchange carriers (LECs) are required to pay each other reciprocal compensation for the transport and termination of local traffic.[21] Reciprocal compensation rates are set in state-level negotiation and arbitration proceedings under a cost-based pricing standard ("a reasonable approximation of the costs of terminating such calls.")[22] Reciprocal compensation only applies to *local* traffic; interstate traffic is covered by the FCC's access charge rules. This distinction matters a great deal in practice, not just because of the level of the charges, but because of their direction. Access charges are paid by the carrier in the middle of the call (the inter-exchange carrier (IXC)) to the local carriers at either end (the LECs). Thus, for originating traffic, the LEC gets paid for bringing traffic to the IXC. When reciprocal compensation applies, however, the *terminating* carrier always receives the payment, to recoup the costs of transporting the other carrier's traffic to its destination.[23]

The reciprocal compensation regime works fine if end-users make and receive about the same number of calls. A CLEC would therefore pay about as much in reciprocal compensation as it received, unless it had a significantly different cost structure than carriers with which it interconnected. But if traffic is unbalanced, CLECs can become either net payers or net recipients of reciprocal compensation. Asymmetric traffic exists

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[21] *See* 47 USC 251(b)(5).

[22] *See* 47 USC 252(d)(2).

[23] The difference makes sense in the existing pricing regime, because it reflects the different billing arrangements for local and long-distance calls. For local calls, the customer pays his or her LEC, meaning that a terminating CLEC has no way to recoup its costs directly. For long-distance calls, the customer pays his or her IXC, which makes the originating LEC the one in need of compensation.

in the world of traditional telecommunications – think telemarketing or customer-support call centers. However, dial-up ISPs are a source of much more traffic. End-users of dial-up ISPs call to initiate an Internet connection; the Internet does not call them.[24] By exploiting the structure of the reciprocal compensation rules, CLECs serving ISPs have amassed aggregate reciprocal compensation balances of several billion dollars.[25]

As reciprocal compensation balances ballooned, most ILECs refused to pay on the grounds that the traffic at issue was not local.[26] The Internet, they argued, is a global network, even if the call to an ISP is initially local. In a February 1999 declaratory ruling, the FCC attempted to split the difference.[27] It found that traffic to dial-up ISPs was not local. However, the FCC left existing state-level interconnection agreements in place, and sought comment on what a federal inter-carrier compensation regime should look like. The US Court of Appeals for the DC Circuit vacated the FCC's decision in March 2000, finding the Commission's jurisdictional analysis unpersuasive.[28] It remanded the issue to the Commission, where it remains pending.[29]

The reciprocal compensation controversy shows the failings of the horizontal approach for Internet services. First it is too rigid. A connection to a dial-up ISP has a definite origination point, but no destination in the same sense as a circuit-switched call. From

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[24] This scenario only applies for dial-up Internet access, since broadband connections are generally "always on" and therefore do not involve directional calls. Though broadband is growing, it represents only a small fraction of the Internet access customer base today. tk stats. tk – revise this to not imply that no recip comp applied to broadband. Also tk – look at the discussion in text to avoid implication that dial-up traffic is interstate.

[25] tk stats on reciprocal compensation balances.

[26] CLECs and their supporters pointed out in response that in state-level negotiations, the ILECs had opposed compensation-free "bill-and-keep" arrangements because they expected to be net recipients of traffic in most situations.

[27] *See* Implementation of the Local Competition Provisions in the Telecommunications Act of 1996; Inter-Carrier Compensation for ISP-Bound Traffic, Declaratory Ruling in CC Docket No. 96-98 and Notice of Proposed Rulemaking in CC Docket No. 99-68, FCC 99-38, 14 FCC Rcd 3689 (1999).

[28] *See* Bell Atl. Tel. Companies v. F.C.C., 206 F.3d 1 (D.C. Cir. 2000).

[29] The FCC recently sought comment on this issue. *See* Comment Sought on Remand of the Commission's Reciprocal Compensation Declaratory Ruling, CC Docket Nos. 96-98, 99-68, FCC 00-227 (June 23, 2000).

the user's perspective, a Website or an email address may be a destination, but there doesn't seem to be a separate "call" to each of these locations, just a stream of packets back and forth. And even if there were, it's not so clear what location should be assigned to a Website, which might reside on numerous mirrored servers and local caches around the world. Second, the horizontal paradigm means that relatively arbitrary classification decisions have excessively far-reaching consequences. If traffic is local, revenues flow in one direction, but if it is interstate they flow the opposite direction. The economics of the dial-up Internet business and the financial viability of many CLECs, turns on an obscure provision in the 1996 Act in a situation Congress appears to have not contemplated at all.

Open access

The debate over open access to broadband Internet access services shows another example of the flaws in the horizontal regulatory model. The Communications Act treats voice telephone networks as common carriers under Title II, and cable television networks under a separate set of rules in Title VI. This makes sense under the notion that telephone networks are wired networks that carry two-way voice communications, while cable networks are wired networks that carry one-way video programming. In fact, that's exactly how Title VI defines cable:

> [T]he term 'cable service' means – (A) the one-way transmission to subscribers of (i) video programming, or (ii) other programming service, and (B) subscriber interaction, if any, which is required for the selection or use of such video programming or other programming service.[30]

A "cable system" is defined as "a facility…that is designed to provide cable service."[31] Among other things, Title II networks are subject to common-carrier interconnection and non-discrimination requirements, along with the competitive and pricing rules the

[30] 57 USC 522(6).

[31] 47 USC 522(7).

1996 Act imposed depending on the status of a carrier as an incumbent.[32] Cable networks have special requirements about their use of video programming (for example, they must offer channel capacity on a "leased access" basis). But they have no requirement to interconnect with other cable providers or to treat content in a non-discriminatory way. Cable operators must choose some programming over others to fill their limited set of channels, so a common-carrier obligation wouldn't make any sense.

What happens, though, if cable networks and telephone networks carry the same services? The FCC first considered this issue when both types of operators attempted to offer the traditional service of the other. For telephone companies offering video programming, the FCC developed the video dialtone rules, superceded under the 1996 Act by the open video system rules.[33] Cable operators interested in offering telephony were subject to the same rules and requirements as any other new entrant in the local exchange market, described in section 251 and 252 of the 1996 Act.

But these rules aren't adequate to deal with broadband Internet access. Such services include elements of information, cable and telecommunications services. The end-user service resembles dial-up Internet access, which the FCC has classified as an information service, albeit faster and without the required phone call for each connection. Requesting and viewing Web pages and engaging in other Internet functions over a cable Internet connection also seems to be "subscriber interaction…required…for the…use…of…other programming services,"[34] which is part of the definition of cable service. This viewpoint is strengthened by the legislative history surrounding the addition of "or use" to this provision in the 1996 Act.[35] And finally, cable Internet service can be classed as telecommunications, in that the cable operator gives the subscriber a raw connection to an Internet backbone.

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[32] *See* 47 USC 251, 252.

[33] *See* 47 USC 571-573.

[34] 47 USC 522 (6)(B).

[35] *See* Barbara Esbin, **Internet Over Cable: Defining the Future in Terms of the Past**, FCC Office of Plans and Policy Working paper #30 (August 1998), available at http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp30.pdf.

This uncertainty has come to the fore in the "open access" debate. The leading cable operators have signed exclusive contracts with two broadband ISPs: Excite@Home and Roadrunner. Other ISPs that wish to serve those customers cannot do so over the cable plant. Moreover, the cable ISPs are able to impose content restrictions such as limitations on the length of video streams that subscribers can access. Such restrictions are unremarkable in the Title VI world of cable, but prohibited in the Title II world of common carriers. ISPs, consumer groups and content providers urged the FCC to mandate that the cable ISPs provide open access to their platforms, similar to what ILECs must do for their broadband digital subscriber line (DSL) services.

In February 1999, the FCC refused to address open access in a formal proceeding, arguing that the broadband market was too nascent for any regulatory intervention.[36] However, precisely because the Commission didn't open a proceeding, it did not rule on the jurisdictional classification of broadband Internet services or prohibit other regulatory authorities from adopting open access rules. When cities such as Portland, Oregon stepped into the breach through the required franchise transfers in the AT&T acquisition of TCI (a major Excite@Home participant), the jurisdictional question become critical. AT&T sued Portland, arguing that it didn't have the authority to impose open access requirements. On appeal, the 9th Circuit threw the parties (and the FCC) a curve. It concluded that the Excite@Home service was telecommunications, therefore outside the scope of the cable franchising authority.[37] This disposed of the case at hand, but opened up a can of worms at the federal level. If cable Internet services are telecommunications, does that make them subject to Title II requirements? And what about Internet access services over telephone networks, both dial-up and DSL?

[36] *See* Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations from Tele-Communications, Inc. to AT&T Corp., CS Docket No. 98-178, Memorandum Opinion and Order (February 18, 1999).

[37] *See* AT&T v. City of Portland, tk cite (9th Cir. June 22, 2000).

The FCC has announced that, in light of the Ninth Circuit decision in the Portland case, it will begin a proceeding on open access issues.[38] Whatever comes of that proceeding, it is clear that the Commission is in a difficult spot because of the limitations of its existing rules.

Coming soon: more problems

Open access is hardly the last case where the FCC will face such a dilemma. As broadband connections multiply, a whole new set of Internet services will become commercially viable. Internet telephony, which has so far been limited primarily to free PC-to-phone services and international calling, will become a much more direct competitor through next-generation voice-over-DSL hardware. It will become possible to distribute television-quality video programming over the Internet, competing directly with existing broadcast and cable offerings. Though the definition of broadcasting specifies use of the radio spectrum,[39] the Internet will eventually pose at least as great a competitive threat as early cable services did to over-the-air broadcasters. As they did in the cable situation, broadcasters will likely appeal to the FCC to impose a "level playing field," and the Commission will be hard-pressed to respond.

A BETTER WAY

There is a better way. Rebuilding communications regulation for the Internet era will not be easy, but it is possible. At the tactical level, the FCC should expressly acknowledge that the current period is one of transition, and that in such an era the tools of the past may not be the most appropriate guide. Then, going forward, the Commission should get out in front of the technological developments now underway and develop a new policy framework. This framework should replace horizontal

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[38] *See* FCC News Release, Fcc Chairman to Launch Proceeding on "Cable Access," June 30, 2000, available at http://www.fcc.gov/Bureaus/Cable/News_Releases/2000/nrcb0017.html.

[39] *See* 47 USC 153 (6) ("The term 'broadcasting' means the dissemination of radio communications intended to be received by the public....).

categories with vertical layers, definitional challenges with policy goals and price regulation with a focus on open networks.

The layered model is the primary focus of this paper. However, the intermediate steps are also important. Though putting a comprehensive structure into place is important, policy-makers should be sensitive to the transitional nature of the current environment. There won't be a flash cut to something better. First, such a change would be highly disruptive, as large sums of money depend on the regulatory and pricing arrangements now in place. Second, even if it were clear where communications regulation should go, getting there involves at the least FCC rulemaking proceedings, and most likely also Congressional action, both of which involve significant time lags, comment periods, negotiation processes and so forth.

The perfect should not be the enemy of the good

Communications policy is like sausage – even if you like the results, you may not want to know how it *really* gets made. Under the formal tenets of administrative law, the FCC is delegated authority by Congress to implement statutory mandates, with the courts serving as a check against "arbitrary and capricious" agency actions. This only tells part of the story. In theory Congress makes the hard decisions and delegates only the details to the expert agency, but in reality Congress often sets general policy frameworks and leaves it to the FCC to hammer out many of the hard issues. On the most important issues, Congressional dictates are seldom unambiguous. The cycle of contested FCC proceedings, often featuring formal or informal interjections by individual Members of Congress, followed by litigation and possible reversal the Commission, shows just how much reasonable minds can differ on these questions.

Though it has never been stated in this manner, the FCC Internet-related efforts to date have often been animated by a desire to avoid bad results.[40] In many cases, the results

[40] *See* Oxman working paper, *supra* note 5. There are certainly exceptions, including the schools and libraries or "E-Rate" program that has dramatically improved the rate of Internet connectivity at such institutions.

the Commission sees as potentially harmful appear to be dictated by the very statutes it is required to implement. Consequently, the Commission has often had to bide its time, and decide not to decide.

A good example is the FCC's April 1998 Report to Congress on Universal Service, known as the "Stevens Report."[41] The Commission was directed to issue the report by the Senate Appropriations committee, chaired by Senator Stevens of Alaska. Senator Stevens had made it quite clear that he believed the FCC was misguided in its treatment of Internet services, especially Internet telephony, which he felt should be subject to universal service obligations.[42] As part of its 1998 budget appropriation, the FCC was directed to deliver a report to Congress. The committee asked pointed questions, leaving little double what answers it expected:

> The report…shall provide a detailed description of the extent to which the Commission interpretations…are consistent with the plain language of the Communications Act…and shall include a review of…who is required to contribute to universal service…and of any exemption of providers or exclusion of any service *that includes telecommunications* from such requirement or support mechanisms…. (emphasis added)[43]

The Commission had previously reaffirmed that ISPs should not be subject to access charges, and had avoided imposing any Title II obligations on Internet telephony. It could not simply repeat these positions in the Stevens Report, because the appropriations language and committee pressure obligated it to explain specifically how services such as Internet telephony could be classed as "information services" and not "telecommunications services."

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[41] *See* Stevens Report, *supra* note 15.

[42] *See, e.g.*, statement of Senator Stevens, Universal Service Hearing, June 3, 1997, tk full cite ("I am concerned that the continued exemption of information service providers from access charges, with their inherent contribution to universal service, amounts to a continued subsidy by other telecommunications users.")

[43] *See* Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act, 1998, Pub. L. No. 105-119, 111 Stat. 2440, 2521-2522, § 623.

The FCC escaped the desired conclusion that Internet telephony was telecommunications by dividing Internet telephony into three categories: phone-to-phone, PC-to-phone and PC-to-PC. It acknowledged that phone-to-phone IP telephony, tentatively defined under a four-part test, was probably telecommunications:

> Thus, the record currently before us suggests that this type of IP telephony lacks the characteristics that would render them "information services" within the meaning of the statute, and instead bear the characteristics of "telecommunications services."[44]

The inordinate number of qualifiers in this sentence suggests how hesitant the Commission was to reach this conclusion.[45] By concentrating on the small number of commercial phone-to-phone IP telephony providers that provide the most extreme case of an Internet-based telecommunications service, the Commission remained true to its statutory mandate while avoiding the minefield of the ESP exemption.[46] Remarkably, this most tentative and vague of conclusions remains the Commission's most direct statement on the regulatory status of IP telephony more than two years later. Though USWest and BellSouth made noises after the Stevens Report was issued seeking to impose access and universal service charges on IP telephony providers, the Commission has taken no action and the situation remains largely where it was before the Stevens Report.[47] The report took the pressure off the Commission, allowing the Internet industry to develop without the threat of imminent regulatory intervention.

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[44] Stevens report, *supra* note 15, at p. 44 para. 89.

[45] The following two paragraphs of the report further reiterate that this decision is not binding and that a more thorough record would be required for any firm conclusion to be made. *See id.* at pp. 44-45 paras. 90-91.

[46] The Commission walked a similarly fine line in its treatment of Internet backbone services in the Stevens Report. *See id.* at pp. 32-36, paras. 66-72.

[47] *See* "BellSouth Policy on IP Telephony," available at http://www.bellsouthcorp.com/issues/telephony/; US West letter regarding access charges for IP telephony, available at http://techlawjournal.com/agencies/netphone/80911uswlet.htm.

Similar tactical maneuvering will remain important throughout the transition from service-specific networks to next-generation data networks. But there is a danger in carrying this approach too far. Fudging avoids bad or premature decisions, but it doesn't move the regulatory structure any closer to where it needs to be. And it can allow pressure to build up to the point where a minor decision becomes a full-throttle battle involving billions of dollars. The Commission will need to think carefully in each case about when to shift from avoiding harmful or disruptive outcomes to a more pro-active strategy.

THE LAYERED MODEL

With the first step damping the conflicts surrounding the transition to the Internet era, policy makers can turn to the most important change: the replacement of horizontal categories with vertical layers as the basis of communications regulation.

As discussed above, the regulatory ambiguity of Internet-related services derives from the dominant horizontal categorization model of communications policy, under which a string of rules apply based on the substantive or geographical status of an offering. There are four primary problems with this approach. First, it assumes distinctions between services are clear, but in a converged Internet-centric world any network can carry virtually any type of traffic. Second, it applies most rules in an all-or-nothing fashion. To avoid imposing certain provisions, the FCC finds itself compelled to class services in the unregulated "information services" bucket.[48] The FCC and industry participants are also forced to contend with the possibility that if services (such as cable Internet services) bear indicia of more than one regulatory category, they will be subject to *both* sets of rules. Third, the horizontal model looks at each service category in

[48] The 1996 Act does give the FCC the authority to forbear from imposition of virtually any provision of the Act or the FCC's rules. *See* tk forbearance provision. However, this power has been more theoretical than real, and has been barely invoked in more than four years since the Act's passage. On its face, the forbearance provisions are a sort of "get out of jail free" card that would allow the FCC to rewrite the Act based on its analysis of real-world conditions. However, political realities, and the possibility of judicial reversal, have kept the FCC from doing so up to this point.

isolation, when increasingly all networks are interconnected and the critical policy issues concern the terms of such interconnection. Fourth, it concentrates on the services ultimately provided to end-users, when competitive dynamics are increasingly driven by behind-the-scenes network architectures.

Rather than seeking to defend ephemeral service boundaries in a digital world, regulation should track the architectural model of the Internet itself. The Internet's astonishingly rapid growth derives in large part from its technical architecture.[49] That architecture is based on two characteristics: end-to-end design and a layered protocol stack.[50] The Internet's end-to-end structure means that intelligence resides at the edges.[51] A new service can be deployed simply by connecting two client devices capable of talking to one another, without requiring any approval or technical configuration inside the network. By contrast, traditional communications networks involve centralized control mechanisms such as switches that must be upgraded when new features are added. Layering means that higher-level functions, such as content presentation, are defined separately from lower-level ones such as congestion buffering and traffic routing. A consequence of layering in an end-to-end environment is that Internet services can be moved up or down the stack as necessary. IP telephony, for example, takes a service – voice – previously delivered at one level and recreates it at a higher level on top of an Internet data stream.

Engineers generally describe the Internet's layered structure using what is known as the OSI model, developed in the 1980s by the International Standards Organization (ISO).[52] The OSI model identifies seven layers from physical to application, [53] but several of

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[49] See Kevin Werbach, "The Architecture of Internet 2.0," **Release 1.0**, February 1999, at 1, available at http://www.edventure.com/release1/cable.html.

[50] A full technical description of Internet architecture is beyond the scope of this paper.

[51] See Saltzer, Reed, and Clark, "End-to-end arguments in system design," *ACM Transactions on Computing Systems*, vol. 2, no. 4, 1984.; Stupid Network, *supra* note 1.

[52] tk cite to OSI Model.

[53] The seven layers, in descending order, are: Application, presentation, session, transport, network, data link and physical.

these are only relevant from an engineering perspective. For regulatory purposes, it makes sense to think of the Internet as comprised of four layers:

- content
- applications or services
- logical
- physical

Communications policy should be developed around these four vertical layers, rather than the horizontal categories employed today. What each layer includes, and the implications of this approach, are described below.

Physical

Physical infrastructure is the underlying networks: wireline (copper), cable, fiber, terrestrial wireless and satellite. This includes switching as well as transport, from the local loop to the long-haul backbone networks. It is at this level that most communications regulation has concentrated. Even when competition is not an issue, there may be other causes for regulation, such as the disruption involved in tearing up streets the lay cable, the scarcity of space on telephone poles, the need to avoid spectral interference and the need to assign satellite orbital slots. Because infrastructure deployment involves heavy fixed costs, it has historically been viewed as a natural monopoly. In recent decades communications policy has moved away from regulation of monopolies toward pro-competitive approaches that rely on market forces to stimulate innovation and keep prices under control. As the 1996 Act demonstrated, however, such "deregulation" generally involves substantial regulatory involvement to ensure that incumbents do not simply shift from regulated to unregulated monopolies. A vertically-layered communications policy would focus on these issues, starting with the concept that where a physical network owner has market power, regulation may be the only way to ensure an open platform that fosters the beneficial dynamics of competitive markets.

Logical

Logical infrastructure includes the management and routing functions that keep information flowing smoothly within and across networks. The classic example is the telephone addressing system, which the FCC oversees in conjunction with the North American Numbering Council. In the telephone world, logical infrastructure was tightly coupled to physical infrastructure because of the lack of competition and the focus on the single application family of voice. There is a precedent, however – the FCC's open network architecture (ONA) rules under Computer III, which govern competitive access to advanced intelligent network features in the telephone network.[54] Though the ONA implementation process bogged down, the basic notion was the foundation for the unbundled network elements provisions of the 1996 Act. As networks become more dynamic, their logical infrastructures will become increasingly important relative to the physical infrastructure, making a coherent policy approach to such facilities essential.

In the Internet world, logical infrastructure issues have generally not reached government regulatory forums, because the industry has done a sufficiently good job of preserving open standards and competition.[55] One are where a policy-making body has become involved is the management of the domain name system (DNS), the closest thing today's Internet has to telephone numbering. For most of the history of the Internet, the DNS was overseen through a set of informal arrangements loosely governed by contracts among various arms of the US government, private companies including Network Solutions Inc. (NSI) and an informal technical organization that came to be known as the Internet Assigned Numbers Authority (IANA).[56] In 1998, the Internet Corporation for Assigned Names and Numbers (ICANN) was formed to take on

[54] tk cite to ONA rules.

[55] Internet technical standards have traditionally been developed by loose organizations or engineers such as the Internet Engineering Task Force (IETF), which operate on the principles of "rough consensus and running code."

[56] Cite to some history of the DNS issues.

the mantle of DNS coordination and policy development.[57] The Department of Commerce is the lead federal agency overseeing the relationship with ICANN, though FCC staff have been involved in policy discussions through inter-agencies working groups. The DNS issues are extremely complex and easily beyond the scope of this paper, but they give a flavor of the kinds of logical infrastructure issues that are emerging and the difficulty of finding appropriate institutional structures to deal with them.

Another element of logical infrastructure involves the distributed virtual networks that are poised to become the critical management and distribution points for Internet content, applications and transactions.[58] The first application of this architecture, promoted by companies such as Akamai and Digital Island, is speeding up delivery of Web pages. By using thousands of edge servers so that content is served from the edge of the network close to the end-user, these "meta service networks" avoid bottlenecks in delivering information across the Internet. As they are extended to handle other functions, meta service networks may have a significant impact on issues as diverse as privacy, intellectual property and antitrust, but they tend to be overlooked because they do not fit into traditional categories such as carriers or service providers to end users.

Today, with the exception of established historical functions such as telephone number assignment, the FCC has no foundation for understanding the policy implications of logical infrastructure. Competition and private self-regulatory bodies may obviate the need for government involvement in many or all of the cases described above, but should those conditions not hold, the FCC will need a way to ensure that logical

[57] Esther Dyson, the Chairman of EDventure Holdings, currently also serves as Chairman of ICANN. The views expressed in this paper are solely those of the author and should not be construed as those of Esther Dyson.

[58] *See* Kevin Werbach, "Meta Service Providers: The Internet's SS7 Network," **Release 1.0**, December 1999.

infrastructure does not become a competitive bottleneck.[59] Thinking about the problem on its own terms is the best way to start.

Applications

The *application* (or service) layer is where most of the functions familiar to end-users appear. Basic voice telephony is an application, as is Internet access, IP telephony, video programming, remote access to corporate local area networks, alarm monitoring and so forth. Much of the existing body of communications regulation appears to concern itself with applications, but in actuality relates more to physical infrastructure.

By and large, applications need not be regulated to ensure competition, so long as the physical and logical infrastructure underneath is open. With open platforms, anyone can build new applications to compete with incumbent providers. Regulatory issues related to applications generally spring from other policy goals. For example, under section 255 of the 1996 Act, providers of telecommunications services must "ensure that the service is accessible to and usable by individuals with disabilities, if readily achievable."[60] The FCC also has initiatives to ensure that certain services, including basic telephony and "advanced communications services,"[61] are available to all Americans. How such rules should be implemented may vary from application to application but divorcing application-level policies from all-encompassing categories and unrelated infrastructure issues makes it easier to focus on such issues directly.

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[59] The open access debate, at least in part, involves such a question. Cable Internet access services uses networks of local caches to enhance performance of their networks, but those caches also give the cable operator the ability to degrade or exclude content from competitors. *See* Architecture of Internet 2.0, *supra* note tk.

[60] 47 U.S.C. 255(c).

[61] 47 U.S.C. 706 .

Content

Content, the final layer in the stack, involves the information delivered to and from users as part of the applications running over communications networks. In the US, government directly regulates content only in very limited circumstances. For example, the FCC has rules governing indecency on broadcast networks (but not for telecommunications services). It also seeks to ensure a diversity of voices in media, though in practice it seeks to achieve that goal through limits on ownership of multiple media outlets rather than directly. In addition, the FCC has various rules relating to political advertising, and also considers factors such as educational programming in connection with its broadcast license renewals. Under "must-carry" rules, cable operators are required to carry over-the-air broadcast channels, but government is not involved in selecting the programming on those channels.

Content-related issues are likely to become more significant in the future due to the Internet's blurring of category boundaries. Under the horizontal categorization model, telecommunications services generally fall within a "common carrier" framework, meaning that service providers – and government – may not dictate the content users can create. Broadcast and cable services, in contrast, are seen as inherently involving content discrimination, because the broadcaster must decide what content to deliver over scarce spectrum. In other words, telecommunications is thought of as two-way and open, while broadcast is one-way and controlled. Internet-based services, however, can exhibit elements of both paradigms. When a user sends an instant message to a friend commenting on a streaming video clip delivered over an Internet-based broadband platform to a digital television set-top box, which paradigm should apply? What happens if the broadband provider, or the government, wants to constrain the content of that instant message? Such questions only make sense if viewed in terms of content rather than categorization.

IMPLICATIONS OF THE LAYERED MODEL

The layered model makes many of the conflicts that today bedevil regulators more tractable. For example, the inconsistency between the treatment of DSL, which is subject to federal open interconnection requirements (under Title II), and cable modem services, which currently are not, turns out to be a figment of the horizontal model. Both cases involve the possibility that service providers with control over the physical and logical layers of networks will extend that control into applications and content. Looking at the issues in this way doesn't compel one outcome or the other. It may be that the FCC concludes open access is the right policy result, but that in the cable situation market forces will be sufficient to arrive at that result. The important shift is that the focus is now on the key policy issue at stake, rather than the almost accidental context that defines the issue today.

The layered model doesn't necessarily require wholesale changes in existing rules. In fact, the FCC's basic/enhanced distinction can be viewed as a partial implementation of a vertically-layered approach. The Commission in effect concluded that, to the extent that the communications and computer-processing layers can be separated, services that reside higher up are less regulated, while those lower down are subject to Title II obligations.[62] The binary distinction embodied in the *Computer II* and *Computer III* decisions and the 1996 Act is not sufficiently fine-grained to address the issues in today's data-centric networks, but it has proved quite resilient given the technological and competitive changes since it was first developed.

Going forward

The layered model does more than reframe existing debates. It brings to the surface important issues that tend to become lost under the existing regulatory model. Perhaps the most significant of these is the question of interfaces between layers. A key element

[62] This viewpoint has sometimes been expressed in the notion that information services "ride on the rail" of telecommunications service. *See, e.g.*, Remarks of FCC Commissioner Susan Ness before the Policy Summit of The Information Technology Association of America, "Making Sense" (March 30, 1998), available at http://www.fcc.gov/Speeches/Ness/spsn807.html.

of the Internet model is that these interfaces are open. This allows competitors to circumvent a bottleneck at one layer by deploying services over another layer, and prevents companies that have control of lower-level services to prejudice or preclude certain services at higher layers. Cable open access can thus be understood as a debate over whether cable operators can use their control of the physical layer (cable distribution plant) to restrict choice and competition at the three higher levels. Telephone number portability, mandated under the 1996 Act, is a way to ensure that ILECs don't leverage control over logical infrastructure (phone numbers) to prevent competition at the application layer. And so forth. In the horizontal model, service categories are viewed as distinct from one another, and therefore the issue of interfaces doesn't arise. But in a communications world that will only become more converged and more interconnected, open interfaces are increasingly critical to an innovative, competitive market.

Restrictions on ILEC information services derive from the same issue. When an ILEC offers an application-level service such as Internet access or voice mail, the competitive issue does not arise from the nature of those services. SBC's Internet access services do not differ in any fundamental way from Earthlink's. What's different is that SBC controls lower-level infrastructure which it could use to disadvantage ISP competitors. The ILECs have frequently made the argument that they should be freed from regulation on their data services because these markets are competitive.[63] But this analysis misses the importance of interfaces between layers.

Under the layered model, ILEC data services should be deregulated if and when the FCC can assure itself that ILECs will not be able to leverage lower-level control into these layers. This could happen in one of two ways. If the physical and logical infrastructure layers in the relevant markets were sufficiently competitive, ILECs would not be able to gain unfair advantage over competitors at the application and content layers. Despite many changes in technology and market dynamics since the passage of the 1996 Act, this level of competition does not yet exist in the local exchange market. The second

[63] tk cites.

possibility is that the FCC or Congress could adopt rules that prevent ILECs from closing the interfaces between layers or otherwise constraining higher-level competition. The *Computer II* structural separation requirements and the *Computer III* non-structural safeguards are in effect such rules. The FCC's rules governing collocation and line sharing for DSL services can also be put in this category.[64]

CONCLUSION

The layered model addresses all four of the shortcomings of the current structure in the age of the Internet. Focusing on vertical layers removes the assumption that service boundaries are clear, and are tied to physical network boundaries. It implies a more granular analysis within each layer, moving from overarching policy goals to specific cases rather than applying categories that bring with them laundry lists of requirements. It brings the issues of interconnection between networks, and between functional layers within those networks, to the forefront. And it recognizes the significance of network architecture as a determining factor in shaping business dynamics.

This paper has attempted to outline frameworks and highlight issues, rather than propose specific policy outcomes. More analysis is necessary to understand exactly what a vertically-layered communications policy regime would look like, and how it could best be implemented. The project of redefining communications policy will take many years. It means changing administrative rules and structures, and it may also require new legislation. There's a window of opportunity to create the new regime before the old one comes crashing down. But it's an opportunity that should not be missed.

[64] tk cite