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In the Matter of	)	
	)	
Protecting and Promoting the Open Internet	)	Proceeding 14-28
	)	

COMMENTS OF KENDALL KONING
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I. ABOUT THE AUTHOR

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II. INTRODUCTION AND SUMMARY

For the past several years, questions of the regulatory status of the Internet and the FCC's authority over it have been the subject of robust debate.[1] Unfortunately, this debate has become disconnected from the technological realities of the network itself, leading to a policy with internal contradictions[2] and absurd results.[3] At the root of this problem is the Commission's assertion that the Internet is fundamentally an inexorably integrated information service.[4] In fact, the separation of concerns and transparency to applications is the central

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[1] See, e.g., Comcast Corp. v. FCC, 600 F.3d 642 (2010); James B. Speta, *The Shaky Foundations of the Regulated Internet*, 8 J. ON TELECOMM. & HIGH TECH. L. 101 (2009).

[2] *See* In the Matter of Petition for Declaratory Ruling that AT&T's Phone-to-Phone IP Telephony Services are Exempt from Access Charges, 19 F.C.C.R. 7457 (2004). If VoIP is a telecommunications service, then it does not involve information service processing. However, it uses the Internet for transport. The Internet Protocol either involves processing constituting an information service or it does not; it cannot simultaneously do both.

[3] *See* Comment Sought on Transition from Circuit-Switched Network to All-IP Network, Public Notice, 24 FCC Rcd. 4323862 (2009). With the sunset of the legacy PSTN, will the United States no longer have a public telecommunications infrastructure?

[4] In the Matter of Fed.-State Joint Bd. on Universal Serv., 13 F.C.C.R. 11501, 11540 (1998)

architectural principle of the Internet Protocol.[5] As demonstrated below, the Internet's transparency to user information can be confirmed by any network engineer with a pair of Internet connections and a protocol analyzer. Of course, it is true that Internet Protocol packets contain protocol information that is processed, but this is true of *any* telecommunications network, including the legacy PSTN.[6]

The Internet is, at its most basic level, a massive, globally addressable, and connectionless packet switched network. None of these properties however, while critical to the Internet's commercial success, are relevant to the legal question of whether the Internet should be regulated differently than other packet switched networks. Those lines were drawn in the *Computer Inquiries* and formalized in the 1996 Act.[7] There, the Commission defined three categories of protocol processing as parts of basic telecommunications services.[8] With the exception of intercepting proxy caches, discussed in §IV.C, all Internet Protocol processing fits into one of these three categories.

Nevertheless, the Internet has historically been classified as an information service. While unfortunate, this is understandable. ISPs' most visible

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[5] RFC 791 - Internet Protocol, THE INTERNET ENGINEERING TASK FORCE (1981), http://tools.ietf.org/html/rfc791 (last visited Apr 12, 2012).
[6] In the Matter of Amendment of Sections 64.702 of the Comm'n's Rules & Regulations (Third Computer Inquiry); & Policy & Rules Concerning Rates for Competitive Common Carrier Services & Facilities Authorizations Thereof Communications Protocols Under Section 64.702 of the Comm'n's Rules & Regulations, FCC 86-253, 1986 WL 291966 (F.C.C. June 16, 1986) [hereinafter *Computer III Phase II Supplemental NPRM*] ("In both analog and digital networks, protocols must be established and protocol processing must take place.")
[7] National Cable & Telecommunications Assn. v. Brand X Internet Services, 545 US 967, 992 (2005).
[8] See *infra* part III.B.

predecessors, particularly at the national level, were online services such as CompuServe and America Online. These services were originally structured as server-side applications, where a customer's communications *were* mediated by the type of information storage and computer processing that constitute information services.[9] However, after the tremendous growth of Internet Protocol based applications, it was only a few short years before these services gave way to direct Internet Protocol connections and the end-to-end network model. There was, however, no reason for the Commission to revisit the classification question until the controversy over third-party ISP access to broadband networks. There, rather than take the more difficult route provided by the statutory forbearance process,[10] the Commission relied on this outdated classification to protect incumbents from what it considered undesirable unbundling regulation.[11]

The conventional wisdom is that the Commission's decision to classify the Internet as an information service was validated by the Supreme Court in *Brand X*.[12] However, the controversy in that case was over third party ISP access to the last mile cable modem facilities. Interconnection with an existing Internet Protocol service was irrelevant to those ISPs' commercial interests; in fact, they were already interconnected on that level through Internet backbone networks. *Brand X* specifically did not address the regulatory classification of Internet

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[9] See *infra* part V.A.
[10] 47 U.S.C. §160.
[11] Kevin D. Werbach, *Off the Hook*, 95 CORNELL LAW REVIEW 535, 544 (2010).
[12] *Brand X*, 545 U.S. 967 (2005); Werbach, *supra* note 12 at 545; Rob Frieden, *What Do Pizza Delivery and Information Services Have in Common - Lessons from Recent Judicial and Regulatory Struggles with Convergence*, 32 RUTGERS COMPUTER & TECH. L.J. 247, 252 (2005).

service as a whole[13] but whether the cable modem component was itself a separate offering. The cable modem component is analogous to the local copper loop; neither is itself a telecommunications service because an interconnected network with switching equipment is also required before users can exchange information with arbitrary points of their choosing.[14] In other words, a cable modem connection is not more than a telecommunications service but less.

This comment is organized as follows. Section II covers the Commission's classification of protocol processing in packet switched networks from *Computer III*, and how this was applied to earlier packet switched networks. Section III describes the Internet Protocol and the necessary information processing in detail, including a detailed comparison of an actual IP packet both as sent and as received. It also addresses the issue of intercepting proxy caches. Section IV describes the online services that were the ISPs immediate commercial predecessors, and distinguishes these services from later, Internet-based applications with similar functionality. Section V contains the detailed analysis of *Brand X*. Section VI concludes.

III. PACKET SWITCHED NETWORKING IS A BASIC SERVICE

A packet switched network "divides the input flow of information into small segments, or packets, of data which move through the network in a manner

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[13] *Brand X*, 545 U.S. at 987 ("The Commission first concluded that cable modem service is an 'information service,' a conclusion unchallenged here.")
[14] 47 U.S.C. §153(50).

similar to the handling of mail but at immensely higher speeds."[15] Early packet networks benefited from the ability to use existing telecommunication services,[16] as opposed to building special-purpose facilities, which vastly lowered barriers to entry and therefore allowed a highly competitive and innovative market to develop for both computer networks and network applications offered by a set of firms dubbed Value Added Networks or VANs.[17] However, this dependence on the existing telecommunications network left VANs vulnerable to a variety of anti-competitive strategies available to incumbent carriers. The resulting conflicts were a central theme of the decades-long and wide-ranging *Computer Inquiries*, most of which have been covered extensively by the existing literature.[18] This section focuses specifically on the regulatory treatment of packet switched networks and the conditions under which they were considered *basic* services. It starts with an analysis of the first such ILEC network, which was specifically designed (and named) to comply with the initial limitations established for basic service. It then offers a detailed description and analysis of the Commission's final word on the classification of protocol processing services before the passage

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[15] Lawrence G. Roberts, *The Evolution of Packet Switching*, 66 PROCEEDINGS OF THE IEEE 1307–1313, 1307 (1978).

[16] Dave Clark et al., *Overlay Networks and the Future of the Internet*, 63 COMMUNICATIONS & STRATEGIES 109–129, 120 (2006).

[17] Robert Cannon, *The Legacy of the Federal Communications Commission's Computer Inquiries*, 55 FED. COMM. L.J. 167, 168 (2003); Eli M. Noam, *International Telecommunications in Transition*, *in* CHANGING THE RULES 257–297, 273–74 (1989) (In addition to packet switching, VANs offerings included "store and retrieve systems (89); mailbox service (71); protocol conversion between incompatible computers and terminals (71); customers' data bases (54); deferred transmission (50); user management packages (46); view data 49); word processor and facsimile interfacing (40); multiaddressing routing (49); and speed and code conversion between incompatible terminals (43). Other VANs include automatic ticket reservation, conference calls, long-term archiving, secure delivery services, telesoftware, retrieval, and text editing.").

[18] *See, e.g.*, Cannon, *supra* note 17.

of the 1996 Act, which is generally accepted to codify these rulings in statutory form.[19]

A. The Basic Packet Switching Service (BPSS)

The Commission's basic regulatory approach in the *Computer Inquiries* was to create a distinction between *basic* or fundamental services that were necessarily part of telecommunications networks and therefore should be subject to the associated suite of common carrier regulation, and *enhanced* services, which could be provided by competitive firms and therefore should be unregulated and left to the open market. One of the fundamental difficulties of this approach, however, was in establishing the exact boundaries between the basic and enhanced services categories.

The Commission was faced with these issues almost immediately after having made the original basic/enhanced distinction, with AT&T's offering of an X.25 packet switched network it called the Basic Packet Switching Service, or BPSS.[20] While BPSS had originally been designed to be part of AT&T's own VAN-like service, the company had separated out the "basic transport and switching functions," planning to offer them "as a separate service, to be available

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[19] *See infra*, part III.C.

[20] *In re* Application of American Telephone and Telegraph Company For Authority under Section 214 of the Communications Act of 1934, as amended, to Install and Operate Packet Switches at Specified Telephone Company Locations in the United States, 94 F.C.C.2d 48, ¶¶7,12 (1983) [hereinafter *BPSS Rejection*] ("BPSS . . . offers . . . a service for the transmission of digital signals using packet switching technology" using the X.25 protocol.).

to any customer requiring packet switching."[21] In other words, BPSS had been *specifically designed* to comply with the Commission's definition of a basic service.

Turning to the functionality provided by BPSS service, the Commission rejected arguments that the use of computer processing merely to switch and reliably transport packets between user endpoints constituted an enhanced service. Rather, it accepted AT&T's argument that "protocol and software functions used by BPSS merely operate to assure the correct delivery of information . . . [and] that BPSS will not use computer processing actions to act on the format, content, code, protocol, or similar aspects of the subscriber's transmitted information."[22] The Commission therefore concluded that BPSS was properly classified as a basic service and approved its deployment.[23]

B. Computer III and Basic Protocol Processing

The Commission's final and most systematic analysis of protocol processing took place several years later, in the context of *Computer III Phase II*. Unfortunately, the Commission's summary of that order, stating that protocol processing had always been and would continue to be considered an enhanced

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[21] In the Matter of American Telephone and Telegraph Company Tariff F.C.C. No. 270 Rates and Regulations for Bell Packet Switching Service., 91 F.C.C.2d 1, ¶3 (1982) [hereinafter *BPSS Approval*].
[22] *Id.* at ¶8.
[23] BPSS APPROVAL, *supra* note___ at ¶39.

service,[24] oversimplifies and, when taken out of context, misrepresents the content of the order. The Commission defines protocol processing as "a generic term that denotes the use of a computer or computer-like device to process the protocol-related symbols appearing either in a subscriber's transmission or generated within the network for the purpose of intra-network data transport."[25] As that proceeding itself points out, this is an incredibly broad definition that includes not just computer applications but such network functions as generating dial tone,[26] regenerating digital signals across extended backbone links,[27] circuit and packet switching,[28] and protocol conversion.[29] These functions are fundamental to the operation of *any* telecommunications network.[30] If any protocol processing were sufficient to render a service enhanced, basic telecommunications networks would effectively cease to exist. To prevent this, the Commission created three types of basic protocol processing based on their function and effect.

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[24] *In re* Amendment of Sections 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry) Phase II Report and Order, 104 F.C.C.2d 958, ¶7 (1986) [hereinafter *Computer III Phase II Order*] ("we conclude that protocol processing should remain an unregulated enhanced service").

[25] In the Matter of Amendment of Sections 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry); and Policy and Rules Concerning Rates for Competitive Common Carrier Services and Facilities Authorizations Thereof Communications Protocols under Section 64.702 of the Commission's Rules and Regulations, Supplemental Notice of Proposed Rulemaking, 1986 WL 291966, ¶ 16 (1986)(hereinafter Computer III Supplemental NPRM).

[26] *Id.* at ¶17 ("An elementary form of protocol processing takes place when, in response to an off-hook signal from a subscriber's telephone, a dial tone sent from the end office informs the subscriber that the network is ready to accept address digits.").

[27] *Id.* at ¶22 ("Computer processing applications that act upon the information symbols of a subscriber's message must be performed… to provide the pulse regeneration and error detection and correction necessary to maintain transmission quality with the express purpose of not changing information content.").

[28] *Id.* at ¶19 ("In a packet switched network, for example, protocol processing takes place continuously during the end-to-end transmission, while in an analog circuit-switched system, protocol processing does not occur after a connection has been established.")

[29] *Id.* at ¶16 ("We consider 'protocol conversion' to be a subset of 'protocol processing'. Protocol conversion is the specific type of protocol processing that is employed to permit communications between terminals or networks that observe disparate protocols.")

[30] *Id.* ("In both analog and digital networks, protocols must be established and protocol processing must take place.").

The first such category is any protocol processing that takes place in the context of user interaction with the operation of the network itself. While this most obviously includes PSTN dialing, it is "general and applies whether data calls are routed over a circuit switched network or a packet network."[31] In a more modern context, this would include the communication with a provider switch necessary to set a switched virtual circuit (SVCs) on a Frame Relay or ATM network, PPPoE connection setup on DSL networks, or the connectionless switching that takes place on Ethernet and IP networks. In addition to allowing users to specify the intended destination of their communications, this category also includes communication with provider network equipment related to other transmission characteristics, such as error detection or traffic prioritization. While the Commission has only ruled on this issue directly in the context of Frame Relay,[32] the principle is applicable to other QoS protocols, such as Diffserv,[33] that perform analogous functions in a different packet switching context.

The second category includes protocol conversion within the network necessary to interconnect two otherwise basic services.[34] It is needed because new networks and technologies do not replace old ones overnight, and compatibility with existing equipment must be maintained.[35] For example, it

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[31] *Computer III Phase II Order,* supra note at ¶69.
[32] In the Matter of Independent Data Communications Manufacturers Association, Inc. Petition for Declaratory Ruling That AT&T's InterSpan Frame Relay Service Is a Basic Service, 10 F.C.C.R. 13717, ¶¶29–33 (1995) ("The use of such a feature to facilitate the economical, reliable movement of in- formation in this manner does not alter the nature of the basic service.").
[33] S. Blake et al., RFC 2475 - AN ARCHITECTURE FOR DIFFERENTIATED SERVICE THE INTERNET ENGINEERING TASK FORCE (1998), http://tools.ietf.org/html/rfc2475 (last visited Apr 12, 2012).
[34] COMPUTER III, PHASE II REPORT AND ORDER, *supra* note___ at ¶70.
[35] *Id.* at ¶70.

would "exclude applications such as a carrier-provided end office analog to digital conversion that permits an analog terminal to be accommodated by a network that is evolving to digital status."[36] Without this exception, the PSTN would largely fall under the enhanced category; any call between a residential POTS line and a business ISDN line or a GSM cellular service necessarily involves a conversion between the different protocols used on these different networks.

On the surface, this rule would seem to be in conflict with the typical treatment of protocol conversion, "employed to permit communications between terminals or networks that observe disparate protocols,"[37] as an enhanced service. For instance, when AT&T first introduced its InterSpan Frame Relay service, it was not permitted to bundle CPE capable of the protocol conversion necessary for existing networks to use the new service directly.[38] There are, however, two salient differences between these two scenarios that help explain the difference in regulatory treatment. First, unlike the protocol conversions between e.g. POTS and GSM, which take place deep within the network, protocol conversion that takes place at the customer premise is specific to, and feasibly performed by, that specific customer. Second, the PSTN (like the Internet) is a public network in the sense that universal interconnectivity between arbitrary end users is expected. In contrast, Frame Relay networks were typically used for interconnecting private

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[36] *Id.* at ¶70.
[37] *Id.* at ¶16.
[38] *In re* Independent Data Communications Manufacturers Association, Inc. Petition for Declaratory Ruling That AT&T's InterSpan Frame Relay Service Is a Basic Service, 10 F.C.C.R. 13717, ¶61 (1995) [hereinafter *Frame Relay Order*].

computer networks in different physical locations.[39] The protocols used are therefore within the control of a single firm.. Because technological change on the scale of public networks takes place over a substantial period of time in which universal connectivity must be maintained, this category of basic protocol processing is necessary to allow innovation in public telecommunications networks to proceed.

The third category of basic protocol processing includes internetworking performed by a network in the process of providing a basic service. An early example of this type of processing can be found in the X.25/X.75 conversions necessary to interconnect two X.25 networks. Packets received from a customer in the X.25 format were converted to X.75 for transport between the two networks, and then converted back to X.25 before being delivered to the destination network. Such a protocol conversion is "treated as facilitating a basic X.25 service, rather than enhanced protocol conversion."[40] Similarly, Frame Relay DLCI (and ATM VPI/VCI) identifiers change as frames (or cells) transit the network, because the specific identifiers used must uniquely identify a virtual circuit on each physical link.[41] Such "conversions tak[e] place solely within the network [and] result in no net conversion between users . . . [but] merely facilitate the provision of an overall basic service."[42]

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[39] For example, to connected a firm's branch offices to a headquarters location.
[40] *Frame Relay Order*, supra note 38 at ¶16.
[41] *Id.* at ¶29–30. ("Moreover, changes to the header information such as the location code, are in some instances responsible for the carriage of the customer's data through the network to the proper termination point and, hence, are part of a basic transmission service.").
[42] *Id.* at ¶16.

More commonly today, internetworking protocol processing of this sort does not technically perform a *conversion* between disparate protocols but rather an *encapsulation* of those protocols by others, often more closely tied to the underlying physical network architecture. These protocols interoperate with one another using the ubiquitous layers principle that is the foundation of modern internetworking technology.[43] For example, Internet Protocol packets are often transported by encapsulation in Ethernet frames. The Ethernet layer needs to know nothing about the IP layer; operating system networking stacks merely uses functionality Ethernet provides as a means to transmit unmodified IP packets to other devices. The Internet Protocol was specifically designed with this encapsulation in mind, to allow interconnection between applications on devices using networks with differing protocols- protocols which themselves were not designed for operation on the scale of public networks like IP.

C. The Computer Inquiries and the 1996 Act

The regulatory treatment of protocol processing in the *Computer Inquiries* is critically important for current regulatory policy because there is well-supported, widespread agreement that the 1996 Act intended codification of these decisions into federal statutes.[44] Most importantly, it defines telecommunications as "the transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the

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[43] NADER F. MIR, COMPUTER AND COMMUNICATION NETWORKS 19–39 (2007).
[44] *See*, e.g., BRAND X, *supra* note 7 at 977.

information as sent and received."[45] This statutory language is based on the Commission's treatment of protocol processing in the *Computer Inquiries*. The exclusion of processing for the management, control, or operation of networks closely corresponds with the first and third categories of protocol processing above, though it is slightly broader. A user cannot transmit information to a specified point without telling the network to expect the transmission and specifying a destination to which it should be transmitted, so a telecommunications service cannot operate without that information; the information communicated tells the network how and when to operate. Likewise, the internetworking that takes place deep within the network is part of a system designed and built the for the purpose of transmitting a message to its intended destination. Similarly, the description of a telecommunications service as one where user information is transmitted without change in the form or content of the information as sent and received is another way of describing the internetworking protocol processing detailed in *Computer III*. While such processing may change the form of user information during its transit of the network, no net conversion means that information is ultimately received in the same form in which it was sent.

Was this not the case, a carrier could transform any telecommunications service into an information service at will. While historical regulation makes such a claim unlikely in the PSTN context, such an argument might be made by

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[45] 47 U.S.C. §153(50).

carriers moving to a new technology. In fact, AT&T did exactly this in 2004.[46] It argued that, since its long distance service used VoIP transport telephone calls over its Internet backbone, it was exempt from access charges otherwise applicable to such calls.[47] It did so even though customers placed these calls through the legacy PSTN using standard dialing patterns; only the long distance portion used the new technology.[48] While it was careful to limit its decision to VoIP specifically,[49] the Commission held that PSTN interconnected VoIP was not an information service because it involved nether a net protocol conversion or a "capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information."[50] Holding otherwise would make Title II completely irrelevant as the legacy PSTN is replaced with these new technologies.[51]

IV. THE INTERNET IS A PACKET SWITCHED NETWORK

What exactly is the Internet? Popular notions vary, and, for those without some understanding of how the technology works, the Internet is easily confused with the plethora of applications and services available through it. The Commission has defined it as "a global, packet switched network that enables

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[46] *In re* Petition for Declaratory Ruling that AT&T's Phone-to-Phone IP Telephony Services are Exempt from Access Charges, 19 F.C.C.R. 7457, ¶1 (2004) [hereinafter *AT&T VoIP Petition*]. *See also* In the Matter of Compass Global, Inc., Apparent Liability for Forfeiture, 23 F.C.C.R. 6125 (2008) (assessing $828,000 fine for VoIP provider's failure to make USF and other required payments).
[47] *AT&T VoIP Petition*, supra note 46 at ¶¶1,13
[48] *Id.* at ¶11.
[49] *Id. at* ¶1.
[50] *Id. at* ¶12 (quoting 47 U.S.C. §153(20)).
[51] See *Comment Sought on Transition From Circuit-Switched Network to All-IP Network*, 24 FCC Rcd. 14272 (2009).

interconnection between networks using the Internet Protocol."[52] This is true, but it is only part of the story. The Internet Protocol is not used just for interconnecting existing provider networks; it extends all the way to the end-users of these networks. Put another way, end user devices use the Internet as a packet switched network directly; unless blocked by a firewall or similar device, every Internet connected computer can send messages to every other Internet connected computer in the same native, Internet Protocol format.[53] More technically, the Internet is the packet switched network that receives Internet Protocol formatted packets from connected users and delivers them, immediately and unmodified, to the computer specified by the sender in the destination IP address field. This is exactly the type of protocol processing *Computer III Phase II* and subsequent decisions have found constitute basic or telecommunications services,[54] and it is in many ways indistinguishable from those which came before it. The differences, primarily that the Internet is connectionless, globally addressable, and agnostic as to the specific underlying physical transport, are not significant under the rules of the *Computer Inquiries* or therefore the 1996 Act.

A. IP is an Abstract and Transparent Network Layer

The genius of the Internet Protocol is that it enforces standardization only at the network layer, allowing considerable flexibility in the lower transport layers

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[52] *In re* Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, Notice of Proposed Rulemaking, 17 F.C.C.R. 3019, ¶16 (2002) [hereinafter *Wireline Broadband NPRM*].

[53] In fact, one of the major challenges faced by network planners and engineers is that so many computers are connected in this way that the ~2^32 unique network addresses allowed by the protocol are rapidly becoming exhausted.

[54] See *supra* part III.B.

and providing a consistent, transparent interface to higher application layers.[55] This allows an IP network to be built using any transport technology[56] so long as in each case the IP packets are delivered to the next hop exactly as sent. The advantage of this approach is that it allows the creation of a large, interconnected network using existing networks, not themselves designed to be interconnected on such a scale, as transport. This greatly reduced adoption costs, a critical factor in overcoming the initial adoption barrier posed by economic network effects.[57]

The transparency of network protocols—that they transmit user-specified data without modification—is a central feature of their design, and the manifestation of a layer-driven design philosophy nearly as old as packet-switched networking itself.[58] If protocols did modify the content or format of user data, applications using them need to be aware of these changes and specifically account for them. They would also need to be redesigned whenever a new technology was used which changed the data in a different way. This would be a major impediment to the development of both new network protocols and applications; new network protocols (e.g., MPLS) could not be implemented without breaking applications, and applications would require constant maintenance to account for changes to the network. With the vast number of independently developed applications and networks, this would be a virtually

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[55] RFC 791, IPv4, *supra* note___; James B. Speta, *A Common Carrier Approach to Internet Interconnection*, 54 FEDERAL COMMUNICATIONS LAW JOURNAL 225, 247 (2002).
[56] Typically, this is another network, e.g. Ethernet, but a wide variety of means can be used. See, e.g., D. Waitzman, RFC2549 - IP OVER AVIAN CARRIERS WITH QUALITY OF SERVICE THE INTERNET ENGINEERING TASK FORCE (1999), http://tools.ietf.org/html/rfc2549 (last visited Apr 12, 2012).
[57] See note 32 *supra*, and accompanying text.
[58] H. Zimmermann, *OSI reference model–The ISO model of architecture for open systems interconnection*, 28 IEEE TRANSACTIONS ON COMMUNICATIONS 425–432 (1980).

Position | Transmitted Data in Hexidecimal Form | ASCII Text Representation

```
0000  00 26 0b 29 70 8e 00 06 5c 14 26 4b 08 00 45 00   .%.)p...\?&A..E.
0010  00 6b 96 ab 00 00 40 11 62 5c 23 0d b2 92 44 3c   .k....@.f\#...D<
0020  63 7f 4f cc 4f cc 00 57 38 1b 54 68 69 73 20 69   c.O.O..W8.This i
0030  73 20 61 72 62 69 74 72 61 72 79 20 64 61 74 61   s arbitrary data
0040  3b 20 61 70 70 6c 69 63 61 74 69 6f 6e 73 20 64   ; applications d
0050  65 70 65 6e 64 20 6f 6e 20 69 74 20 6e 6f 74 20   epend on it not
0060  62 65 69 6e 67 20 61 6c 74 65 72 65 64 20 69 6e   being altered in
0070  20 61 6e 79 20 77 61 79 2e                         any way.
```

impossible task. Fortunately, the Internet does not work this way. Its transparency in transmitting user data allows a wide variety of applications to be designed and implemented without the network even being aware of their existence, and innovation without coordination with, or permission from, the network provider.[59] In fact, without this transparency widely used encrypted application protocols (e.g., HTTPS[60] and IPSEC[61]) would not be possible.[62]

Figure 1 - Representation of a Internet Protocol packet in an Ethernet frame

Consider the following set of Internet Protocol packets, relayed through thirteen different routers operated by Michigan State University and two different ISPs. It was captured in two locations- once at the computer that sent it and again at the computer that received it. Figure 1 shows these two captures as raw data,

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[59] Mark A Lemly & Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era*, 48 UCLA LAW REVIEW 925, 930 (2001).
[60] E. Rescorla, RFC 2818, HTTP OVER TLS THE INTERNET ENGINEERING TASK FORCE (2000), http://tools.ietf.org/html/rfc2818 (last visited Apr 12, 2012).
[61] S. Kent & R. Atkinson, RFC 2401 - SECURITY ARCHITECTURE FOR THE INTERNET PROTOCOL THE INTERNET ENGINEERING TASK FORCE (1998), http://tools.ietf.org/html/rfc2401 (last visited Apr 12, 2012).
[62] Because their contents are encrypted, any alteration of information seen by the network provider would corrupt the message.

overlaid on top of one another to show the places where they differ.[63] As you can see, most of the information has been received exactly as it was transmitted. The three places where the information differs are the result of protocol processing performed by the network and described in detail below.

The rectangular area in Figure 1 is an 802.3 Ethernet header. These Ethernet frames are not actually transmitted to the Internet service provider, but are merely the means by which the IP packets are transmitted between the two user endpoints and their respective local upstream routers. Ethernet is extremely popular in this application for several reasons, but from IP's perspective it is irrelevant that each end of a connection uses the same local transport protocol because those local networks are not themselves connected. No protocol *conversion* takes place; user data transmitted to ISPs is already formatted as IP packets, sent to it using whatever protocols are chosen by the ISP to accomplish this transmission, and received by the end user in this same form. With few minor exceptions covered below, these packets retain their exact form and content when received by the destination host.

B. Protocol Processing in IP

The specifications for the operation of the Internet Protocol are defined by the Internet Engineering Task Force (IETF).[64] Aside from the encapsulation and

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[63] The data shown was captured using the 'wireshark' program. For ease of reading, this binary data is presented the standard hexadecimal (base 16) format. The columns on the right are the ASCII text representation of data in the center columns.

[64] RFC 791, IPv4, *supra* note 5; *The Tao of IETF: A Novice's Guide to the Internet Engineering Task Force*, THE INTERNET ENGINEERING TASK FORCE (October 15, 2011), http://www.ietf.org/tao.html (last

switching necessary to actually transmit IP packets between routers, other protocol mechanics require that some processing takes place. However, this processing is within the scope of that exempted from information services classification, as described in §III.B above, because its purpose is the operation of a packet-switched network.

The first instance of this processing can be seen in the difference in the rounded area of Figure 1; it is the result of processing the IP time-to-live (TTL) field. As an IP packet traverses the network, each forwarding router decreases this number by one. Once the TTL reaches zero, the packet is discarded. The purpose of this procedure is to allow graceful failure in the case of routing loops; packets are eventually discarded rather than being forwarded in a circle forever.[65] That this processing takes place in connection with the operation of the network should be obvious.

The area in bold is the IP header checksum, used to detect corrupt packets which may then be discarded. It differs between the packets because the TTL field is used in its calculation.[66] These error-detection facilities are similar to those provided by other packet switched networking technologies such as Frame

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visited April 13, 2012) (The IETF "is a loosely self-organized group of people … engaged in the development of new Internet standard specifications.").

[65] RFC 791, IPv4, *supra* note___ at §3.1.

[66] *Id.* at §3.1.

Relay. The FCC has held that this type of error detection does not alter the basic nature of a telecommunications service.[67]

The Internet Protocol also provides a variety of means for the user to signal the network regarding the desired treatment of IP packets. The *type of service* field allows users to specify the "internet service quality" desired for a particular packet, including its relative priority and preference for low delay, high throughput, and reliability,[68] though other protocols[69] are now used for this purpose. It also allows users to include a set of *options* in the IP header that contain similar but more detailed information.[70]

IP also provides for a process called *fragmentation*, where large packets are broken up into smaller pieces for transport.[71] Fragmentation may be necessary when intermediate networks are incapable of processing full IP packets because those packets exceed the maximum transmission link for packets on the local network. The Internet Protocol therefore defines a process whereby these intermediate nodes can fragment these larger packets and package them for later reassembly by the receiving host. When fragmentation takes place, the form of the user information as received is thereby slightly changed. However, fragmentation is neither requested by the user nor does it provide the user with

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[67] *Frame Relay Order*, supra note 38 at ¶10 ("The use of packet switching and error control techniques … do not alter the nature of the basic service.")
[68] RFC 791, IPV4, *supra* note 5.
[69] *See, e.g.* Blake et al., *supra* note___.
[70] p 15. E.g. source specified routing, often ignored because it creates security problems. SOURCE ADDRESS SPOOFING, HTTP://TECHNET.MICROSOFT.COM/EN-US/LIBRARY/CC723706.ASPX (LAST VISITED OCTOBER 06, 2010).
[71] RFC 791, IPv4, *supra* note___.

any service other than facilitating transmission of the associated packet. Rather, it is performed at the initiative of the network if it is incapable of transmitting these larger packets directly. Fragmentation, therefore, does not transform IP networks into information services.

Finally, while the Internet Protocol is connectionless, in that processing and communication with the network for the purpose of call or session establishment is unnecessary, IP does provide a mechanism for the network to communicate with users through the Internet Control Message Protocol (ICMP).[72] This protocol is responsible for informing users of network events such as the unreachability of specific hosts or networks or the expiration of TTL counters.

C. Intercepting Proxy Caches

Unlike television and radio, where a single broadcast signal is simultaneously received by many users, the Internet is principally a unicast medium.[73] This means that each time a user accesses content, a separate copy is transmitted across the network. Both ISPs and content providers have incentives to reduce this inefficiency by storing copies of frequently accessed data clos to the end-users so that fewer network resources are consumed.[74] Content and application providers address this problem by deploying (or leasing capacity on)

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[72] John Postel, RFC 792 - INTERNET CONTROL MESSAGE PROTOCOL THE INTERNET ENGINEERING TASK FORCE (1981), http://tools.ietf.org/html/rfc792 (last visited Apr 12, 2012).
[73] See, e.g., Sylvia Ratnasamy et al., *Revisiting IP Multicast*, 36 SIGCOMM COMPUT. COMMUN. REV. 15 (2006) (IP Multicast has existed since 1990, but has not seen widespread deployment on public networks.).
[74] I. Cooper, I. Melve & G. Tomlinson, RFC 3040 - INTERNET WEB REPLICATION AND CACHING TAXONOMY THE INTERNET ENGINEERING TASK FORCE (2001), http://tools.ietf.org/html/rfc3040 (last visited Apr 13, 2012).

servers closer to their users. The applications then direct users to access the nearest copy of the appropriate data. Systems employing this strategy are known as Content Delivery Networks (CDNs). CDNs do not fundamentally alter the way that the network operates, they merely use it more efficiently. ISPs typically have an incentive to work with CDNs because it reduces consumption of congestible network backbone resources and increases the average bandwidth seen by users.[75]

When CDNs are unavailable, ISPs can accomplish largely the same ends through the use of caching proxy servers. In this case, rather than sending the request to the remote server directly, it is sent to a proxy server operated by the ISP. If a local copy of the content is available to the proxy server, it satisfies the client request from its local cache. If not, the request is then passed through to the remote server and a copy is kept for future requests. This strategy initially required that the client be explicitly configured to send application request through their ISP's proxy server. However, to save as many network resources as possible, ISPs sometimes configure their routers to detect and *intercept* these application requests so they can be redirected to the local proxy caching server. Unlike the bundled application services described in §V.B below, this behavior does violate the assumption of network transparency and involves the type of interaction and processing typically associated with information services.

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[75] However, this incentive goes away when CDNs facilitate competition with their own vertically integrated services. *See, e.g.*, Steve Shultze, *Trying to Make Sense of the Comcast / Level 3 Dispute*, FREEDOM TO TINKER (Dec 2, 2010) (http://www.freedom-to-tinker.com/blog/sjs/trying-make-sense-comcast-level-3-dispute/).

Nevertheless, intercepting proxy caches do not alter the fundamental nature of Internet service overall. Intercepting proxies are, by their very nature, not explicitly requested by end-users; they are operated by the ISP for its own benefit to reduce usage of its congestible network resources. This means that caching servers must impersonate remote servers as closely as possible to avoid myriad issues that can otherwise arise from this invisible and unrequested intermediation.[76] For similar reasons, intercepting proxies operate on standard HTTP traffic and not IP generally. this strategy is not applicable to most other applications and, as is the case with encrypted transmissions, is theoretically impossible.[77] (E.g., Google and Facebook use encrypted https by default.) In any case, intercepting proxy servers are not inextricably intertwined with the network; they are an optional addition, operate only with the implicit consent of users, and have largely been supplanted by CDNs, which now account for more than half of total Internet traffic by volume.[78]

V. THE INFORMATION SERVICE CLASSIFICATION IS ANACHRONISTIC

Given the functionality of the Internet itself as a simple packet switched network, the FCC's regulatory classification of Internet access as an information service is puzzling. In its *Wireline Broadband* and related proceedings, the Commission has repeatedly stated that Internet service "always and necessarily

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[76] I. COOPER & J. DILLEY, *RFC 3143 - Known HTTP Proxy/Caching Problems*, THE INTERNET ENGINEERING TASK FORCE (June 2001), http://tools.ietf.org/html/rfc3143 (last visited April 13, 2012); Duane Wessels, *Interception Proxying and Caching*, WEB CACHING (2001).
[77] Rescorla, *supra* note___.
[78] Craig Labovitz et al., *2009 Internet Observatory Report* (October 19, 2009) (http://www.nanog.org/meetings/nanog47/abstracts.php?pt=MTQ1MyZuYW5vZzQ3&nm=nanog47).

combines computer processing, information provision, and computer interactivity with data transport, enabling end users to run a variety of applications such as e-mail, and access web pages and newsgroups" and that they are "inextricably intertwine[d] . . . such that the consumer always uses them as a unitary service."[79] It argues this is so because end users "must have the capability to interact with information stored on the facilities of the provider of the Wireline broadband Internet access service" to use the Web. This claim, at least applied to ISPs as opposed to their market predecessors, Online Services, is demonstrably false.[80]

A. From Online Services to Internet Service Providers

Before there were Internet service providers, there were online services—companies like CompuServe, Prodigy, and America Online.[81] These companies offered their users a variety of applications provided both by themselves and in coordination with third parties. They did so not through a generic, general purpose packet switched network like the Internet but using a proprietary systems and software specific to each online service provider. These systems could be accessed either through general-purpose terminal emulation software or a provider's proprietary front-end software.[82]

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[79] *In re* Appropriate Framework for Broadband Access to the Internet over Wireline Facilities Report and Order and Notice of Proposed Rulemaking, 20 F.C.C.R 14853, ¶9 (2005) [hereinafter *Wireline Broadband Order*].
[80] See §IV.A, above.
[81] ROSALIND RESNICK, EXPLORING THE WORLD OF ONLINE SERVICES 175–190 (1993) (The "big five" services included Prodigy, CompuServe, Genie, America Online, and Delphi.)
[82] *Id.* at 24–31.

This is a very different structure from the layers model on which the Internet is built. This is critically important, because whether the Internet must be classified as a Title II telecommunications service "turns not on the language of the Act, but on the factual particulars of how Internet technology works and how it is provided."[83] In the case of online services, information processing *was* inextricably intertwined with telecommunications in the sense that telecommunications was necessary to operate the application but was not directly accessible by the user. This meant, e.g., that Prodigy users were able to trade stocks only through PCFN, while CompuServe users could do so only through Quick & Reilly, Spear & Rees, and E-Trade Securities,[84] because making these applications available required permission from, and technical coordination with, individual online service providers. In comparison, Internet users today can use the applications provided by any one of the numerous competitors in these markets without giving any thought to which application may or not be available through their ISP.

This model of specific applications and content being tied to access through proprietary online systems did not survive the emergence of the more open Internet network architecture.[85] Collectively, no single online provider could attract the same scale of users and application services as the Internet.[86]

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[83] {Citation}
[84] RESNICK, *supra* note___ at 215–16.
[85] Rajiv M. Dewan, Marshall L. Freimer & Abraham Seidmann, *Internet service providers, proprietary content, and the battle for users' dollars*, 41 COMMUN. ACM 43–48, 44 (1998).
[86] *Id.* ("Although each of the local access providers has only a few thousand customers on average, they collectively have a much larger market share than national providers such as AOL.")

Because of the cost and market structures of content and application services, access to this larger market was preferable, and their functional and market separation from the access layer was underway.[87] Still, because of their existing customer base, these online services became the largest and most visible ISPs at the national level.

While the transition from proprietary systems to open standards and direct network connectivity using the Internet was decidedly complete by the time the FCC's *Broadband Internet* orders issued, this would have been less obvious at the time the relevant policies were being formulated, particularly for those familiar with the large online services like AOL which took longer to phase out use of their proprietary systems and embrace direct Internet connectivity for their customers. But it was this exact split between network access and content that allowed the existing ILECs and MVPDs to leverage their network transmission resources to take over the Internet access market so quickly.[88]

B. DNS and Bundled Application Services

However, just because content and application services were now provided using the Internet does not mean that these companies no longer provided any applications. Even though the technology no longer required email services to be offered by the same company that provided users access to the Internet, existing technology and market norms meant these services were often

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[87] *Id.* at 44.
[88] *Id.* at 44.

bundled along with Internet access. However, the familiar structure of high fixed development costs and low marginal costs meant that those offering service to the entire Internet, rather than a small subset of those users, were in the best position to develop innovative new applications. Today, a majority of users now use web-based email services rather than the email services offered by their ISPs.[89] Similarly, the use of other application services formerly offered by ISPs rapidly declined. Only 14% of Internet users even have their own personal web pages,[90] and only a minority of those likely use their ISP's bundled web hosting as opposed to blogs or third-party hosting. Many broadband ISPs have discontinued their Usenet newsgroups service entirely.[91] It is simply not possible to reconcile these market realities with the Commission's view of these services as 'inexorably integrated.'

Less obviously incorrect is the Commission's reference to the Domain Name System (DNS) as involving the type of processing and interaction with stored data that constitute an information service.[92] While this is true, DNS is not as fundamental to the operation of the network itself as its ubiquitous use might imply. First, the Internet still operates as a packet-switched network even without

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[89] "Cloud computing" takes hold as 69% of all internet users have either stored data online or used a web-based software application | Pew Internet & American Life Project, , http://www.pewinternet.org/Reports/2008/Use-of-Cloud-Computing-Applications-and-Services.aspx?r=1 (last visited Apr 5, 2010).
[90] Online Activities, Total | Pew Research Center's Internet & American Life Project, , http://www.pewinternet.org/Static-Pages/Trend-Data/Online-Activites-Total.aspx (last visited Apr 5, 2010).
[91] *See, e.g.,* Verizon Newsgroup Service Has Been Discontinued, http://www22.verizon.com/ResidentialHelp/HighSpeed/General%20Support/Top%20Questions/QuestionsOne/125159.htm (last visited April 05, 2010); AT&T Jettisons the Last of Its Usenet , http://www.theregister.co.uk/2009/06/09/att_kills_usenet/ (last visited April 05, 2010).
[92] *Wireline Broadband* Order, supra note 3, ¶15 (2005).

DNS. This can easily be demonstrated by, e.g., using an IP address rather than a domain name in the host portion of a URL.[93] Second, while DNS is extremely convenient, and relied upon by some applications, it is not necessary for this service to be provided by the same ISP which provides the Internet service itself; third parties are offering this service today.[94] Third, the function provided by DNS is the mapping of names to network addresses; it no more makes the Internet an information service than a telephone book makes the PSTN an information service.

Not only is it technically possible to access websites by specifying a destination IP address rather than an Internet hostname, DNS service is itself provided using the Internet Protocol network and therefore can be provided by any third party.[95] In fact, until recently the default behavior or most DNS servers was to answer queries from *any* internet host; users could configure their computers to use any one of more than a million servers for free.[96]

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[93] For example, the URL http://192.104.54.5/ may be used access the FCC home page. The use of hostnames is not technically required from the network's perspective, though many *applications* (including HTTP/1.1) depend on the user obtaining DNS service from *someone*.

[94] Google Public DNS, http://code.google.com/speed/public-dns/ (last visited June 25, 2010); *BIND 9 Administrator Reference Manual*, 47 (2007) (In fact, because the most widely used DNS server software allows recursive queries by default, unless a server has been explicitly configured to reject queries an end user could theoretically use any one of potentially millions of publicly accessible systems running this software.); *The Continuing Denial of Service Threat Posed by DNS Recursion (v2.0)*, US-CERT: UNITED STATES COMPUTER EMERGENCY READINESS TEAM (2006), http://www.us-cert.gov/reading_room/DNS-recursion033006.pdf (last visited April 15, 2012) (More than 1m DNS servers answer public recursive queries.).

[95] Google Public DNS, *supra* note___. DNS is transmitted using the UDP protocol which, in turn, uses the IP protocol.

[96] The Continuing Denial of Service Threat Posed by DNS Recursion, *Id.* (last visited Jul 15, 2010).

VI. BRAND X DOES NOT PRECLUDE JUDICIAL RECLASSIFICATION

More than a decade has now passed since the "walled garden" systems of online service providers have been replaced by the open standards and universally interconnected packet switched IP network we call the Internet. The FCC, however, has consistently resisted calls to apply telecommunications law to ISPs,[97] even though the issues it now faces in the network neutrality debate are classic telecommunications issues—interconnection, non-discrimination, and potential abuse of market power to favor vertically integrated lines of business. Instead, it has chosen to rely on a questionable jurisdictional theory that has *twice* already been rejected by the D.C. Circuit.[98] It has been supported in this path by the generally held belief that its classification of Internet access as an information service was upheld by the U.S. Supreme Court in *Brand X*.[99] However, the issue in that case was the regulatory treatment of high-speed link between the cable head-end and the end-user premise, not the end-to-end Internet Protocol transport service described in §IV, *supra*. Based on the functionality IP networks provide to consumers and application service providers, *Brand X* actually *supports* judicially enforced reclassification of Internet access as a telecommunications service.

Faced with the explosive growth in demand for Internet access bandwidth, Brand X and other non-facilities-based ISPs ran into capacity limitations imposed

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[97] Citation Needed, comments on NN order by commissioners, etc.…
[98] COMCAST CORP. V. FCC, *supra* note___; Verizon v. FCC, 740 F. 3d 623 (2014).
[99] BRAND X, *supra* note___; Werbach, *supra* note___ at 545.

by the design of the PSTN. Because that network had been designed only to support voice calls, the available bandwidth was limited to 56kbps for modem connections. Faster speeds required upgrades, and therefore access, to the underlying physical infrastructure used in last mile connections. While unbundling regulations gave them at least a theoretical path to this type of access in ILEC networks, they faced both technical problems and uncooperative ILECs who saw the new technology as an opportunity to break free of the regulatory restrictions that had held them back in the dial-up market. After a round of spectacular bankruptcies at DSL-focused CLECs,[100] independent ISPs faced a price squeeze on ILEC DSL networks[101] and were shut out of any access to consumers through the cable modem infrastructure completely.[102]

Legally compelling access to the cable modem infrastructure required a finding that the cable modem connection used to provide Internet access was itself a telecommunications service.[103] If this were the case, then statutory interconnection and non-discrimination requirements would apply,[104] giving the respondents the 'open access' they desired. On the other hand, a finding that *Internet* connectivity was a telecommunications service would not have had this result. While interconnection with the cable ISP's Internet service would have allowed Brand X to communicate with the customers of cable ISPs, those

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[100] *See, e.g.,* Simon Romero, *Bankruptcy Leaves D.S.L. Customers Without Net Access*, N.Y. TIMES, March 29, 2001, available at http://www.nytimes.com/2001/03/29/technology/29CND-DIGI.html
[101] *See, e.g.,* Pacific Bell v. Linkline Communications, Inc., 129 S.Ct. 1109 (2009).
[102] Werbach, *supra* note___ at 544.
[103] *Id.* at 544.
[104] 47 U.S.C. §§201(a), §202; *Id.* at 2–3,10.

customers would have already been receiving Internet connectivity service from the cable ISP and therefore would have had no reason to purchase the respondents' duplicate services. Further, such an interconnection for the delivery of information services would have been pointless; third-party ISPs already had the ability to communicate with a cable ISP's customers through Internet backbone links without the considerable expense of providing their own dedicated transport. Finally, a finding that Internet access was a telecommunications service would not have triggered the Telecommunications Act's unbundling requirements, which are limited to incumbent providers of telephone exchange service.[105]

The problem with Brand X's case is that the cable modem link between the end user's premises and the cable television wire center does not allow the user to transmit information "between or among points specified by the user,"[106] but only between the two points connected by the physical transmission medium connecting those two locations. Telecommunications functionality can only be provided by an interconnected network of transmission and switching equipment. In other words, the cable modem link at issue in Brand X is to Internet Protocol service what a copper loop is to PSTN service.[107] The Court held that it was reasonable for the Commission's interpretation of the word "offer" to turn on "the

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[105] 47 U.S.C. §251(h). *But see Id.* at 2–3,10.
[106] 47 U.S.C. §153(50)
[107] *Brand X*, 545 U.S. at 990. ("Likewise, a telephone company 'offers' consumers a transparent transmission path . . . [not] other physical elements of the facilities used to provide telephone service, like the trunks and switches, or the copper in the wires.").

nature of the functions the *end user* is offered."[108] Therefore, it was reasonable for the Commission to conclude that the cable modem link was not an offering of telecommunications[109] just as the copper loop used by the PSTN is not, itself, an offering of telecommunications. In fact, the 1996 Act's separate mandates to unbundle local network elements apart from interconnection and non-discrimination requirements[110] suggests that the FCC's interpretation, at least in this context, is the most reasonable one.

Further, based on the regulatory history of the Telecommunications Act,[111] the Court held that it was reasonable for the Commission to limit its interpretation of "offering telecommunications"[112] to require "a 'stand-alone' offering of telecommunications, *i.e.*, an offered service that, from the user's perspective, transmits messages unadulterated by computer processing."[113] Justice Thomas writes, "[a]s we have explained, Internet service is 'not transparent in terms of its interaction with customer supplied information,' the transmission occurs in connection with information processing."[114] However, it is trivial to show that the completed Internet service (as opposed to the cable modem connection alone) *is* transparent in this way.[115] It can be easily demonstrated by any pair of Internet

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[108] *Id.*
[109] Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities, Declaratory Ruling and Notice of Proposed Rulemaking, 17 F.C.C.R. 4798, ¶40–41 (2002).
[110] 47 U.S.C. §251.
[111] See §II.C *supra*.
[112] 47 U.S.C. 153(46).
[113] *Brand X*, 545 U.S. at 969.
[114] *Id. at* 993.
[115] *See* §IV, *supra*.

users with a protocol analyzer, using the same procedure performed above in §IV.A.

With regard to information services such as DNS, email, and web hosting, these services should not, by the Court's own reasoning, alter the nature of the Internet access service. It held that "[t]he entire question is whether the products here are functionally integrated . . .[, t]hat question turns not on the language of the Act, but on the factual particulars of how Internet technology works."[116] While a cable modem connection is functionally integrated with Internet access services, applications such as email, newsgroups, and user websites are not.[117]

For the same reason, the classification of Internet access as an integrated information service would fail *Chevron* step two.[118] In *Brand X*, the Court dismisses the claim that such a classification would allow telephone carriers to escape regulation by including bundled voice-mail "because a telephone company that packages voice mail with telephone service offers a transparent transmission path – telephone service – that transmits information independent of the information-storage capabilities provided by voice mail."[119] Internet access service, it reasoned, was distinguishable because it did not provide such

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[116] *Id. at* 991.
[117] *See* §IV, *supra*; Richard S. Whitt, *A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model*, 56 FEDERAL COMMUNICATIONS LAW JOURNAL 587–672 (2004); S. Jordan, *A layered network approach to net neutrality*, 1 INTERNATIONAL JOURNAL OF COMMUNICATION 427–460 (2007); Clark et al., *supra* note___; Lemly and Lessig, *supra* note___. The end-to-end model is fundamental to the development and operation of Internet applications.
[118] Whitt, *supra* note___; Jordan, *supra* note___; Clark et al., *supra* note___; Lemly and Lessig, *supra* note___.
[119] *Brand X*, 545 U.S. at 998.

transparent transmission path; rather, end-user access to website was *only* possible due to information processing by the ISP, specifically DNS.[120] As discussed above, as a factual matter this claim is demonstrably false. In fact, as I have shown, Internet connectivity involves only basic protocol processing, of the kind used in all packet-switched networks.

VII. CONCLUSION – THE LIMITS OF CHEVRON DEFERENCE

This comment does not dispute that the Commission's decision to classify Internet access as an information service is entitled to *Chevron* deference.[121] Instead, it argues that this decision fails even that highly deferential test. The critical section of *Chevron* is included here for reference:

> "When a court reviews an agency's construction of the statute which it administers, it is confronted with two questions. First, always, is the question whether Congress has directly spoken to the precise question at issue. If the intent of Congress is clear, that is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress. If, however, the court determines Congress has not directly addressed the precise question at issue, the court does not simply impose its own construction on the statute, as would be necessary in the absence of an administrative interpretation. Rather, if the statute is silent or ambiguous with respect to the specific issue, the question for the

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[120] *Id. at* 1000.
[121] *Id.* at 991. (These are "questions Chevron leaves to the Commission to resolve in the first instance.").

court is whether the agency's answer is based on a permissible construction of the statute."[122]

In this case, Congress has spoken to the precise question at issue here; the 1996 Act contains a explicit definition of what constitutes telecommunications. "The term 'telecommunications' means the [1] transmission, [2] between or among points specified by the user, [3] of information of the user's choosing, [4] without change in the form or content of the information as sent and received."[123]

On the first item, there is no respectable argument that the Internet Protocol does not transmit information; this is its entire nature, purpose, and function. Satisfaction of the second item is also self-evident from the operation of the Internet Protocol; users (more directly, the operating systems of their devices) choose whom to communicate with by placing the IP address of the application provider in the destination field of the Internet Protocol itself. Satisfaction of the third element is again obvious; the payload field of the Internet Protocol, which accounts for the bulk of the transmission, is determined by the applications running on the user's devices. This is clearly demonstrated in §IV.A above. As the first three elements are clearly met, if the information is being transmitted without any change in form or content, then the activity in question is telecommunications. This is demonstrably true, as shown in §IV above, with only

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[122] Chevron v. National Resources Defense Council, Inc., 467 U.S. 837, 842–43 (1984).
[123] 47 U.S.C. §153(50).

trivial exceptions. It is simply a fundamental fact of how Internet technology operates.[124]

This is not a situation in which congress has not spoken to the precise question at issue. Congress had the history of the *Computer Inquires* when it passed the 1996 Act, which is widely agreed to codify the distinction between *basic* and *enhanced* services developed there.[125] When comparing Internet service as used by end-users and application providers, rather than what was essentially a dispute over wholesale unbundling in *Brand X*, there is no ambiguity for the Commission to clarify. Congress defined what telecommunications is, and Internet Protocol networks function exactly as described in that statutory definition.

In conclusion, I strongly encourage the Commission to comply with federal statutes and treat Internet Access as telecommunications service. This doesn't necessarily imply that the Commission must apply all provisions of Title II to Internet Service Providers. However, in order to exempt them from specific provisions the Commission must rely on its statutory forbearance authority.

In closing, I'd like to point out that the limits of *Chevron* deference are not just a highly technical administrative law issue, but one that goes to the very core of how political power is organized in our democracy. Laws passed by both

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[124] RFC 791, IPv4, *supra* note___; Lemly and Lessig, *supra* note___; Jordan, *supra* note___; S. Jordan, *Implications of Internet architecture on net neutrality*, 9 ACM TRANSACTIONS ON INTERNET TECHNOLOGY (2009); BARBARA VAN SCHEWICK, INTERNET ARCHITECTURE AND INNOVATION (2010).
[125] BRAND X, *supra* note___ at 977; Cannon, *supra* note 17 at 191.

houses of Congress and signed by the President should not be able to be effectively reversed or ignored by administrators at the FCC.