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FEDERAL COMMUNICATIONS COMMISSION
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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Inquiry Concerning High-Speed Access	)	
To the Internet Over Cable and Other Facilities	)	
	)	
	)	GN Docket No. 00-185
	)	
	)	FCC 00-355

COMMENTS

OF AARP

January 10, 2001

No. of Copies rec'd 0+3
List A B C D E

AARP welcomes the opportunity to offer comment on the Federal Communications Commission's (FCC) Notice of Inquiry regarding high-speed access to the Internet over cable and other facilities. AARP has taken an interest in this issue because of the potential impact decisions regarding Internet access could have on mid-life and older consumers. Increasingly, Americans age 55 and older, are going "on-line," taking advantage of the myriad opportunities such access provides.

The Internet has become something akin to an essential service to many AARP members. A recent AARP survey on computer use among Americans over the age of 45 found that 81% of those surveyed use the Internet and that close to 2/3 of the time spent on-line was devoted to non-e-mail activities[1]. As older Americans become more proficient in their use of computers and more knowledgeable about the benefits of being on-line, as the survey reflects, their interests have spread beyond the ability to send text e-mail. The wealth of information available through websites, the ability to shop from home and the wonder of receiving photographs from loved ones are just some of the advanced services older consumers are beginning to enjoy. Because many of these advanced uses of the Internet are not easily accomplished through the use of a dial-up phone line, the appeal of broadband services, either from a phone company or from a cable provider, is growing.

AARP is concerned, however, that while interest among consumers in subscribing to high-speed Internet access is on the rise, developments in the marketplace might limit the choice of providers for the service. This concern is heightened by the fact that restricted choice tends to limit competition in pricing. Requiring cable modem service providers to open their systems to other Internet Service Providers (ISPs) will temper our concerns and provide consumers with access to the widest, most affordable high-speed access to the Internet. We urge the Commission to adopt such a plan.

In its inquiry, the Commission has requested comment on a variety of issues pertaining to open access. AARP's comments will focus on what we deem to be the two most critical issues facing the FCC at this juncture: how to define cable modem service and how the Commission should approach open access from a regulatory standpoint. Additionally, we are submitting a copy of a study commissioned by AARP's Public Policy Institute entitled, *"Tangled Web: The Internet and Broadband Open Access Policy."* The work, conducted by Dr. Trevor Roycroft, lends support to AARP's concern that a closed access system will not adequately serve consumers and provides insight as to how open access can prove beneficial not only to consumers, but to providers as well.

How to Define Cable Modem Services

In the Notice of Inquiry, the Commission asks whether cable modem service should be classified

[1] AARP National Survey on Consumer Preparedness and E-Commerce: A Survey of Computer Users Age 45 and Older, March 2000, p. 2.

as a cable service subject to Title VI of the Telecommunications Act of 1996 (the Act), an information service, a telecommunications service subject to Title II of the Act or some type of hybrid service heretofore undefined. Proper classification of cable modem services is critical because it will define the parameters within which the Commission may exercise authority.

AARP has been a vocal supporter of competition in all areas of telecommunications policy – including broadband cable service. Believing that Title II of the Act will provide the Commission with the jurisdiction needed to open the cable access market, we support the use of the term "telecommunications service" to define cable modem service.

AARP contends that neither the 1984 Cable Act nor the expanded 1996 Telecommunications Act definition of cable service accurately describes broadband cable service. Both definitions refer to service that is derived exclusively from cable service providers. Cable modem service however, involves a relationship between the cable provider and the ISP. This relationship is identical to that of other common carriers that provide phone lines to link with ISPs and through those linkages, currently provide telecommunications service. Recognizing the similarity in the relationship of the providers in both situations, AARP urges the Commission to adopt the definition of telecommunications service when referring to cable modem service.

The U.S. Court of Appeals for the 9th Circuit's decision in AT&T, TCI v. City of Portland supports AARP's position on this issue as well. In the case, the city of Portland argued that it should have jurisdiction over the cable companies so that the city could impose access requirements on the providers. The court ruled against Portland, saying that cable modem services were telecommunications services and were therefore not subject to local franchising authority. The immediate impact of the decision was to undermine the position of open access advocates like AARP. However, the court's definition of cable modem services as telecommunications services clearly provides the Commission with the authority to accomplish on a national level, what might otherwise have been carried out on a jurisdiction-by-jurisdiction basis. The issuance of a rule advocating open access would strengthen the telecommunications marketplace and directly benefit consumers.

What Role Should the FCC Play?

In the Notice of Inquiry, the Commission asks if open access is a desirable policy goal and if so, in what form should this policy be crafted. As we have made clear above, AARP strongly believes that open access is a desirable policy goal, that the FCC has the authority to achieve that goal and that the Commission should move ahead toward accomplishing that policy goal.

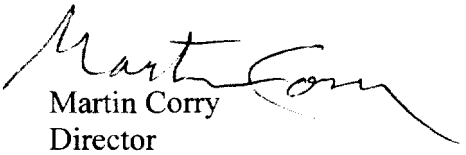
The exact manner in which open access should be achieved is a discussion that should take place through a Notice of Proposed Rulemaking. The Commission has offered three separate models and has asked for suggestions on others. While AARP has not taken a position on any specific model, we offer two recommendations:

1) Open access policy should ***be consistent*** so that if and when competition develops in cities, towns and rural areas, the rules will apply across the board. We are concerned that policy aimed at certain segments of the consumer base, if not applied consistently, will fail to benefit residential consumers.

2) Open access policy should be constructed so that a consumer may select ***any ISP*** company providing service in that area rather than a pre-selected, contracted set of providers. It is through free choice among the broadest range of alternatives that residential consumers will benefit most with regard to price and customer service.

AARP applauds the Commission for introducing this Notice of Inquiry regarding high-speed access to the Internet over cable and other facilities as a first step to addressing this issue. We hope that the Association's comments and enclosed policy paper will result in further action by the Commission, and we stand ready to assist you in this important endeavor.

Sincerely,



Martin Corry
Director
Federal Affairs

Tangled Web:

The Internet and Broadband Open Access Policy

by

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J. Warren McClure School
Ohio University

January 2001

The Public Policy Institute, formed in 1985, is part of Public Affairs at AARP. One of the missions of the Institute is to foster research and analysis on public policy issues of importance to older Americans. This publication represents part of that effort.

The views expressed herein are for information, debate, and discussion and do not necessarily represent the formal policies of AARP.

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Foreword

Currently, most consumers who use the Internet do so through a dial-up telephone line connection, a type of "narrowband" Internet access technology, that delivers content at a relatively slow speed. With the emergence of "broadband" Internet access technology, however, users can connect to the Internet at higher speeds, enabling a range of new and enhanced voice, video, and data services that have the potential to fundamentally change the way consumers live. For example, with a broadband connection to support monitoring devices and interactive video, home health care becomes a viable option for many consumers, and particularly those with limited mobility or those who may not be well enough to travel. A broadband connection also facilitates life-long learning opportunities at convenient times and places, especially for individuals who have jobs, disabilities, or family responsibilities that make it difficult to travel to a classroom. Telecommuting, ordering movies on demand, and participating in electronic town hall meetings are but a few of the many other applications consumers can enjoy with a broadband connection.

The full potential of an end-to-end broadband Internet may not be realized, however, if the owners of broadband Internet access networks are able to exercise control over Internet content and stifle competition in the Internet service marketplace. In this regard, the astonishing growth of the narrowband Internet over the past decade and the benefits that have resulted from its development have occurred, in large part, because consumers have had open and unfettered access to and use of the Internet, Internet content, and other on-line services. In contrast, cable broadband network owners are permitted to choose the Internet service providers who use their systems, effectively closing their infrastructure to competitors. While federal law and regulation require that a local telephone company's digital subscriber line (DSL) service — the other leading broadband Internet access technology — be provided on an open access basis, cable companies are not mandated to maintain an open system.

Because broadband technologies have the potential to change the way consumers communicate, learn, shop, and entertain, a better understanding is needed of how competing Internet service and content companies will use the broadband infrastructure. To this end, AARP's Public Policy Institute commissioned Dr. Trevor R. Roycroft of the J. Warren McClure School at Ohio University to prepare a report that 1) examines the relationship between the current success of the Internet and the open nature of telecommunications markets and the Internet; 2) describes and analyzes how competing Internet service and content providers use the broadband Internet network and how their actions may affect the future development of the Internet; and, 3) develops recommendations for the Federal Communications Commission (FCC) to consider as it seeks to create a national policy framework for high-speed Internet services.

In completing the report, Dr. Roycroft has made an important contribution to the debate on broadband access. The author's analysis of this issue concludes that market forces have not produced open access to cable broadband facilities and that the FCC should require open access by classifying cable broadband Internet access as a telecommunications service.

Christopher A. Baker
Senior Policy Advisor
AARP Public Policy Institute

Executive Summary

Background

Over the past 40 years, many telecommunications markets in the United States have been transformed from single source monopolies to competing providers. This transformation largely resulted from the efforts of Congress and the Federal Communications Commission, and State regulatory agencies and legislatures. Policy measures to promote competition and innovation during this period have frequently required *open access* to telecommunications facilities controlled by monopoly telephone companies. Open access policy emulates a competitive market environment where inputs are readily available to firms and no input supplier exercises exclusive market power. Open access extended the use of telephone company monopoly facilities to new competitors. This policy of open access has led to increased customer choice, technological innovation, and lower prices — all significant public benefits.

The development of the Internet paralleled this 40-year history of the regulatory promotion of open access in telephone markets. However, the Internet produced its own open access principles without overt regulatory intervention. The open nature of Internet technology led to rapid dissemination and growth, customer choice, and innovation with Internet services — also significant public benefits.

The potential for further benefits is at hand, as Internet access facilities, the communications pathways between an Internet user and an Internet service provider, are beginning to evolve from low-speed narrowband to high-speed broadband. This transition has the potential to revolutionize the Internet and provide consumers with an array of enhanced services including the ability to send and receive high-quality audio and video content. However, this next Internet revolution also poses a threat to the Internet's structure, a structure that has promoted rapid innovation and economic growth.

Two technologies that provide broadband Internet access are being widely deployed today: cable television cable modem service and local telephone company digital subscriber line (DSL) service, which is often identified as xDSL in recognition of the wide variety of DSL technologies such as asymmetric DSL (ADSL), Symmetric DSL (SDSL), and High-data-rate DSL (HDSL). Local telephone companies are required to provide open access to their broadband Internet access facilities. A household that purchases broadband access under this open access policy is free to choose from a variety of companies that provide Internet services. Cable television companies are currently not required to provide open access to their broadband Internet access facilities. A potential consequence of closed access to cable Internet access facilities is the stifling of competition in the Internet service marketplace.

One confusing aspect of the Internet access debate arises due to the distinction between Internet access facilities and Internet services. Internet access facilities are entirely separate (or separable) from Internet services. For example, an individual with a dial-up connection gains access to their Internet service provider (ISP) through an Internet access facility (the telephone lines and switching equipment) provided by the local telephone company. The ISP then provides the Internet services, such as e-mail, web hosting, and the ability to communicate with the rest of the Internet. To avoid confusion this report will identify the physical telecommunications pathways between a customer and an ISP as "Internet access facilities." What ISPs provide are called "Internet services."

The Internet and Internet access facilities are dynamic. However, as Internet technology evolves, the

basic policy question will remain intact— should customers have the ability to choose how they will purchase Internet services, or will the providers of the physical telecommunications pathway to the Internet dictate to the public how they will consume Internet services?

Purpose and Methodology

The purpose of this report is to examine the relationship between the openness of Internet access facilities and the current success of the Internet. The report will examine emerging issues that may affect the future development of the Internet, including the related areas of Internet content and e-commerce. Specifically, the report will consider current Federal Communications Commission (FCC) policies relating to broadband Internet access facilities.

This report is based on the analysis of publicly available information that includes documents filed with the Securities and Exchange Commission, reports, orders and industry analysis produced by the Federal Communications Commission, orders of Federal courts, reports by private industry analysts, articles from the trade press, company reports to shareholders, business-to-business reports and analysis, and articles from academic journals.

Principal Findings

Telecommunications Policy for an Emerging Internet Economy

The key organizational feature of the data network known as the Internet is openness. This openness has been achieved without much government interference. The non-proprietary nature of Internet protocols has allowed the network infrastructure to serve as a platform for new telecommunications services and rapid innovation. The openness of the network has empowered changes in telecommunications and in social and economic relationships that were impossible with the centralized network model associated with the telephone network. The Internet has developed open access principles, the same principles that regulatory agencies and Congress have been gradually applying to the public switched network. The openness of the Internet is threatened by the closed access policy of cable television companies. The architecture of the Internet may change as a result of cable company practices, resulting in less competition and innovation.

In order to promote open access in other telecommunications markets, a two-pronged policy approach has been used in the United States. First, consistent with the principles of antitrust, policy makers have implemented measures that prevent or eliminate the leveraging of monopoly power into markets where competition is possible. The second prong of the policy approach to the promotion of innovation and competition in the telecommunications industry has been the recognition that some telecommunications facilities may continue to have natural monopoly characteristics. Thus, duplication of facilities and competition may not take place even if legal entry barriers are removed. When these conditions have been identified, the policy approach has been to require interconnection with, and network unbundling of, the monopoly firm's physical network plant. To prevent anti-competitive behavior and leveraging of market power by cable companies, a similar approach is required.

Broadband Internet Access Facilities and Internet Service Markets

Internet access facilities can be classified as either broadband or narrowband, depending on the facility's data carrying capacity. The FCC has defined broadband access as a connection that provides at least 200 kilobits per second, in both the sending and receiving direction, thus dial-up

access (at a maximum of 56 kilobits per second) is not broadband. A broadband connection provides the end user a faster and better experience as compared to a narrowband dial-up connection.

In a broadband environment, the user's connection to the network is "always on." Assuming that the end-user's computer has launched the appropriate software, for example a web browser, the end-user can immediately access information over the Internet. The broadband connection allows the user to send and receive large amounts of data over the access link relatively quickly. The high bandwidth can dramatically increase the speed at which information is downloaded.

In the narrowband dial-up Internet access world, users of Internet services are able to exercise customer choice from among a large number of Internet service providers (ISPs). These ISPs have open access to the transmission facilities that carry information between the provider of Internet services and the end-use customer. The open-access arrangement has resulted in competition among ISPs and benefits for users of Internet services.

Telephone companies employ a technology known as Digital Subscriber Line or DSL to provide broadband services. This technology uses a single telephone line to furnish both voice and high-speed data services. As a result of the policy decisions discussed above, telephone company DSL technology is provided on an open access basis, promoting customer choice of Internet services over the broadband Internet access facility. Furthermore, the Federal Communications Commission has recently taken the additional step of requiring open access to just the high-speed data portion of a telephone company's DSL line. This action further promotes open access to telephone company broadband facilities, again promoting customer choice of Internet services.

Cable television companies such as AT&T, Time-Warner, Comcast, Cox, and Cablevision have entered into exclusive partnerships with ISPs to provide Internet services using a cable company's broadband access facilities. Time-Warner and AT&T provide Internet services primarily through their respective affiliates, Roadrunner and Excite@Home, which also serve as exclusive ISPs for other non-affiliated cable companies. These relationships between the exclusive ISPs and the cable network access providers reduce customer choice and establish a new model for future Internet development, reducing openness and the potential for competition and innovation.

The cable companies' proprietary ISP's business strategy goes beyond simply providing Internet services such as e-mail and web hosting. AT&T and AOL/Time Warner are unveiling business strategies that leverage the market advantage of the broadband access connection with the provision of customized content and e-commerce activities.

Cable television company strategies are beginning to change the structure of the Internet. Rather than providing an open access environment that allows users of Internet services and producers of Internet services to communicate without third-party interference, cable company strategy introduces a gatekeeper between users and producers of Internet services. Cable companies can discriminate against content providers that may compete against cable-company-affiliate providers of Internet content and e-commerce. Cable companies can influence a user's Internet choice without the user being aware of the interference. Cable companies, because they control broadband Internet access facilities and high-speed data networks, as well as sources of Internet content, have the greatest potential to interfere with the openness of the Internet structure and to reduce the benefits that have been generated by the open architecture of the Internet.

Is There a Policy Basis for Cable Open Access?

Current broadband deployment in the U.S. is occurring using two competing technologies,[1] cable modems and digital subscriber lines, and two competing regulatory models. Digital subscriber line customers can gain high-speed access with the ISP of their choice. Cable customers, on the other hand, have limited or no choice because owners of cable broadband networks are not required to permit unaffiliated Internet Service Providers to offer Internet services over their facilities. Classification of cable Internet access facilities as telecommunications services will allow open access principles to be consistently applied across technologies. This leveling of the regulatory playing field will provide benefits for end-users, ISPs, content and e-commerce providers, and technological innovation. Consumers will benefit due to the ability to choose which ISP best meets their needs. ISPs will benefit by being able to offer Internet services over all varieties of access technology, both narrowband and broadband. Content and e-commerce providers will be able to deliver their services without having to confront a broadband access gatekeeper that may also provide content and e-commerce activities. Technological innovation is promoted by fostering the openness of the Internet platform. Internet application developers can build upon an open broadband platform, bringing future generations of applications to end-users based on free choice, with end-users determining the success or failure of such applications.

Issues with the Regulation of Broadband Access

Actions taken by a regulatory agency like the FCC that alter the operations of the "free market" are always controversial. However, such action may be required when firms in the "free market" exercise market power and operate in a manner that hinders competition and innovation. A measured regulatory response now may forestall greater problems in the future, including the potential for anti-trust action, should the level of competition on the Internet suffer due to cable companies' corporate closed access policies.

Regulatory action would not likely reduce investment. Rather, applying consistent open access principles to cable and telephone company broadband Internet access facilities would level the regulatory playing field and encourage competition between these alternative access technologies. As was noted by the FCC in a recent order requiring telephone companies to share their broadband facilities with competing firms: "... we find that the increased competitive pressures caused by the deployment of xDSL-based services by competitive LECs and cable modem service by cable companies should increase the incentive of incumbent LECs to invest in advanced services."[2]

Widespread broadband competition would mitigate the need for regulatory action. However, it is unreasonable to expect that the majority of residential Internet users will face broadband access competition in the near future. For example, nationwide the FCC reports that 57.9% of zip codes in the U.S. have either no high speed data services available or service available from a single provider,

[1] As is discussed further in Appendix A, other broadband technologies, such as fixed wireless, are also on the horizon. However, cable and DSL appear to be the likely contenders in the near term. Even if other technologies successfully emerge, their status with regard to open access will also need to be determined.

[2] In the Matters of Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996. CC Docket Nos. 98-147 and 96-98. FCC 99-355. December 9, 1999. ¶ 150.

and that 18.6% have two providers, with the remaining 23.5% having more than two providers.[3] However, the FCC's methodology is optimistic, as reporting by zip code does not account for the limited service availability for DSL based on loop length (see Appendix A). Within any zip code it is likely that a significant proportion of individuals would be outside of the 3-mile loop length needed for successful DSL provision. As is indicated in the FCC's report, competition, when it does emerge, will most likely do so in the most lucrative markets first. As there is no guarantee that multiple providers would emerge in all segments of any given market, pockets of monopoly may persist in the long run. Consistent open access policy could provide benefits across the patchwork quilt of access technologies that are likely to be deployed in the coming years.

Market forces have not provided a reasonable resolution of the broadband open access issue, in spite of commitments made by AT&T and AOL Time Warner to open their networks to competing providers of Internet services. It is possible that the limited progress that has emerged to date is the result of cable companies' positioning themselves to forestall more extensive government regulation.[4]

Conclusion

The report concludes that the market is not working to open cable broadband facilities and that a strong economic and policy basis exists for the FCC to classify cable company Internet access facilities as telecommunications services and to exercise a limited role in regulating these services. The report concludes that the FCC should classify cable company broadband Internet access facilities as a telecommunications service and require open access to these facilities. Extending FCC jurisdiction over cable Internet access facilities may be sufficient motivation for cable companies and independent Internet service providers to reach reasonable agreements that promote customer choice. However, the FCC should also be prepared to take additional steps to promote competition in the market for Internet services if the requirement of cable open access alone proves insufficient to protect competition in the market for Internet services.

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[3] "High Speed Services for Internet Access: Subscribership as of June 30, 2000." Federal Communications Commission, Industry Analysis Division, October, 2000. Accessed December 4, 2000 at: http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/recent.html

[4] See, for example, "AT&T Seeks to Deflect Internet Criticism," *New York Times,* online edition, October 6, 1999.

I. Introduction

Background

Over the past 40 years many telecommunications markets in the United States have been transformed from single source monopolies to competing providers. This transformation largely resulted from the efforts of Congress and the Federal Communications Commission, and State regulatory agencies and legislatures. Policy measures to promote competition and innovation during this period have frequently required *open access* to telecommunications facilities controlled by monopoly telephone companies. Open access policy emulates a competitive market environment where inputs are readily available to firms and no input supplier exercises exclusive market power. Open access extended the use of telephone company monopoly facilities to new competitors. This policy of open access has led to increased customer choice, technological innovation, and lower prices — all significant public benefits.

The development of the Internet paralleled this 40-year history of the regulatory promotion of open access in telephone markets. However, the Internet produced its own open access principles without overt regulatory intervention. The open nature of Internet technology led to rapid dissemination in the U.S., with access to this new network growing much more rapidly than the experience with the public switched telephone network (PSTN). Approximately 50% of households in the U.S. now have Internet access,[5] an accomplishment that has required less than 10 years.[6] However, a low-speed narrowband connection over the PSTN provides the "last mile" access link for the vast majority of households that do have Internet access.[7] Internet access facilities, the communications pathways between an Internet user and an Internet service provider, are beginning to evolve from low-speed narrowband to high-speed broadband. This transition has the potential to revolutionize the Internet. However, this next Internet revolution also poses a threat to the Internet's structure, a structure that has promoted rapid innovation and economic growth.

Two technologies that provide broadband Internet access are being widely deployed today: cable television cable modem service and local telephone company digital subscriber line (DSL) service, which is often identified as xDSL in recognition of the wide variety of DSL technologies such as asymmetric DSL (ADSL), Symmetric DSL (SDSL), and High-data-rate DSL (HDSL). Local telephone companies are required to provide open access to their broadband Internet access facilities. A household that purchases broadband access under this open access policy is free to choose from a variety of companies that provide Internet services. Cable television companies are currently not required to provide open access to their broadband Internet access facilities. A potential consequence of closed access to cable Internet access facilities is the stifling of competition in the Internet service marketplace. A household that purchases broadband access under this closed access model will receive Internet services from a proprietary Internet service provider, one that is possibly affiliated with the cable company.

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[5] Chea, Terence. "Data Basics," *Washington Post*, August 24, 2000, page E08.

[6] The Internet, while originating in the late 1960s, became more attractive to consumers with the advent of the World Wide Web application. Thus, the 1990's mark the period residential customers began to use the Internet. By contrast, the telephone existed for about 70 years before 50% of households had telephone service.

[7] As is discussed further in Appendix A, about 4.9 million of the 55 million Internet households in the U.S. have broadband Internet access.

One confusing aspect of the Internet access debate arises due to the distinction between Internet access facilities and Internet services. Internet access facilities are entirely separate (or separable) from Internet services. For example, an individual with a dial-up connection gains access to their Internet service provider (ISP) through an Internet access facility (the telephone lines and switching equipment) provided by the local telephone company. The ISP then provides the Internet services, such as e-mail, web hosting, and the ability to communicate with the rest of the Internet. To avoid confusion this report will identify the physical telecommunications pathways between a customer and an ISP as "Internet access facilities." What ISPs provide are called "Internet services."

The Internet and Internet access facilities are dynamic. However, as Internet technology evolves, the basic policy question will remain intact— should customers have the ability to choose how they will purchase Internet services, or will the providers of the physical telecommunications pathway to the Internet dictate to the public how they will consume Internet services?

Purpose and Methodology

The purpose of this report is to examine the importance of the openness of Internet access facilities to the current success of the Internet and to examine emerging issues that may affect the future development of the Internet, including the related areas of Internet content and e-commerce. Specifically, the report will consider current Federal Communications Commission (FCC) policies relating to broadband Internet access facilities.

This report will illustrate contradictions in U.S. telecommunications policy and the potential consequences of allowing the closed access model to continue for cable companies. Then, following a brief section describing how the Internet works, the discussion will turn to emerging policy questions regarding the distinction between Internet access facilities and Internet services. The answers to these questions will shape the Internet and society, which is coming to rely on the Internet as a basic mechanism for achieving social, political, and economic goals. The FCC will be deciding the regulatory treatment of cable Internet access facilities in the near future. This report concludes that there is a need for consistent national policy with respect to broadband Internet access facilities and provides some suggestions for broadband open access policy.

This report is based on the analysis of publicly available information that includes documents filed with the Securities and Exchange Commission, reports, Orders and industry analysis produced by the Federal Communications Commission, Orders of Federal courts, reports by private industry analysts, articles from the trade press, company reports to shareholders, business-to-business reports and analysis, and articles from academic journals.

II. Telecommunications Policy for an Emerging Internet Economy

The United States is a world leader in the deployment of telecommunications infrastructure and the promotion of competition in telecommunications markets. The transition from the dominant AT&T monopoly to the multiple providers of voice and data telecommunications today was not accidental, but is the result of 40 years of government policy that gradually introduced competition to a variety of telecommunications markets. Starting with the FCC's "Above 890" decision,[8] which allowed private firms to self-provide some telecommunications services, to the Telecommunications Act of 1996, with its mandate of interconnection and network unbundling in the last bulwark of monopoly, the local exchange market, the general theme of policy has been the same, i.e., competition among multiple providers is superior to a regulated monopoly. Society benefits from more innovation, rapid deployment of infrastructure, and a proliferation of services. Customers are better off with choice.

Telecommunications Competition and Open Access

A two-pronged policy approach has been at the core of the transformation of telecommunications markets in the United States. First, consistent with the principles of antitrust, policy makers implemented measures that prevent or eliminate the leveraging of monopoly power into markets where competition is possible. Customer premise equipment (CPE), which was deregulated by the FCC in 1980,[9] is an example of this policy action. AT&T and other telephone companies had extended their network service monopoly into the provision of the wide variety of telephone equipment that is needed by end users. The deregulation of CPE, which ended the telephone companies' equipment monopoly, led to rapid entry by a variety of producers, a growing selection of equipment, and a rapid decline in prices. Deregulation of CPE resulted in open access to equipment to connect to telephone company networks.[10]

The long distance market is another example of the anti-leveraging policy applied to telecommunications markets. AT&T had, until 1977, a nationwide monopoly in the provision of switched long distance services.[11] New entrants such as MCI and Sprint, after gaining legal authority to provide switched long distance services, struggled to compete against the incumbent AT&T as AT&T still held preferential dialing patterns.[12] AT&T, with its continued control over the local exchange bottleneck, was able to discriminate against its rivals. This discrimination ended with the structural separation of AT&T's local and long distance operations. The divestiture of AT&T in 1982, with the corresponding introduction of equal access, was critical in the process of leveling the playing field between AT&T and its new rivals.[13] Equal access guaranteed that local telephone

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[8] Allocation of Frequencies in the Bands Above 890 Mc, Report and Order, 27 FCC 359 (1959).

[9] Amendment of Section 64.702 of the Commission's Rules and Regulations (Second Computer Inquiry), 77 FCC2d 384 (1980).

[10] Equipment was required to meet standards established by the FCC to ensure compatibility and network performance.

[11] Switched long distance services are those utilized by most residential and small business customers that are provided with a dial-up connection to the long distance carrier through the local exchange carrier's network.

[12] Customers of AT&T's rivals were required to dial 7-digit numbers and access codes to be able to use a long distance provider other than AT&T. AT&T customers simply dial "1" plus the telephone number.

[13] The terms of the divestiture recognized the cost advantages that AT&T would have over its rivals and mandated preferential treatment of AT&T rivals through the emerging system of access charges. Furthermore, AT&T was regulated by the FCC as a "dominant carrier" until 1995. AT&T still remains a focal point of regulatory attention in the long-distance market.

companies would provide nondiscriminatory open access to their networks for competing long distance carriers.

The second prong of the policy approach to the promotion of innovation and competition in the telecommunications industry has been the recognition that some telecommunications facilities may continue to have natural monopoly characteristics. Thus, duplication of facilities and competition may not take place even if legal entry barriers are removed. When these conditions have been identified, the policy approach has been to require interconnection with, and network unbundling of, the monopoly firm's physical network plant. This regulatory philosophy also requires open access to monopoly bottleneck facilities. Interconnection and network unbundling are the cornerstones of the local competition provisions of the Telecommunications Act of 1996. However, these principles have been applied for a much longer period through the FCC's Open Network Architecture (ONA), which was envisioned in the mid 1980s with the FCC's Third Computer Inquiry.[14] The ONA model of open access required local exchange carriers to provide network elements to companies who combined the network elements with their own computer technology to generate new services. Companies that benefited from ONA included voice mail providers, alarm monitoring companies, paging companies, and Internet service providers (ISPs). These companies, in addition to gaining access to technology that was difficult or impossible to duplicate, also received regulatory protection from competition from the local exchange carriers that provided the unbundled technology. The open access environment provided by ONA promoted technology deployment and investment that might not have been forthcoming if the open access principles had not been applied.

Are Data Networks Different?

Are the lessons learned from the 40-year history of introducing competition in the telecommunications industry relevant for data communications networks and the Internet? The Internet initially connected data networks associated with government agencies and academic institutions.[15] However, the scope of interconnection increased dramatically in the early 1990s, making the Internet, while still a data network, into a truly public network. The economics and technology of the Internet resulted in a network driven by open access principles.[16] Interconnection to the Internet is competitive and non-discriminatory. ISP networks interconnect at open access Network Access Points (NAPs). ISPs, big and small, exchange traffic in private peering arrangements. Large end-users connect to ISPs via dedicated communications facilities that could be self-provided or purchased from an array of vendors. Residential users typically connect to their ISP using a dial-up connection provided by their local telephone company. The regulatory principles of open access in the telephone network reinforced the overall competitive open access Internet model. Until February 2000, dominant telephone companies (the Regional Bell Operating Companies or RBOCs) were not allowed to provide ISP services, thus furthering the competitive open access Internet environment.

The economics and technology of the Internet (along with some regulatory help with ONA)

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[14] Amendment of Section 64.702 of the Commission's Rules and Regulations. Report and Order, 104 FCC 2d 958 (1986).

[15] For a brief overview of the history of the Internet, see "Hobbes' Internet Timeline." Accessed December 4, 2000 at: http://www.isoc.org/guest/zakon/Internet/History/HIT.html

[16] The 1990s marked the transition of Internet backbone facilities from government provision to private sector provision. This transformation maintained the open access principles that had been in place prior to privatization.

generated a self-enforcing open access environment, which led to benefits similar to those that regulators had delivered in the regulated telecommunications common carrier industry by promoting competition, the divestiture of AT&T and the introduction of equal access, and ONA. The policy goals of competition and open access, which required Herculean effort to implement in the telecommunications common carrier industry, developed without much direct regulatory intervention with the Internet. As a result, the ISP market today is highly competitive with more than 9,400 ISPs operating nationwide,[17] and with hundreds of firms operating in large metropolitan areas. The open access environment has encouraged ISPs to compete on points of customer service such as the availability of service, web hosting, e-mail addresses, and quality of the ISP's connection to the Internet.[18]

However, the importance of the pre-existing regulatory arrangements on the development of the Internet and the growth of competition in the ISP market should not be overlooked. Development of the Internet could have been adversely affected if ISPs had been denied an open access environment in the PSTN. RBOCs could have come to dominate the ISP market if they had not been prevented from providing Internet services.[19] As such, the open access Internet model depended upon the regulatory control of firms which could have exercised monopoly power and leveraged that power to detriment of the Internet.

Internet Technology

In a discussion of policy regarding access to the Internet, understanding the technical structure of the Internet and identifying where the access component of the Internet begins and ends is useful. At first glance, a distinguishing feature of the Internet is its packet switching and best effort service architecture. Unlike the telephone network, which provides a dedicated circuit when a user initiates or receives a call, packet switched networks, like the Internet, dynamically share telecommunications paths among multiple users. User information (data) that is transmitted over the Internet is broken apart and these "packets" of data may traverse widely differing routes between the point of origin and the point of destination. These data packets can contain a wide variety of information content, such as text, video, images, facsimile documents, voice, or music. All packets dynamically share common transmission facilities, leading to tremendous economies in transmission. Rather than requiring multiple networks to transmit information, a single network can accomplish the goal, although service quality on the Internet is not guaranteed. Each packet of data is treated equally as it makes its way through the Internet switches, known as routers. If routers are busy, the packets may be delayed and in some cases are lost or dropped.

Three other characteristics distinguish the Internet from other packet switched networks, such as those that might be used by a government or large corporations for internal communications. These characteristics are its open architecture, the layering of protocols and networks, and the shifting of

[17] See. http://thelist.internet.com/ Accessed December 4, 2000.

[18] For example, here is a New England-based ISP's description of its service quality advantages: "CyberZone has the latest technology, including all fiber optic connections, all digital modems, DS-3 Internet bandwidth with multiple T-1 backups, and brand name equipment and software. CyberZone uses the US Robotics Enterprise Network Hub System with Digital X2 56K modems and Cisco/Ascend chassis with Rockwell K56flex technology. We are also the first ISP in New England to support V.90 at every POP." Accessed December 4, 2000 at: http://www.cyberzone.net/services.html

[19] The Modification of Final Judgement prevented the RBOCs from providing information services, such as Internet services. This prohibition continued until February 8, 2000. However, the open access requirements still apply for Internet access facilities provided by the RBOCs.

network control to the edge of the network.

Openness

The openness of the Internet is an integral aspect of the Internet's success. Previous models of networks and computing relied on proprietary standards. Early computer networks simply extended the proprietary operating systems over networks to connect other computers with the same proprietary operating system.

The standards that allow the Internet to operate are non-proprietary. When issues arise that impact Internet architecture, the Internet Engineering Task Force (IETF) solicits comments through a public process which may result in modifications to existing standards or the introduction of new standards. The openness of Internet protocols prevents any single entity from exercising control over network users or providers.

Protocol Layers

The Internet allows communication to occur between a wide variety of computers and computer network equipment. The fact that this can occur is a result of the non-proprietary Transmission Control Protocol/Internet Protocol (TCP/IP), which is the common currency of data communication over the Internet. The part of this protocol with which most individuals are familiar is the application layer. This protocol layer supports network applications such as Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), and Simple Mail Transfer Protocol (SMTP). These protocols support applications that allow users to browse the World Wide Web, download information, and send e-mail. Because the protocol is open, developing applications that will to run on the Internet is open to anyone with the necessary skill. This openness promotes innovation as application designers are confronted with common non-proprietary standards that will allow new applications to work in a predictable fashion on any equipment that is associated with the Internet. For example, once the HTTP application protocol was developed, independent software developers created a new application, the web browser, that introduced an innovative platform for a variety of Internet applications. These non-proprietary protocols at the application layer of the Internet protocol help fuel the engines of innovation associated with the Internet.

Network Layers

The Internet connects millions of computers around the globe. These connections are achieved by interconnecting computer networks. The network of networks is loosely hierarchal.

Diagram 1 shows a simplified representation of the network hierarchy possible with the Internet. At the bottom of the pyramid are the *Internet access facilities* that attach end users to their ISP.

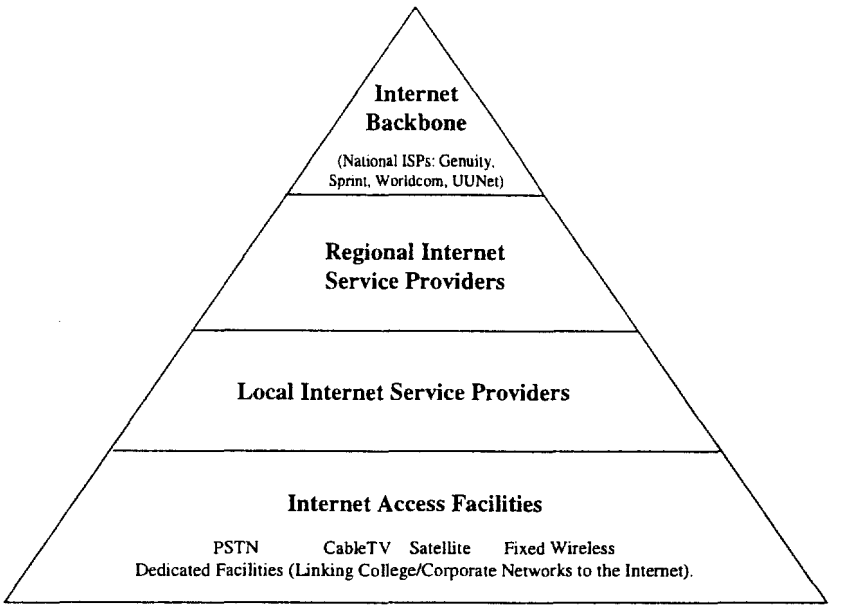

Diagram 1. Network Layers

These facilities include the PSTN, which the vast majority of residential customers utilize to dial up a connection to the Internet, cable television company broadband networks that have been upgraded to provide data communication capacity, satellite systems, emerging fixed wireless systems, and dedicated facilities that connect businesses and college campuses to the Internet. These facilities are entirely separate or separable from the ISP that provides Internet services. For example, an individual with a dial-up connection gains access to their Internet service provider (ISP) through an Internet access facility (the telephone lines and switching equipment) provided by the local telephone company. The ISP then provides the connection to the Internet.

As an example of network layering consider FrogNet, a local ISP serving Southeast Ohio. FrogNet provides Internet services through both dial-up and dedicated Internet access facilities, facilities which its customers purchase from the local telephone company. FrogNet does not connect to a Network Access Point to provide Internet connectivity. Rather, FrogNet purchases Internet access service from two facilities-based national ISPs, Digex and UUNet, and connects to these networks using leased high-capacity telephone lines.[20] Thus, to a FrogNet customer using a dial-up connection, reaching the Internet means using the PSTN, FrogNet's local facilities and leased lines, and Digex and UUNet networks. To the extent that the information that the FrogNet user wants is not hosted on the Digex and UUNet networks, the many other networks that make up the Internet are likely to be utilized.

Thus, the network hierarchy depicted in Diagram 1 arises as Internet access facilities are separate or separable from ISPs. Then the local ISPs may connect to regional or national ISPs. Regional ISPs interconnect with national ISPs which provide the so-call Internet backbone. The Internet backbone, once provided by the U.S. government through the National Science Foundation, is privately

[20] Interview with FrogNet customer service representative, June 24, 2000. See also: http://www.frognet.net

provided today by companies such as MCI/WorldCom, Sprint, PSINet, and Genuity. These companies have national networks that provide high capacity circuits between their switching centers. The national ISPs interconnect at Network Access Points (NAPs), which are high speed local area networks that are often provided by RBOCs,[21] and through private peering arrangements. Private peering occurs when ISPs enter into agreements to exchange traffic by establishing a mutual connection between their networks, another example of the openness of the Internet. It should be noted that the depiction of the Internet hierarchy is an approximation. For example, many national ISPs, in addition to providing backbone facilities, also directly connect to end users. Thus, some Internet users will bypass some network layers when using the Internet.

Control at the Edge

As a network model, the PSTN contrasts with the Internet. A significant difference between the Internet and the PSTN is the location of the intelligence or computer processing power of the network. Where a user connects to a network is known as the *network edge.* For example, users of the PSTN connect devices such as telephones and fax machines to a wall jack in their home. This is the edge of the PSTN. PSTN users make service requests of the network by dialing numbers to complete calls, may enter special codes to request enhanced services like automatic callback, or may receive Caller ID information from the network on special telephone equipment. Computers in the PSTN perform the tasks that the user requests. However, these computers are located in the network core, in the switching centers that set up and route calls and provide enhanced services like call waiting and Caller ID to customers. The network model of the Internet contrasts with the PSTN. The intelligence or computer processing power of the Internet is located at the edge of the network. For example, when an individual "surfs the web" using a web browser on their personal computer, information is received from computers which are typically much more powerful than their own. These powerful computers are also at the edge of the network, connected by an ISP network. In fact the consumer end of the interaction does not need much computer processing power at all. Devices such as WebTV and other new information devices (cell phones, personal digital devices (such as Palm Pilots), e-mail telephones) provide Internet services without a personal computer.

Both the Internet and PSTN rely on switches to route traffic, but the Internet's switches are "dumb" in the sense that all they do is route traffic over the network.[22] Consumers and producers of Internet services rely on computer processing power that is at the edge of the network, leaving the core of the Internet to simply move information between the consumer and producer of information.

It should be apparent that the importance of the network edge is highly consistent with the openness of the Internet model. Individuals, organizations, or businesses with modest resources can connect to that edge and provide information. New services, applications and information can be quickly and widely disseminated as the edge of the Internet is not under any centralized control. Unlike the PSTN, where it has been common practice to suppress technologies that may be considered unprofitable by the firm which owns the network,[23] the Internet allows for innovation, even if that

[21] Due to the Local Access and Transport Area (LATA) restrictions placed on the RBOCs, first by the Modification of Final Judgement and then by the Telecommunications Act of 1996, RBOCs currently cannot provide Internet backbone facilities. Given that the traffic in a NAP is carried within a LATA (and typically in an area much smaller), the RBOCs can provide these NAP facilities.

[22] As is discussed further below, this is beginning to change with the implementation of network services being provided by the data networks that can improve service quality.

[23] Integrated Services Digital Network (ISDN) has been priced by many telephone companies to discourage its usage in favor of their DSL offerings. For example, Verizon offers unlimited usage DSL service in Maryland for $39.95 per

innovation ultimately does not become financially successful. In sum, the openness at the network edge in the Internet provides the foundation for rapid innovation and new service development.

Summary–Are Data Networks Different?

The data network known as the Internet is different because it is a network of networks whose key organizational feature is openness. This openness has been achieved without much government interference. The non-proprietary nature of Internet protocols has allowed the network infrastructure to serve as a platform for new telecommunications services and rapid innovation. The openness of the network has empowered changes in telecommunications and in social and economic relationships which were impossible with the centralized network model of the PSTN. The Internet has developed open access principles, the same principles that regulatory agencies and Congress have been gradually applying to the public switched network.

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month. See, http://www.bell-atl.com/infospeed/more_info/pricing.html . Accessed December 4, 2000. Unlimited usage ISDN in the same state is priced at $236.00 per month. See, http://www.cptech.org/isdn/flat.html . Accessed December 4, 2000.

III. Broadband Internet Access Facilities and Internet Service Markets

Until recently, household users have relied upon Internet access facilities provided by their local telephone company, i.e., a dial-up connection using a modem.[24] For these household users, Internet services were not provided by the telephone company that provide the access facility. As a result, customers had choice in the market for Internet services. This section of the report examines the emerging importance of broadband Internet access facilities and the emerging impact on customer choice resulting from cable companies that have integrated broadband Internet access facilities and Internet services.

Advantages of Broadband

Internet access facilities can be classified as either broadband or narrowband, depending on the facility's data carrying capacity. The FCC has defined broadband access as a connection that provides at least 200 kilobits per second, in both the sending and receiving direction,[25] thus dial-up access (at a maximum of 56 kilobits per second) is not broadband. A broadband connection provides the end user a faster and better experience as compared to a narrowband dial-up connection.

In a broadband environment, the user's connection to the network is "always on." Assuming that the end-user's computer has launched the appropriate software, for example a web browser, the end-user can immediately access information over the Internet. The broadband connection allows the user to send and receive large amounts of data over the access link relatively quickly. The high bandwidth can dramatically increase the speed at which information is downloaded. Internet users in an always-on environment are also able to take better advantage of "push" technologies that deliver information to the user rather than having the user seek and retrieve information across the Internet.

A broadband connection improves work-at-home opportunities. Tele-medicine, and distance learning also become feasible. New services, such as streaming video that provides an alternative source of video programming for the end user, are also possible. Additionally, the broadband connection will improve the quality of video conferencing or access to an employer's local area network. Future applications of an always-on broadband connection offer the potential for a wide variety of services, including services that monitor "smart" appliances, increased ability to monitor medical conditions, and improved household security. For example, linking embedded microchips in home electronic equipment with a centralized network security monitoring system would ensure that equipment operated anywhere other than its "home" address will not function. A stolen VCR would be worthless and presumably less likely to be stolen.[26] The impact of broadband access deployment on the Internet and the overall economy should not be underestimated. This technology will have a significant impact on the growth of electronic commerce and provide increased opportunities and new services for households and businesses.

There are two leading broadband technologies. These are cable television company cable modem service, with about 3.2 million subscribers nationwide, and digital subscriber line (DSL) service,

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[24] See Appendix A for a discussion of alternative Internet access facilities.

[25] *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996.* CC Docket No. 98-146, February 2, 1999, 20.

[26] See, "BT Pushing Home Appliance 'Tagging,' Monitoring Technology," *Telecommunications Reports, TR Daily*, April 21, 2000.

deployed by local telephone companies, which have about 1.7 million subscribers nationwide. For a more detailed discussion of broadband and narrowband technologies, see Appendix A.

Cable Companies as Internet Service Providers

Bundled Broadband Access and ISP Service

Cable television companies such as AT&T, Time-Warner, Comcast, Cox, and Cablevision have entered into exclusive partnerships with ISPs to provide Internet services using the cable companies' broadband access facilities. Time-Warner and AT&T provide Internet services primarily through their respective affiliates, Roadrunner and Excite@Home, which also serve as exclusive ISPs for other unaffiliated cable companies. These relationships between the exclusive ISPs and the cable network access providers reduce customer choice and establish a new model for future Internet development, effectively closing the network edge.

The cable company's proprietary ISP's business strategy goes beyond simply providing Internet services such as e-mail and web hosting. The ISP affiliate will encourage the customer to utilize the proprietary ISP's portal or start screen. This starting point offers information services, such as stock quotes or sports scores, shopping, and search capability. AT&T and AOL/Time Warner are unveiling business strategies that leverage the market advantage of the broadband access connection with the provision of customized content and e-commerce activities.

The Potential for Cache and Bandwidth Discrimination

Because of the interconnected shared networks and best effort service that is available over the Internet (the best service the network can deliver at a point in time), Internet content providers and online retailers have limited ability to control network service quality. Consider the example in Diagram 2.

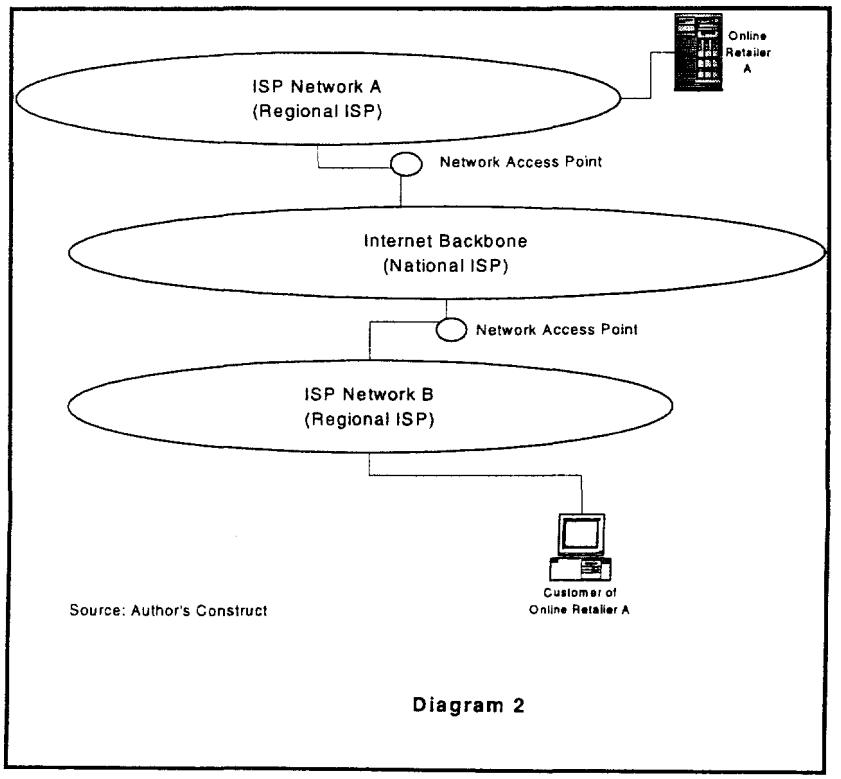

Diagram 2

A customer of an online retailer uses the firm's web site which is hosted on ISP network "A." That customer's service quality will depend on the connection speed linking the user to the ISP, the amount of congestion on the customer's ISP network (network B), congestion at network access points where the ISPs connect, congestion on the ISP network to which the online retailer is connected (network A), and the level of congestion on the online retailer's web site. The online retailer has the ability to engineer its web site to handle what it believes is the optimal amount of peak traffic and to select an ISP that offers good service. However, other aspects of the connection are beyond the online retailer's control. Thus, the user's experience at the online retailer's web site remains beyond the online retailer's control.

An online retailer can improve quality by delivering content to the user through multiple local ISP networks rather than relying on a single server (see Diagram 3).[27] This process, known as caching, places content closer to the user and improves the user experience by reducing the number of Internet switches (routers) through which traffic must proceed on the Internet. The more localized content that is available on ISP "B's" network in Diagram 3, the better the service quality that the customers of ISP B will experience.

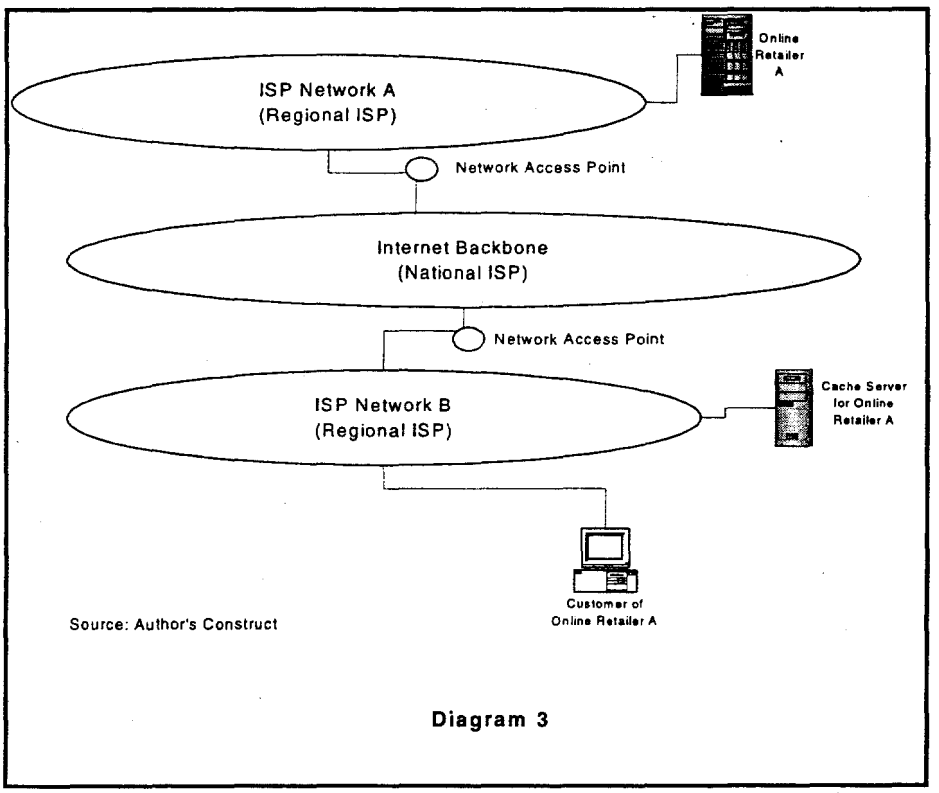

Diagram 3

Caching by ISPs may have the potential to affect competition for content providers and online retailers. An ISP could offer preferential caching service to certain online retailers, and prominently feature the retailers on the ISPs portal or start-up screen. For example, if an ISP entered into a preferential caching agreement with a hypothetical online bookseller "Bookish.com," an end-user would experience superior service quality from the Bookish.com web site, as opposed to the level of

[27] Independent cache network providers, such as Akamai and Inktomi, have emerged to provide cache services to any company willing to purchase their services. See: http://www.akamai.com/ and http://www.inktomi.com/ . Accessed December 4, 2000.

service quality available from alternative online booksellers that are not cached. The placement of Bookish.com on the ISP's portal and the superior service quality available due to caching would make shopping at the ISP's preferred bookseller more likely by that ISP's customers. In addition to preferential placement of content, ISPs can also take more proactive steps to influence the end-user's behavior. For instance, ISPs can use emerging routing technology to assign service quality levels based on the web addresses that are selected by the end user.[28] Not only could the hypothetical ISP from the online bookseller example give preferential placement to Bookish.com, but the ISP could also identify requests made by end users to reach unaffiliated online bookstores and assign inferior service quality to those requests. The end user might experience extremely slow service in requesting an alternative bookseller, thus making the ISP's preferred bookseller even more attractive. This situation is analogous to a customer trying to drive to the bookstore of their choice only to find that roadblocks have been established to channel customers to another bookseller, to the exclusion of all other booksellers. Unlike the roadway analogy, in the online world the end user may not be aware that the roadblocks have been placed and may have their behavior influenced without even knowing that the ISP has limited their ability to choose.

The emerging concern of ISP discrimination with content is exacerbated further if the Internet access facility is not provided on an open access basis. Open access empowers the customer to at least choose which ISP will offer service. ISPs likely will compete on issues of how they provide cache and whether or not they discriminate against certain content providers or online retailers. Open access allows the end-user to fire their ISP and choose another if they are dissatisfied with the current provider's policies regarding customer access to content. The combination of a cable company's broadband Internet access facility and bundled ISP services undermines customer choice and threatens the basic Internet model. If the broadband access provider, like a cable company, ties the end-user's ISP to the broadband access link, then the affiliated ISP's strategies and actions may be more difficult for the end user to avoid. The end user might face the prospect of reverting to a dial-up connection to have a choice of ISP.

Excite@Home Business Strategy

Specific policies of Excite@Home, AT&T's ISP affiliate, generate questions regarding the extent to which ISPs can influence their customer's activities and choices while on line, often without the customer's knowledge.

Excite@Home acknowledges that the user may experience service quality differences when accessing content from an off-network site:

> As with any network, actual downstream speed when using the @Home service will vary. There are many factors that affect the data transfer speed, including:
>
> - overall network traffic
> - your computer's performance and configuration
> - *accessing non-cached or cached data*
> - *location and configuration of the accessed server*
> - performance characteristics of each component of the data network
> - the number of users, and all users' compliance with Excite@Home's Acceptable Use Policy[29]

[28] "Controlling Your Network–A Must for Cable Operators" Cisco System White Paper, 1999, page 5.

[29] @Home, "The Facts About Speed," emphasis added. Accessed December 4, 2000 at: http://www.home.com/sf.html

Excite@Home describes the impact of its network technology and control over the high-speed customer connection on the user as follows:

> To overcome the performance limitations of the Internet, Excite@Home has developed a high-performance "parallel Internet." While it uses the same underlying protocols to ensure compatibility and seamless access to everything on the Internet, @Home's network architecture is markedly different.
>
> Two key themes in @Home's network strategy are "pushing data closer" and "end-to-end management." To embody the first theme, Excite@Home uses a hierarchical, distributed network architecture with proprietary caching and replication technologies to ensure that the information a user wants is always "as close as possible" within the network. "End-to-end management" describes @Home's proactive network quality, service, and performance management systems. Because the network is centrally managed, @Home can avoid the "finger pointing" that plagues the general Internet, and dynamically identify and address network quality, service, and performance issues before they ever affect users.[30]

Knowing what information the user wants will, of course, require monitoring of user preferences, a topic that is discussed further below. The notion of a "parallel Internet" turns the Internet model of openness in a new direction, i.e., to a proprietary data network designed to provide proprietary content to the customer.

Users of @Home's network will not necessarily have a passive experience with the network. As was mentioned in the quote above, @Home strives to keep the information that the user wants available on its network. How does it know which information the user wants? The @Home network monitors users' behavior online:

> ... [L]ocal neighborhood points of presence, called headends, are connected to each Super Node. Consistent with the goal of pushing data as close to the customer as possible, these headends deploy enhanced proxy servers for caching content. Benefits of using local caching servers to keep data close to the user include:
>
> - Major performance improvements since the cache acts as a "dedicated" local server, even for data that originated in the broader Internet
> - Reduction in the amount of data movement in higher layers of the network
> - Far more comprehensive usage statistics than normally attainable on the Internet; these statistics can be used for tuning performance, tailoring the service, and targeting promotions and advertising.[31]

The benefits to @Home of the utilization of customer specific information to target promotions and advertising is described in @Home's 1999 10K report, as filed with the Securities and Exchange Commission:

> We believe that our expertise in targeted Internet advertising provides us with a significant competitive advantage. Our MatchLogic subsidiary utilizes its databases

[30] @Home, "Network Architecture," emphasis added. Accessed December 4, 2000 at: http://www.home.net/about/network.html

[31] @Home, "Network Architecture." Accessed December 4, 2000 at: http://www.home.com/about/network.html