some are focused on local broadband; some are focused on specific customer segments. The Commission need not, should not and indeed cannot select the winning approach here: the market will do it far more efficiently. The Commission should allow MCI WorldCom and Sprint to implement their strategy and offer their competitive alternative.

V. The Merger Of MCI WorldCom And Sprint Will Not Harm The Robust Competition Among Providers Of Internet Backbone Services.

A. Overview

In their Supplemental Internet Submission in this proceeding, MCI WorldCom and Sprint showed that the Internet business has expanded at a phenomenal rate since 1998.[140] The number of Internet users worldwide has quadrupled to 200 million; Internet traffic has increased from six to ten times; the number of Internet Service Providers (ISPs) is estimated to exceed 6500; virtually all facilities-based ISPs have expanded their backbone networks; and new facilities-based ISPs have begun providing service.[141]

A broad consensus exists among the commenters that competition among providers of Internet backbone services today is robust. Several parties, primarily telecommunications competitors of MCI WorldCom and Sprint, however, assert that the addition of Sprint's Internet backbone business to MCI WorldCom somehow will enable the merged company to attain a dominant position in the provision of Internet backbone services. In particular, these parties allege that the merged company will have the incentive and ability to engage profitably in

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140 Letter from Sue D. Blumenfeld, Attorney for Sprint Corporation, and A. Richard Metzger, Jr., Attorney for MCI WorldCom, Inc. to Magalie Roman Salas, FCC, CC Docket No. 99-333 (dated Jan. 14, 2000) ("Supplemental Internet Submission") at 12.

141 Id.

anticompetitive strategies, such as the degradation of peering arrangements, to disadvantage its rivals. As shown below, these claims are baseless.[142]

In the discussion that follows, the Applicants first show that the structure of the Internet today precludes any single firm from achieving a dominant position in the provision of Internet backbone services. As the Declaration of Dr. Nicholas S. Economides (attached as Exhibit 5) ("Economides Decl.") explains, the network externalities associated with the Internet strengthen the incentives of Internet backbone providers to interconnect with other providers, a conclusion that is corroborated by the expansion of public and private peering agreements over the past two years.

Even assuming, arguendo, that one were to adopt the theoretical argument of the merger's opponents, a complete examination of the current market environment of the Internet dispels any likelihood of harm. Dr. Economides explains why it would not be profitable for the merged company to attempt to engage in degradation, or other strategies hypothesized by opponents to the merger, each of which would require the merged company to impair the quality of service to its own customers. The Applicants identify specific market and other changes that have occurred or accelerated over the past two years that reduce the asserted incentive and ability of a substantial provider of Internet backbone services to degrade its interconnection arrangements with other Internet backbone providers.

Finally, the Applicants demonstrate that, contrary to the claims of some parties, the

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142 While Sprint has previously asserted that the Internet has hierarchical characteristics, and does not disclaim those assertions here, Sprint agrees with MCI WorldCom that developments in the Internet, as described herein, resolve all competitive concerns regarding the merger of the Applicant's Internet businesses.

divestiture of MCI's Internet backbone assets to Cable & Wireless, Inc. ("C&W") was more than sufficient to accomplish the Commission's intended objective. The proof that the divestiture achieved its goals is that Internet backbone services are competitive, a point generally conceded by commenters. Moreover, C&W today is a leading provider of Internet backbone services in the United States and has commenced an aggressive program to expand its presence on a nationwide and worldwide basis.

In view of the current, vibrant competition among providers of Internet backbone services and the Applicants' express commitment to work with policymakers to address potential concerns regarding the addition of the Sprint Internet business to that of MCI WorldCom, the record clearly supports a finding that the proposed merger is in the public interest.

B. Competition To Provide Internet Backbone Services Is Thriving.

The Commission previously defined Internet backbone services as "the transporting and routing of packets between and among ISPs and regional backbone networks."[143] The Commission further observed that "[Internet Backbone Providers] interconnect with one another through either a peering arrangement or a transiting arrangement."[144] Applicants recognize that, in the WorldCom/MCI Order, the Commission stated, without reaching a final determination, that it was "inclined to agree" with those commenters that had argued that the provision of Internet

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143 WorldCom/MCI Order ¶ 148.

144 Id. ¶ 145.

backbone service was a separate relevant product market.[145] Under this definition, the market includes numerous competing providers and is characterized by ongoing expansion and new entry.

In contrast, C&W alleges that the relevant market should be defined very narrowly to include only "top level ISPs," and that this conclusion alone is dispositive of the issue of whether the merged company will have market power. The Applicants disagree with C&W's view.

Each ISP decides between transit and peering based on the relative costs, including the cost of building a network sufficient to support peering relationships and the transaction costs of peering with multiple Internet backbone providers.[146] The traffic arrangements among firms encompass a continuum, including backbone providers that rely exclusively on transit to achieve connectivity, backbone providers that rely exclusively on peering to achieve connectivity, and backbone providers that rely on both transit and peering.

In the Supplemental Internet Submission, the Applicants reported the tremendous growth of the Internet industry and the trends of new entry and expansion by existing providers of Internet backbone services.[147] This description is consistent with the Commission's own conclusions concerning the deployment of backbone facilities.[148] In a recent report, Commission staff observed that:

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145 Supplemental Internet Submission at 10-11 (quoting WorldCom/MCI Order ¶ 148). In the view of MCI WorldCom, the relevant product market is broader than simply Internet backbone services.

146 Economides Decl. ¶ 38. ("Peering is preferred when the cost incurred by X for traffic from X to Y and Y to X is roughly the same as the cost incurred by Y for the same traffic.")

147 Supplemental Internet Submission at 12-17.

148 In the Advanced Services Report, the Commission concluded that the communications industry appeared to be making large investments in advanced technologies and that the

> The Internet was in its infancy in 1996 when there were only 14.3 million host computers . . . connected to it in the world and only 27 million Americans using it. Today there are more than 44 million Internet hosts, and nearly 80 million users in the U.S.[149]

Several commenters agree that competition among Internet backbone providers is thriving.[150] The commenters identify many providers of Internet backbone services, as well as new entrants that are competing to establish positions in this business.[151] By any measure,

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deployment of high-speed long distance or 'backbone' facilities, appeared to be reasonable and timely. See Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, 14 FCC Rcd 2398, 2421 (1999) ("Advanced Services Report"). The Commission observed that since its first report on the state of deployment of advanced services "deployment has increased substantially . . . ." See 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 Dkt. No. 98-146, Notice of Inquiry (rel. Feb. 18, 2000) (FCC 00-57) ("Second Advanced Services NOI").

149 Millennium Report at 4. The report also observes that the growth in electronic commerce is "one of the drivers causing data traffic to double every 100 days." Id.

150 See, e.g., GTE at 5-6; C&W at 16; Pearce Aff. at 7 ("According to industry estimates, the worldwide Internet backbone market in 1998 was $8.3B. This should reach $20B by 2002, with an increasing contribution from Europe and the rest of the world."). Bell Atlantic conclusorily asserts that MCI WorldCom dominates the provision of Internet backbone services, based on its estimates of MCI WorldCom's share of backbone services and its calculations of the effect of the merger on the HHI. Bell Atlantic at 2. As we explain infra, those estimates are flawed. In addition, we observe that Bell Atlantic-Pennsylvania sent a letter to the Pennsylvania PUC supporting the merger. See Letter from Christopher M. Argaa, Bell Atlantic-Pennsylvania, to James J. McNulty, Pennsylvania Public Utility Commission, PA PUC Dkt. Nos. A-310183F0003, A-313200F0006, and A-310356F0002 (dated Mar. 8, 2000) ("Please be advised that Bell Atlantic-Pennsylvania, Inc. supports Pennsylvania PUC approval of the referenced applications and the immediate issuance of a certificate of public convenience by the Pennsylvania PUC authorizing the transfer of control necessary to accomplish the merger . . . ").

151 See, e.g., NEXTLINK at 2. (NEXTLINK "has a vested stake in this proceeding as a competitor of MCI-W and Sprint in the provision of telecommunications and Internet access services."); Pearce Aff. at 8 (identifying MCI WorldCom, Sprint, GTE, C&W;

competition among Internet backbone providers has increased since 1998.[152] Qwest, Level 3, AT&T and others, through new construction and acquisition, have become significant providers of Internet backbone services.[153] Competition among Internet backbone providers has fostered the dramatic growth in Internet traffic and the continuing decline in prices for Internet access.

C. Commenters Rely on Inaccurate Information To Reach Erroneous Characterizations of Market Shares.

1. Market share estimates

As part of their efforts to characterize the existing relationships among competing providers of Internet backbone services, several parties submitted widely differing estimates of the providers' shares. Those estimates are unreliable and, consequently, do not present an accurate depiction of this industry segment. Even Internet revenues, which are probably the most useful measure available, do not provide a precise metric, because, among other things, not all providers report revenues, those that do report do not necessarily use consistent reporting criteria, and there is no consensus concerning the service revenues that should be included and excluded. At best, available information about revenues offers only an order-of-magnitude indication of the relative

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AT&T and PSINet as "major incumbent backbone providers" and BT/AT&T/TCI/MediaOne, Qwest, Level 3, Williams Companies, Frontier-Global Crossing, and Broadwing as "the challengers"); SBC at 40 (alluding to the "next 11 backbone providers" and stating that after the merger of MCI WorldCom and Sprint, Intermedia would be the next largest provider).

152 Economides Decl. ¶¶ 59-61; see also Supplemental Internet Submission at 13-14; Boardwatch Magazine's Directory of Internet Service Providers (11th ed. 1999) at 6 (identifying 46 national Internet backbone providers and 12 newcomers to the list in 1999.) Even under C&W's definition of "top level" providers, there are five providers (UUNET, C&W, Sprint, GTE/BBN, AT&T) today compared to four in 1998 (UUNET, iMCI, Sprint, GTE/BBN).

153 Supplemental Internet Submission at 15.

positions of the leading providers. Because calculations of the Herfindahl-Hirschmann Index ("HHI") are derived directly from market share estimates, the commenters' HHI estimates are as erroneous as the market share estimates on which they are based.

As the Commission observed in the Advanced Services Report, it is difficult to obtain data specific to any segment of broadband businesses.[154] The comments in this proceeding demonstrate that this observation remains true today. The very substantial range reflected in the share estimates provided by commenters underlines the fact that, as the Applicants noted previously, there continues to be no generally accepted standard for estimating the relative shares of Internet backbone providers. SBC, for example, offers estimates, based on different measuring standards, indicating that the combined companies' share of Internet backbone services is somewhere between 43 and 70 percent.[155] Bell Atlantic's estimates of the combined share range from 34 to 70 percent.[156]

Even commenters that purport to be using the same measuring tool do not present comparable estimates. Both C&W and AT&T, for example, claim to estimate the "wholesale market," but their estimates are significantly different. C&W states that MCI WorldCom accounts for 56.7 percent of the wholesale services market by revenue, while Sprint accounts for 11.2 percent.[157] By contrast, AT&T estimates MCI WorldCom's share of the wholesale market

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154 Advanced Services Report ¶ 35; see also Second Advanced Services NOI ¶ 4 (seeking "objective, empirical data about the current state of deployment.").

155 SBC at 40.

156 Bell Atlantic at 2-3.

157 C&W at 8.

at the end of 1998 to be 34 percent and Sprint's share to be 17 percent. AT&T does not specify the method that it used in arriving at those estimates (e.g. revenues, connections).[158]

Moreover, there is no agreement, even among the commenting parties, as to which standard is the most reliable. Thus, for example, SBC estimates industry shares based on a service provider's connections, and states that after MCI WorldCom and Sprint, the next largest backbone provider is Intermedia.[159] The number of ISP connections, however, does not reveal whether the connections are with small, large or mid-sized ISPs or the capacity of the connections. According to Bell Atlantic, the use of ISP connections produces misleading results, because "a relatively small number of ISPs generate the lion's share of Internet traffic."[160] A recent New York Times article about PSINet illustrates the flaws in using ISP connections as a measure of market share.[161] According to that report, in 1999, AT&T accounted for approximately twice the Internet-related revenues of Sprint, but Sprint had more than twice as many ISP connections.[162]

Estimates of provider shares based on the number of "top" web sites that they serve

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158 AT&T at 8.

159 SBC at 40.

160 Bell Atlantic at 4. Having acknowledged that ISP connections are an unreliable basis for estimating market share, Bell Atlantic nevertheless attempts to use ISP connection data to support its claim that C&W's share has declined since it acquired MCI's Internet assets. Id. at 7-8 n.22.

161 New York Times, "An Iconoclast Goes It Alone On the Net" at C1 (Mar. 13, 2000).

162 Id. According to the chart, Sprint had $600 million in "Internet-related" revenues for 1999, compared to $1.206 billion for AT&T. But Sprint had 1,607 connections, compared to 789 for AT&T.

similarly present a distorted picture.[163] As with ISP connections, the number of web sites served by a particular backbone provider does not indicate the relative amount of Internet traffic generated by the web sites. An Internet backbone provider that served the ten busiest web sites in the survey and a provider serving the ten web sites ranked 41-50 would be shown as having equal shares.

Even if the methodology advocated by AT&T and GTE were used, the share estimates they submitted are simply wrong. AT&T claims that, according to a June 1999 report, MCI WorldCom hosted 178 of the 500 busiest web sites, and that Sprint hosted 56 of those sites, giving the combined companies a share of 47 percent of the top web sites.[164]

These percentage estimates overstate the combined companies' share of the busiest web sites because they ignore the fact that a total of 669 web connections are associated with the 500 top web sites (presumably because a number of the web sites were multihomed). Use of the correct denominator produces an estimate of the combined companies' shares of 35 percent ((178 +56)/669).

In sum, use of both ISP connections and "top" web sites to estimate the shares of Internet backbone service providers suffers from a fundamental flaw: even if the calculations were performed properly, the results do not provide an accurate assessment of the firms' relative size.

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163 See AT&T at 7; GTE at 4. The "top" web sites were the 500 "busiest" sites as identified by a research firm that tracked the Internet activity of a sample group of Internet users. The "busiest" web sites were ranked according to the number of unique visitors to the page. <www.data.com/issue/990607/topisps.html>.

164 AT&T at 7 (citing <www.data.com/issue/990607/topisps.html>). GTE cites the same study at 4, but calculates a share of 49 percent for the combined companies. GTE does not provide the calculation it performed and, hence, it is not clear why AT&T and GTE's estimates differ.

Revenues from the provision of backbone services provide the most credible barometer of size, but there is no single reliable method available today for estimating shares. First, as discussed in the Applicants' Supplemental Internet Submission,[165] there are scores of firms offering backbone services. Those firms that are not publicly traded companies are not required to disclose information concerning their financial performance. Thus, it is impossible to know precisely total revenues from Internet backbone services. Second, firms that provide public financial information do not report Internet-related revenues in a consistent fashion. For example, two firms may provide their revenues from "Internet services," but may use different criteria to determine the services that are included in that category.

It should be noted that various estimates of revenue shares have been offered by independent parties to estimate the relative performance of different firms based on revenues, although the Applicants obviously cannot vouch for the accuracy of such information. For example, a leading Wall Street analyst estimated last year that the merged firm's share of Internet backbone revenues in 2003 would amount to 39 percent.[166] The analyst further testified that MCI WorldCom's revenue share alone would decline by 6 percent between 1999 and 2003, from 38 percent to 32 percent, and Sprint's share would decline by 2 percent, from 9 percent to 7 percent over the same period. A recent IDC report estimated that the combined companies' share of overall dedicated access revenues (sold to both businesses as well as ISPs) amounted to 39

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165 See Supplemental Internet Submission at 14 (citing Boardwatch Magazine's Directory of Internet Service Providers (11th ed. 1999) at 5, 27-206).

166 Hearing on the MCI WorldCom-Sprint Merger Before the Senate Committee on the Judiciary, Exhibit 3, Testimony of Tod A. Jacobs, Senior Telecommunications Analyst, Sanford C. Bernstein & Co., Inc. (Nov. 4, 1999).

percent in 1999.[167]

2. HHI estimates

Relying on flawed HHI estimates based on imprecise market share calculations, the commenting parties contend that combining the Internet backbones of MCI WorldCom and Sprint would enable the new WorldCom to dominate the Internet. The HHI calculation is the starting point, not the ending point, of the analysis.[168] The key to understanding the competitive significance of this merger of Internet backbone service providers is understanding the ease with which the substantial number of competing national backbone providers, and sophisticated customers, can respond to any anticompetitive conduct by the merged firm by shifting traffic off its network. Any reasonable assessment demonstrates that vigorous competition among Internet backbone providers will continue with or without the merger of MCI WorldCom and Sprint.

D. The Merger Will Not Impair The Robust Competition Among Internet Backbone Service Providers.

The record demonstrates that competition among providers of Internet backbone services today is vigorous and growing. Nevertheless, some commenters argue that the addition of Sprint's backbone business to MCI WorldCom somehow will enable the merged company to attain a dominant position in the provision of Internet backbone services. In particular, these parties allege that the merger will lead to: (1) higher prices for, and degradation in the quality of, interconnection between the combined company's and competing backbone networks;[169] and (2)

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167 Internet Data Corporation (IDC), "Internet Service Provider Market Review and Forecast, 1999-2004," at Tables 9 and 10.

168 See discussion at Section II.A.

169 See, e.g., AT&T at 11; Bell Atlantic at 6-7; SBC at 42; Hausman Decl. at 29, C&W at 4, 18; GTE at 7; Pearce Aff. at 23, 27; NEXTLINK at 8.

increased barriers to entry.[170] Commenters predict that these developments will strengthen the combined company's market power in the provision of Internet backbone services;[171] undermine competition in the market for downstream ISP services; and stunt the development of advanced services.[172] As demonstrated below, these claims are baseless and should be rejected.

1. Barriers to expansion and entry are negligible and outside the Applicants' control.

Bottlenecks, such as those seen in the local telecommunications network, do not exist on the Internet, except of course with respect to the "last mile" of Internet access, which is dominated by the local telephone companies.[173] As the Commission has found, the facilities used to provide Internet backbone services are routers and the high-speed transmission lines that connect these routers.[174] Dr. Economides explains that any barriers to expansion or entry in the supply of additional raw transmission capacity are negligible.[175] Fiber capacity can be leased from a variety of sources, and there is no shortage of capacity that would constrain the ability of smaller networks or new entrants to expand capacity or enter the market.[176] Moreover, fiber capacity is growing rapidly today and will continue to grow for the indefinite future. In addition to transmission capacity, networks need routers, which are readily available from a variety of third

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170 C&W at 5, 18; Pearce Aff. at 23; GTE at 8.

171 See, e.g., SBC at 41; C&W at 15; GTE at 7; Pearce Aff. at 23, 30; NEXTLINK at 8.

172 See, e.g., C&W at 5, 19-22; Pearce Aff. at 24, Global Crossing at 6.

173 Economides Decl. ¶ 27.

174 WorldCom/MCI Order ¶ 148.

175 Economides Decl. ¶ 59.

176 Id. ¶¶ 55-57.

party suppliers.[177] With respect to Internet addressing, tools exist which enable systems administrators to configure their systems to minimize any administrative burdens associated with changing IP addresses.[178] As to the other purported entry barriers, the commenters have not substantiated their claims with any factual data showing that the alleged concerns would impede entry.

The conclusion that the barriers to entry and expansion in the provision of Internet backbone services are negligible is further supported by the growth in Internet backbone services in recent years. As noted in the supplemental submission, companies with relatively small backbone networks have quickly developed, through new construction and consolidation, into significant providers of backbone services.[179] These include Qwest, Level 3, Global Crossing, AT&T and Teleglobe. The Commission similarly concluded in its Advanced Services Report last year, that "backbone facilities are being deployed in a reasonable and timely fashion."[180]

2. Conditions for exercising market power in network industries are not present.

In his Declaration, Dr. Economides explains that, although there are conditions under which network externalities may inhibit competition, these conditions are not present here. Indeed, Dr. Economides states:

> The presence of network externalities does not generally imply the existence of monopoly power. Where there are network

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177 Id. ¶ 58.

178 See discussion below.

179 Supplemental Internet Submission at 15.

180 Advanced Services Report ¶ 44; see also Second Advanced Services NOI (seeking comment on whether that conclusion remains true today).

> externalities, adding connections to other networks and users adds value to a network, so firms have strong incentives to interconnect fully and to maintain interoperability with other networks. Thus, network externalities can act as a strong force to promote competition for services based on interconnected networks.[181]

Dr. Economides states that economics literature has established that using network externalities to affect market structure by creating a bottleneck requires three conditions: (1) networks use proprietary standards; (2) no customer needs to connect to buy services from more than one network; and (3) customers are captives of the network to which they subscribe and cannot switch providers cheaply and easily.[182] In the case of the Internet, none of these conditions is present.

There are no proprietary standards inhibiting the exchange of traffic on the Internet.[183] The Internet links together independent networks that use the same, non-proprietary data transfer protocols.[184] Internet transport standards are publicly available and no single service provider

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181 Economides Decl. ¶ 15. As with other networks, the Internet's value to each customer rises as more customers access it. For example, the addition of a user potentially adds to the information other users can reach, adds to the goods available for sale, adds a customer to e-commerce sellers, and adds to the collection of people who can send and receive email or otherwise interact through the Internet. See id. ¶ 9.

182 Id. ¶ 20.

183 Id. ¶ 22. Of course, providers attempting to establish market dominance through the use of proprietary standards run the risk that they will isolate themselves. See id. ¶ 18 (describing Sony's strategy concerning Beta video cassette recorders).

184 See "Internet Over Cable: Defining the Future in Terms of the Past," OPP Working Paper No. 30, FCC (Aug. 1999) ("Internet Over Cable"), at 12 ("the Internet exists and functions as a result of the fact that hundreds of thousands of separate operators of computers and computer networks independently decided to use common data transfer protocols to exchange communications and information with other computers (which in turn exchange communications with still other computers). There is no centralized location, control point, or communications channel for the Internet.") (citing ACLU v. Reno, 929 F. Supp. 824, 832 (E.D. Pa. 1996).

controls any of the necessary technical standards. The existence of common interconnection standards and protocols helps to ensure that no service provider can use the existence of network externalities to create and use monopoly power.[185]

A second prerequisite cited by Dr. Economides for establishing market power is that customers do not need to connect to or to buy services from more than one proprietary network.[186] As long as customers require access to multiple networks, it will be difficult, if not impossible, for a single network to acquire market power. In the context of the Internet today, it is undisputed that customers demand universal connectivity.[187] Customers of Internet services expect to be able to connect with every web site on the Internet and to exchange electronic mail with anyone. This means that every network must connect with the rest of the Internet in order to provide the ubiquitous service that its customers demand.

The third condition, difficulty in switching networks, also is not met. The costs for an ISP to migrate some or all of its transport traffic to other network providers are not prohibitive, which is why such changes are a common occurrence. To switch to another provider's Internet backbone facilities typically involves four steps: (1) ordering a new circuit from a telecommunications carrier; (2) resolving any contract termination costs; (3) renumbering the network IP addresses; and (4) coordinating both services during a limited transition period. The costs are predictable[188] and can be minimized by contracting parties and network administrators.

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185 Economides Decl. ¶¶ 22-23.

186 Id. ¶ 20.

187 Id. ¶ 24.

188 For example, steps one, two and four are comparable to those routinely faced by any entity seeking to switch private line telecommunications services to another provider.

With respect to IP numbering, for example, tools exist that enable systems administrators to configure their systems to minimize any administrative burdens associated with changing IP addresses. Network Address Translation ("NAT") and Dynamic Host Configuration Protocol ("DHCP") can be used by systems administrators to scale, allocate, and change IP addresses efficiently. In addition, many ISPs and large content providers currently obtain connectivity from more than one backbone to guard against network failures.[189] This practice makes it relatively easy for these customers to switch backbone providers.

In sum, Dr. Economides concludes that network effects on the Internet "do not create a tendency to dominate the market or tip it toward monopoly," but rather act as "a pro-competitive force on the Internet, providing strong incentives for incumbents to interconnect with new entrants."[190] The decline of proprietary "online services" at a time when the rest of the Internet industry has flourished is evidence of the benefits of interoperability and tremendous network externalities of the Internet.[191]

E. A Complete Examination Of The Current Market Environment Dispels Any Likelihood Of Harm.

Even assuming, arguendo, that one were to adopt the theoretical argument of the merger's opponents, a complete examination of the current market environment of the Internet dispels any likelihood of harm. Dr. Economides explains why it would not be profitable for the merged

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189 Id. ¶ 25.

190 Id. ¶ 28.

191 Many of the former "online service providers," which provided customers with access to the Internet through the use proprietary standards and interfaces, rather than a direct IP connection, subsequently folded electronic mail and other services into the Internet. See Internet Over Cable at 17-18; Economides Decl. ¶ 23.

company to attempt to engage in degradation, or other strategies hypothesized by opponents to the merger, each of which would require the merged company to impair the quality of service to its own customers. The Applicants identify specific market and other changes that have occurred or accelerated over the past two years that reduce the asserted incentive and ability of a substantial provider of Internet backbone services to degrade its interconnection arrangements with other backbone providers.

1. Attempts to exercise market power would not be profitable.

As noted earlier, various commenters have argued that the merged company would have the incentive and ability to degrade interconnection needed by its competitors[192] or to raise its rivals' costs by forcing other Internet backbone providers to buy transit from it, rather than allowing settlement-free peering arrangements.[193]

The advocates of the "degradation" theory argue that a large ISP today could profitably engage in that strategy against a smaller rival by taking advantage of its alleged control over a large number of customers. According to the theory, ISP customers of a large backbone provider would have to route traffic destined to customers of ISPs served by another backbone provider through peering interfaces between the backbones. When peering interfaces are congested or degraded, the end user may experience considerable delay in obtaining information, and may abandon efforts to access the web site in question. The owner of the web site might then lose revenues from sales and advertising, and the end user might turn to a more responsive, but

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192 AT&T at 11; SBC at 42; Hausman Decl. at 29, C&W at 4, 18; GTE at 7; Pearce Aff. at 23; NEXTLINK at 8.

193 AT&T at 11; Bell Atlantic at 6; SBC at 42; Hausman Decl. at 29, 33; C&W at 4, 16, 18; GTE at 7-8; Pearce Aff. at 23, 28; NEXTLINK at 7.

otherwise less-preferred web site served by the large ISP.

Proponents of the degradation theory further claim that if the interface between a larger and smaller backbone provider were degraded, customers of the smaller provider would suffer the adverse effects of reduced service quality disproportionately because a greater share of their traffic would traverse the degraded interface. Stated differently, the theory assumes that the ISP customers of the larger backbone provider would continue to receive high quality service on a larger proportion of their traffic than would customers of the smaller backbone provider.

As an initial matter, the process known as "dynamic routing"[194] and the abundance of peering arrangements mean that there are numerous routes that Internet traffic may travel to reach its destination. In addition, Dr. Economides points out that, as a matter of economics, a firm with market power will choose to raise price rather than degrade its service because a price increase will generate additional revenues.[195] In order for a price increase to be successful, however, the combined company would have to be in a position to exercise market power. As shown above and explained further below, the conditions necessary for exercising anticompetitive market power are not present in the case of the Internet today.[196] For these reasons, the Applicants believe that the consequences of a reduction in connectivity are unknown, but most likely would

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194 See Internet Over Cable at 14 ("Each router calculates the best routing for a packet at a particular moment, given current traffic patterns, and sends the packet to the next router, through a process known as 'dynamic routing.' At the destination point, packets must be reassembled, and packets that do not arrive must be resent.").

195 Economides Decl. ¶ 78 ("A firm can choose a price increase that will have the same effect as increasing the costs (or reducing the benefits) of its clients, and it is able to collect extra revenue through the price increase while if it just degrades the product it receives no extra revenue.").

196 See discussion at Section V.D.2.

hurt the merged firm as much as or more than its competitors as a group, and any price increases imposed by the combined company would result in profit opportunities for its many rivals.[197]

Given the structure of the Internet today, the degradation strategy would result in a loss of business for the degrading network. Because there are limited switching costs and negligible barriers to expansion and entry, Internet backbone customers would switch to other networks rather than tolerate a degraded connection and alienate their customers.[198] For these reasons, the Commission should reject the arguments of commenters that the combined company would have an incentive to raise the price for or degrade the quality of interconnection with other networks.[199]

Moreover, if one assumes, arguendo, that such an incentive exists in theory, the ability to execute successfully such a plan in the current Internet environment does not exist. As described above, tremendous uncertainty exists with respect to the individual market shares of Internet backbone providers. As a result, an Internet backbone provider cannot know with any degree of precision or reliability its relative position in the market. This means that an Internet backbone provider that undertook a degradation strategy would not be able to determine with any confidence the impact of that strategy on its customers and revenues.

Given the incredible rate of growth of the Internet as a whole, and the enormous investments by competing ISPs, there is substantial risk that an Internet backbone provider's own

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197 Economides Decl. ¶¶ 87, 96.

198 Id. ¶ 93.

199 AT&T at 11; Bell Atlantic at 5-7; SBC at 42; Hausman Decl. at 29, C&W at 4,16, 18; GTE at 7-8; Pearce Aff. at 23, 28; NEXTLINK at 7-8.

estimates of its current share would be wildly inaccurate, perhaps off by 100 percent.[200] In conditions of such uncertainty, it seems highly unlikely that any backbone provider would take the risk of trying to raise rivals' costs by increasing the price or degrading the quality of interconnection with other ISPs.

In the absence of reliable information by Internet backbone providers as to their own market share and the market shares of other Internet backbone providers, and in the absence of other important market information (including the availability, size, price and even existence of alternative Internet backbone facilities), an Internet backbone provider's ability to raise rivals' costs is extremely problematic. If the Internet backbone provider pursued such a strategy by raising its price for transit, it would lose business because other ISPs would move whatever traffic they could to alternative, cheaper Internet backbone routes. If the Internet backbone provider degraded the quality of interconnection, it would degrade the quality of the service it provides to its own customers by depriving them of efficient connections to part of the Internet.

These are obviously substantial risks. If an Internet backbone provider guessed wrong, it would accomplish nothing but to drive away its own customers and thereby do itself serious, perhaps permanent, injury. The exponential growth enjoyed by the Internet already provides an exceptional opportunity for all Internet backbone providers to expand their operations and to share this growth. Thus, today, even under the best of circumstances, it would hardly seem worth the candle for an Internet backbone provider to risk everything and try to raise rivals' costs by severing the network interoperability upon which the Internet depends. The inadvisability of such

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200 See Bell Atlantic at 2-3 (estimating the combined company's market share could range from 34 to 70 percent).

a strategy would seem particularly apparent where, as noted, the information necessary to calculate carefully the risk, costs, benefits, and chances of success of such a risk-laden strategy are clearly lacking. For these reasons, the Applicants disagree with those commenters that suggest an Internet backbone provider would deliberately degrade service or raise prices.

2. Recent technological advances further undermine allegations that the merger will harm competition.

As shown above, providers of Internet backbone service in fact have compelling economic incentives to provide high quality service to all of their customers and to maintain efficient interconnection arrangements with other providers. In addition, recent technological changes further undermine the relevance of the degradation theory to today's Internet industry, because they would reduce the asserted benefits that a large backbone allegedly would gain from such a strategy.

a. Peering

Smaller ISPs make interconnection arrangements with each other that, like the arrangements between larger ISPs, do not involve explicit payments. These peers exchange traffic sent by customers of one of the peering networks to customers of the other,[201] and rely upon transit purchased from another ISP to achieve universal connectivity.

As the following example illustrates, peering among small ISPs reduces any alleged incentives that a large Internet backbone provider may have to degrade the quality of its peering interfaces with a smaller network. The effectiveness of the degradation strategy is based on the assumption that the impact of the degradation would be felt disproportionately by customers of

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201 Traffic addressed to customers of other ISPs is not exchanged over the peering interface between the smaller ISPs.

the smaller backbone provider. Suppose, however, that two ISPs are connected to two different Internet backbone providers, and that the larger of the two initiates a degradation strategy. One response is for the two ISPs to establish a direct connection (through a public or private peering point) thereby avoiding the degraded interface for the traffic they exchange.

Peering between the smaller ISPs thus allows them to obtain the same service quality, with respect to the traffic they exchange, that their customers would experience if the larger Internet backbone provider did not degrade the peering interface. Because this traffic represents a larger proportion of the total traffic of each customer of the smaller Internet backbone provider, the peering arrangements between the smaller ISPs reduces the disparity in service quality experienced by customers of the two backbone providers that results from degradation. In effect, peering between the smaller ISPs reduces any alleged competitive advantage that ISP customers of the large Internet backbone provider would gain if the peering interface were degraded. As a result, the large Internet backbone provider would not be able to attract as many customers from the smaller Internet backbone provider. Accordingly, any alleged incentives that the larger Internet backbone provider may have to degrade the quality of its peering interface are reduced by the additional peering arrangements.

In addition, the ISP connected to the putatively offending Internet backbone provider could switch to another backbone provider, thereby reducing the amount of traffic that goes over its former supplier's backbone. ISPs, like retail customers, would look for any way to reduce use of any Internet backbone provider whose service was always subject to congestion problems. Contrary to the arguments raised by some commenters, it would seem apparent that ISPs and retail customers would not be eager to connect to an Internet backbone provider that does not provide acceptable service over one or more exchange points with other ISPs. The result of each

of these responses to a degradation strategy is to reduce the revenue-generating traffic for the ISP that initiates the strategy, thereby making the strategy unprofitable and counterproductive.

Peering arrangements between smaller Internet backbone providers are becoming even more prevalent. Peering networks use Border Gateway Protocol 4 (BGP4) routing.[202] BGP4 is more complex than other "static" routing protocols used by end users and, until recently, the equipment required to implement BGP4 was both expensive and complex. The cost of this equipment, however, has fallen greatly since the WorldCom/MCI merger,[203] so that peering arrangements have become considerably less expensive to implement. The availability of alternative peering arrangements between smaller ISPs makes any strategy of degrading interconnection especially difficult to accomplish.

There is significant evidence of the growth of NAPs[204] and the concomitant increase in peering. PAIX, a NAP provider, signed up its 100th customer in January 2000,[205] and Equinix, another NAP provider, has announced an ambitious plan to establish 30 NAPs worldwide over

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202 See "Ameritech's Multi-lateral Peering Agreement," version 3.2, at <nap.aads.net/MLPA.html>.

203 "The best low-end router hardware-related news in the last year is the introduction of the Cisco 2600 series. Finally, you can get a $2,000-3,000 router with 64 MB and a RISC CPU that can handle full BGP to at least two providers over two T-1s. Recent models include two 10/100 Ethernet /Fast Ethernet ports at low cost. Before the 2600's introduction, the only Ciscos capable of handling two full BGP "views" of the Internet cost close to $10,000." Boardwatch Magazine, Avi Freedman, "AVI RETURNS — Configuring CAR and CEF to Shape Traffic and Kill Smurfs" (July 1999).

204 There are 41 active U.S. NAPs, 40 European NAPs, and 27 Asia-Pacific NAPs listed at <www.ep.net.html>.

205 Press Release, Palo Alto, CA, "PAIX'S Neutral Internet Exchange Model And Proven Track-Record Propels Growth To 100 Customers -- Splitrock Caps Milestone for PAIX" (Jan. 5, 2000) <www.paix.net/press_releases/2000_0105_paix100customers.htm>.

the next four years.[206] The Multi-Lateral Peering Agreement (MLPA) signed by 42 ISPs at the Ameritech NAP is one example of peering between smaller ISPs.[207] Reports in the trade press provider further evidence of the rapid increase in the extent of peering among smaller ISPs.[208]

In sum, the number of NAPs and other Internet exchanges, the number of ISPs present at them, the volume of traffic exchanged at these points, and the bandwidth of ISPs' connections to some Internet exchanges has grown rapidly since the WorldCom/MCI merger, and continues to grow. A new set of smaller ISPs is establishing a richer set of peering relationships, and the recent growth of NAPs described is evidence of the rapid expansion of peering at neutral Internet exchanges.

b. Multihoming

Multihoming refers to a practice in which a subscriber or ISP is connected to more than one Internet backbone. A multihomed subscriber retains connectivity to the Internet when one connection is disrupted, and can route traffic to any destination over the connection that offers better service to that destination.

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206 <www.equinix.com/company/company.htm>.

207 <nap.aads.net/MLPA.html>. The MLPA obliges each signatory to exchange traffic with every other signatory. Ameritech recently reported that 99 customers were connected to this NAP, of which 42 were signatories of the MLPA. Since large Internet backbone providers, including AT&T, UUNET, C&W, GTE, PSINet, and SprintLink have not signed the MLPA, it is reasonable to conclude that the MLPA does not encompass peering arrangements between the largest Internet backbone providers. Each of the 42 (smaller) signatories of the MLPA is a peer of every other signatory, providing evidence of a significant degree of peering among smaller ISPs at the Ameritech NAP.

208 IdeaByte, Joel Yaffe, "Peering Between ISPs: Recent Developments and Trends" 258919-JY99, (Dec. 30 1999) ("A number of smaller, innovative ISPs have taken different approach to peering with regional ISPs to avoid traversing the backbone providers where possible. ISPs, such as Digital Island, InterNAP, AboveNet and SAVVIS, peer with hundreds of regional providers to give their customers additional enticements to use them for Internet connectivity."); AboveNet claims to have "Peering Agreements with over 301 peers with over 900 sessions." See <www.abovenet.com/web_host.html>.

Like peering among smaller ISPs, multihoming often enables wholesale or retail Internet access customers to divert traffic from one peering interface to other routes. Thus, in the event that service quality at a peering interface were degraded, the ISP is likely to be able to maintain service quality by routing the traffic so that it does not pass over the degraded interface. This reduces the amount of total traffic that passes over the degraded interface, and therefore disproportionately reduces the harm to the smaller ISP. In turn, this reduces any asserted incentive that a large Internet backbone provider may have to degrade its peering interface with a smaller Internet backbone provider.

Some commenters argue that multihoming will actually increase the incentives of a dominant Internet backbone provider to degrade interconnection or will otherwise benefit the dominant network. For example, Dr. Hausman claims that, with the practice of multihoming, ISPs will be able to detect that an Internet backbone provider has a degraded connection and will shift their traffic to the dominant Internet backbone provider.[209] However, a multihoming ISP who is also a customer of the large Internet backbone provider will also observe the degradation and has an equivalent incentive to shift its traffic away from the large backbone provider to another backbone provider. Because the existence of multihoming means that an ISP can easily reduce the amount of transit it buys from the larger Internet backbone provider in response to even a small degradation of quality, multihoming increases the disincentive for a large Internet backbone provider to degrade connectivity.[210]

Similarly, GTE contends that multihoming will increase the market power of the degrading

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209 Hausman Decl. at 35.

210 Economides Decl. ¶ 51.