Interconnection Policy and Technological Progress

Gerald W. Brock*

I. INTERCONNECTION POLICY BEFORE 1996

The network effect in telephone service makes a larger system more valuable to the consumer than a smaller system in the absence of interconnection.[1] Interconnection with no settlement payments among firms eliminates the network effect as a competitive factor and allows small firms to compete with large firms. Although network effects were not developed formally in the economics literature until the 1970s, nineteenth century railroad, telegraph, and telephone executives recognized the critical role of network effects in their strategic interactions with competitors. The emergence of network effects in telephone competition has been a joint product of technology and regulation. The characteristics of interconnection requested by competitors of the dominant firm has changed in a manner corresponding to the current technology. While public policy toward interconnection has also evolved, there is no mechanism that automatically adjusts the policy to changing technological requirements,

*Professor of Public Policy and Public Administration at The George Washington University. Ph.D, Economics, and B.A., Applied Mathematics, Harvard University.

1. Network effects are often called economies of scale on the demand side. While ordinary economies of scale provide a competitive advantage to the largest firms because of lower unit costs compared to smaller firms, network effects also provide an advantage to the largest firms because consumers place a higher value on a large network, allowing the largest firms to charge higher prices than smaller firms for network subscription.

and dominant firms can be expected to resist the extension of interconnection policy to accommodate new technological requirements.

The earliest telephone competition after the fundamental AT&T patent expired, occurred without interconnection, but the large number of potential customers without telephone service and the short distance covered by most telephone calls allowed both AT&T-controlled companies and their competitors to flourish without interconnection. As AT&T developed a monopoly long-distance network, its control of interconnection between AT&T-controlled telephone companies and the long-distance network became an important source of competitive advantage. The antitrust settlement of 1913, the Kingsbury Commitment, provided the first interconnection requirement, but also led to the end of effective competition and the beginning of regulated monopoly.

During the regulated monopoly era, there were no competitive interconnection requirements. AT&T controlled service on an "end-to-end" basis and prohibited foreign attachments while interconnecting with noncompetitive independent domestic telephone companies and with foreign telephone companies that serve geographic areas separate from those served by AT&T. The Communications Act of 1934 established a "duty of every common carrier engaged in interstate or foreign communication by wire or radio . . . in cases where the Commission, after opportunity for hearing, finds such action necessary or desirable in the public interest, to establish physical connections with other carriers . . . ."[2] At the time that provision was passed, the relevant connections were among carriers serving separate geographic territories, but the provision stipulated a statutory basis for the Federal Communications Commission ("FCC") to mandate interconnection when competition began.

Technological progress, especially the dramatic decline in the price of electronic components, upset the established regulated monopoly industry structure and price patterns during the 1970s. As entrepreneurs recognized that the cost of providing both long-distance service and specialized terminal equipment was below the price charged by AT&T, they attempted to enter the industry in competition with AT&T. While the earliest private-line microwave systems operated without interconnection, most competitive entries required some form of interconnection. Because interconnection could only be required after opportunity for hearing when the FCC found that interconnection was necessary or desirable in the public interest, the early competitive interconnection requests were debated

2. Communications Act of 1934, ch. 652, § 201(a), 48 Stat. 1064, 1070 (codified as amended at 47 U.S.C. § 201).

throughout many years of hearings on a wide range of specific issues.[3] The FCC's grant of interconnection authority to specialized common carriers created initial competition in long-distance private-line circuits that was later extended to switched long-distance service. The FCC's Second Computer Inquiry decision (*Computer II*) of 1980[4] established complete interconnection rights between customer premises equipment and regulated telephone networks. That decision also established the legal category of "enhanced services" that would not be considered common carrier services and therefore would not be subject to the interconnection requirements of Section 201(a).[5] However, enhanced services were expected to be comprised of underlying common-carrier circuits and additional computer enhancements; therefore, the basic communication circuits would remain subject to common carrier requirements.

Dissatisfaction with the slow FCC resolution of early competitive controversies caused the Department of Justice ("DOJ") to seek a more comprehensive solution through its antitrust powers. The DOJ antitrust suit was settled in early 1982 with the consent decree known as the Modification of the Final Judgment ("*MFJ*")[6] that required AT&T to divest the Bell Operating Companies ("BOCs"). The underlying premise of the divestiture requirement was that local exchange telephone service constituted a natural monopoly while long-distance service, customer-premises equipment, and information services were actually or potentially competitive, and that the competitive problems were the result of AT&T's incentives to resist interconnection with competitors. The divestiture removed those incentives by separating the natural monopoly and potentially competitive sectors of the industry and therefore created incentives for the BOCs to seek interconnection with a wide range of companies in order to provide services to their customers that they could not provide on their own.

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3. A detailed account of the early competitive efforts and associated interconnection controversies can be found in numerous sources. *See, e.g.*, GERALD W. BROCK, TELECOMMUNICATION POLICY FOR THE INFORMATION AGE: FROM MONOPOLY TO COMPETITION, chs. 6–11 (1994).

4. Second Computer Inquiry, *Final Decision*, 77 F.C.C.2d 384 (1980).

5. The enhanced service category was developed to allow freedom for early data communications carriers to experiment without regulatory constraints. Later, the Internet was classified as an enhanced service and therefore developed outside of the common carrier framework.

6. United States v. American Tel. & Tel. Co., 552 F.Supp. 131 (D.C. 1982), aff'd, 460 U.S. 1001 (1983).

II. INTERCONNECTION AND THE TELECOMMUNICATIONS ACT OF 1996[7]

As technological progress continued, dissatisfaction with the divestiture agreement created pressure for policy change that contributed to the Telecommunications Act of 1996 ("1996 Act").[8] The post-divestiture interconnection arrangements between local exchange carriers ("LECs") and long-distance companies were implemented as a set of access charges paid by long-distance companies to LECs for origination and termination of calls. The structure and level of the access charges were regulated by the FCC and were designed to retain aspects of the predivestiture subsidy flow from long distance to local service. The design of access charges effectively placed a very high price on the local call between a customer and the service location of the long-distance carrier and created a strong incentive to find alternatives to using the LEC for such subsidy-laden calls. Bypass alternatives were legal but presumed difficult or impossible under the divestiture reasoning.

Near the time of the divestiture, continuous reductions in the cost of optical-fiber communications were making optical fiber an economical replacement for earlier technologies on dense local and long-distance communication routes. Fiber technology was relatively expensive per mile installed, but carried such a high capacity that it was the least expensive way to transfer high-density streams of data between two points. The availability of optical-fiber technology and high access charges together created a business opportunity for alternative local carriers in the central business districts of major cities. Teleport Communications initiated a specialized version of local competition in 1985 with a high-speed private line "DS-3"—45 megabits per second—digital service interconnecting long distance companies with major customers in Manhattan. Two years later Metropolitan Fiber Systems began a similar service in Chicago, and those two companies and others added short-distance optical-fiber services in other major cities in subsequent years.

The first services provided by the new local competitors were not interconnected with the local telephone company and were exempt from state regulation because they were classified as interstate access. As the companies developed, they sought interconnection with local telephone companies, first to extend their private-line services to customers beyond

7. A more detailed version of the material in this section is contained in GERALD W. BROCK, THE SECOND INFORMATION REVOLUTION, ch. 14 (2003).

8. Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (codified at scattered sections of 47 U.S.C.).

their physical facilities and then to provide switched-telephone service. The incumbent local exchange carriers ("ILECs") generally refused the requests for interconnection or offered interconnection on terms considered onerous by the new competitive companies. The resulting disputes were adjudicated before the state regulatory commissions because the interconnection was required in order to expand their service offerings from interstate access to intrastate telephone service. Each state developed its own rules after conducting a formal hearing, but the issues and arguments were similar across states. New York and Illinois led the development of state regulatory interconnection and pricing structures to facilitate local telephone competition and several other states developed competitive frameworks before 1996.

While the incipient local competitors were developing, the BOCs were seeking freedom from the divestiture restrictions. The divestiture theory required that the BOCs be restricted to providing natural monopoly local-exchange service and prohibited from providing potentially competitive services. The BOCs disagreed with the rationale for the restrictions from the beginning and developed a sustained campaign to win freedom to participate in any market. They sought relief from Judge Greene—who had oversight of the *MFJ* agreement, from the FCC, and from Congress. Beginning in 1986, several bills were introduced to relax or remove the restrictions from the BOCs, but they did not pass. In 1993, a bill was introduced to promote competition in the local exchange by creating a federal policy on interconnection to replace the emerging patchwork of state policies. The existence of some political support for freeing the BOCs of their restriction to "monopoly" local exchange service and of some political support for developing federal policies to further reduce the monopoly characteristics of local exchange service provided the opportunity for a political bargain, which combined elimination of the *MFJ* restrictions with policies designed to eliminate monopoly power in the local exchange. The general idea of such a bargain had wide support, but the details and timing were matters of crucial importance to industry participants, and extensive negotiations and political maneuvering preceded the transformation of that general idea into the specific language of the 1996 Act.

The interconnection provisions of the 1996 Act were similar to the provisions developed by the state regulatory commissions that had earlier developed frameworks for local competition. The new interconnection provisions substantially strengthened the requirements of the Communications Act of 1934. The new law established a general duty for "each telecommunications carrier . . . to interconnect directly or indirectly

with the facilities and equipment of other telecommunications carriers[,]"[9] instead of only requiring interconnection after a hearing that found such interconnection to be in the public interest. More specific requirements were imposed on ILECs, including the requirement that reciprocal compensation for interconnecting carriers "provide for the mutual and reciprocal recovery by each carrier of costs associated with the transport and termination on each carrier's network facilities of calls that originate on the network facilities of the other carrier[.]"[10] The 1996 Act provided that a telecommunications carrier seeking interconnection with an ILEC should first attempt to negotiate a mutually satisfactory agreement, but that if negotiations failed the dispute should be submitted to the state regulatory commission for compulsory arbitration.

The interconnection provisions of the 1996 Act accelerated and standardized the interconnection arrangements that were being developed in the states at that time. However, they were a modest change from the situation that would have existed if the 1996 Act had not been passed. The 1996 Act provided a general framework that was applicable to all states rather than leaving it to each state to develop its own framework, but the statutory framework left considerable freedom for the development of alternative interconnection arrangements. Most interconnection agreements were developed after arbitration by the relevant state commissions rather than being negotiated voluntarily between the parties. Thus, the practical effect of the federal interconnection requirements was to eliminate separate state policies over the general approach to local competition while retaining state regulatory control over the details of the interconnection agreements. Because the details of the interconnection agreements were crucial to competitive viability, the state commissions retained considerable control over the competitive conditions within their state even after the 1996 Act preempted their control over the general policy toward local competition.

The interconnection framework specified in the 1996 Act has generally worked well and accomplished its goal of facilitating local telephone competition. There have been many disputes and substantial costs have been incurred litigating those disputes in state arbitrations, but the implementation of interconnection for carriers with their own facilities has been much smoother than the implementation of the unbundled network element portion of the 1996 Act. The statutory requirement that interconnecting carriers provide "mutual and reciprocal" recovery of costs incurred in transporting traffic for each other has been interpreted as requiring the same payment for each direction of traffic: if carrier A

9. 47 U.S.C. § 251(a)(1).
10. *Id.* § 252(d)(2)(A)(i).

charges *x* cents per minute for terminating traffic received from carrier B, then carrier B is entitled to *x* cents per minute for terminating traffic received from carrier A. That provision simplified negotiations because the level of the payment only matters for unbalanced traffic, and carriers have some control over the balance of traffic. For example, the early local competition generally showed more traffic flowing from competitors to incumbents than from incumbents to competitors, and consequently, incumbents sought relatively high payments for traffic terminated on behalf of a competitor. Insofar as they were successful through negotiation or arbitration in establishing a compensation rate above the true cost of terminating traffic, that success created an incentive for the competitors to seek out customers with large inbound volumes of traffic, reducing and sometimes reversing the balance of traffic between the carriers. If neither side can predict the balance of traffic, each will have an incentive to seek either the true cost of terminating traffic—normally very low—or a zero termination rate in order to save the transaction costs of measuring and billing for traffic. In contrast, with unbundled network elements, the incumbent always has an incentive to seek higher prices, and the entrant always has an incentive to seek lower prices, leaving little opportunity for voluntary agreement.

III. THE INTERNET AND INTERCONNECTION

The Internet was mentioned in the 1996 Act, but it was not a significant focus except for provisions related to indecent content that were later found unconstitutional.[11] When the major portions of the 1996 Act were passed in 1995, the Internet was a well-established academic communications structure and was beginning its rapid growth as a commercial communications structure, but the communications capacity devoted to the Internet was a tiny fraction of the capacity devoted to common carrier communications. Explosive growth in the Internet occurred just after the 1996 Act was passed as the World Wide Web addressing system and graphical browsers created a practical inexpensive method of retrieving information.[12] Even as it became a major focus of

11. The Communications Decency Act ("CDA"), 47 U.S.C. § 223, was a part of the 1996 Act; however, it was struck down in Reno v. Am. Civil Liberties Union, 521 U.S. 844 (1997), prompting Congress to pass the Child Online Protection Act ("COPA"), 47 U.S.C. § 231, which was also ruled unconstitutional by Ashcroft v. Am. Civil Liberties Union, 535 U.S. 564 (2002).

12. Netscape released the first commercial browser at the end of 1994, and Microsoft released its first browser in the summer of 1995. Both companies made major improvements to their browsers in 1996, and many other software tools to simplify the process of creating and retrieving Web information were created at about the same time. *See* MICHAEL A. CUSUMANO & DAVID B. YOFFIE, COMPETING ON INTERNET TIME: LESSONS FROM NETSCAPE

communication strategies, the Internet continued as an unregulated Title I service, exempt from interconnection, universal service, and other requirements applied to common carriers, while also being classified as an interstate service that was outside the jurisdiction of state regulatory agencies.

The unregulated Internet has provided great freedom for innovation, and Internet suppliers have voluntarily interconnected with each other. The Internet has often been considered an example of the benefits of unregulated competitive communication networks. However, as convergence has allowed a wide range of formerly separate kinds of communication to be transmitted as packets over the public Internet or over combinations of dedicated and Internet facilities, strains in the unregulated approach are appearing. The issues have been developed most clearly in Voice over Internet Protocol ("VoIP") service. VoIP encompasses approaches to voice service ranging from pure Internet provision to service using Internet Protocol ("IP") transmission but with ordinary telephone handsets, numbering, and interconnection with other telephone providers. VoIP has already attracted considerable policy attention for consideration of 911 emergency access by VoIP users and law enforcement concerns, but interconnection problems are likely to emerge in the near future.

If technology evolves to make VoIP the dominant approach to providing voice-telephone service, the current interconnection requirements of the 1996 Act may be eroded away with detrimental effects on local telephone competition. Most versions of VoIP need some combination of elements from circuit-switched voice service and Internet service. If VoIP is classified in the same category as Internet service, it is an interstate noncommon-carrier service and therefore exempt from the interconnection requirements of the 1996 Act and exempt from requirements of state regulatory agencies. Yet VoIP remains a communication service subject to network externalities. For example, a VoIP service provider that wishes to offer its customers universal termination must be able to pass calls originated from its customers to customers of other providers. A dominant provider may have an incentive to refuse interconnection with competitive VoIP providers and may be entitled to do so. So long as there are common carrier competitive LECs who have interconnection agreements with the dominant firm, the VoIP provider can interconnect indirectly by making a voluntary agreement with a circuit-switched telephone company and by using that company as a transit point to the dominant firm. However, that is only a temporary solution if, as it appears likely, VoIP displaces circuit-switched technology. Thus, it may be necessary to revise and extend the

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AND ITS BATTLE WITH MICROSOFT (1998).

definitions of the interconnection requirements created by the 1996 Act in order to continue their beneficial competitive effects.