DEPARTMENT OF JUSTICE

Network Effects in Telecommunications Mergers
MCI WorldCom Merger: Protecting the Future of the Internet

Address by

CONSTANCE K. ROBINSON
Director of Operations and Merger Enforcement
Antitrust Division
U.S. Department of Justice

Before the
Practicing Law Institute
San Francisco, California

August 23, 1999

Introduction

We are currently in the midst of an historic merger wave that has washed across almost every segment of our economy. Every year since 1995 has set a new record for the number of Hart-Scott-Rodino ("HSR") filings received by the agencies. Last year, the Antitrust Division reviewed a record 9,264 HSR filings for 4,728 transactions, an increase of nearly 70% since 1995, and we're receiving just as many this year. If the filings continue at the pace of the last few weeks, we may even meet or surpass last year's record. The hectic pace of filings this year has resulted, as of July 31, in 192 merger investigations, 42 merger challenges, and 44 merger wins. Last fiscal year, one of the busiest and most successful periods of merger enforcement for the Antitrust Division, we had a total of 230 merger investigations, 51 mergers challenges, and 49 merger wins.

Some of the most significant mergers and some of largest mergers we have investigated have been in the telecommunications industries. As of July 31, about 10% of HSR transactions involved telecommunications, similar to last year. That translates into about 23% of our investigations, compared to 27% last year. So far this year, 24% of our cases involve telecommunications, while last year only 17% of cases involved telecommunications.

Perhaps one of the most significant telecommunications merger investigations was the investigation of WorldCom Inc's acquisition of MCI Communications, which resulted in the largest divestiture of a company in merger history. That investigation focused on the Internet backbone market and on how the merger would affect the industry. Today I'm going to talk about network effects and explain how they can be relevant to merger analysis. Then I will talk specifically about the MCI/WorldCom transaction, the role of network effects in our analysis of that case, and the resolution of our competitive concerns.

Explanation of Network Effects and Compatibility

What are network effects? Network effects occur when the customer's value of a product increases with the number of people using that same product or a complementary product. A typical example is the telephone. By itself the telephone is little more than a paperweight; it is only useful to me if other people have them. The more people who have phones, the more useful, and therefore the more valuable, phones are to the consumer. Another example is fax machines; the more people I can reach by faxing, the more valuable my fax machine is. In "real" networks like these communications networks, the value of the product increases with the number of people that the user can communicate with. In addition to real networks, there are "virtual" or "hardware-software" networks. In this type of network, the increase in the number of people using the product increases the number of complements for that product which increases the value of the product.[1] For example, as the number of owners of video tape recorders increases, the number and selection of tapes for video recorders increases, making the video tape recorders more valuable to their owners. Another example is a computer operating system. If only five people owned an operating system, no one would write any software for that system, which would limit its usefulness. But as more people purchase that same operating system, programmers will create more programs for that particular system, increasing its usefulness.

The characteristics of network industries make them prone to dominance by a single firm. If the attractiveness of a network increases as it enlarges, consumers will tend to choose the larger network, which in turn will make it even larger and even more attractive. These "positive feedback" effects are due to "increasing returns to consumption" also referred to as demand-side scale economies and can lead to a market "tipping" towards a single company or standard.[2] A classic

---

[1] For more information on network effects see A. Douglas Melamed, "Network Industries and Antitrust," Address Before the Federalist Society (Apr. 10, 1999); Daniel Rubinfeld, "Competition Innovation, and Antitrust Enforcement in Dynamic Network Industries," Address Before the Software Publishers' Association (Mar. 24, 1998).

[2] It may not take much for one technology to become dominant. "The technology that garners the early lead tends to become locked in as the winner. This early lead can come from relatively minor historical events or from an early technological advantage." William E. Cohen, *Competition and Foreclosure in the Context of Installed Base and Compatibility Effects*, Antitrust L. J., Spring 1996, at 537.

example of tipping is the video tape recorder market, in which Betamax became extinct after consumers flocked to VHS.[3]

In some instances--where there are significant economies of scale, or where costs of designing components to work with different systems ("compatibility") are high[4]--it can actually be more efficient for the market to tip and for a single firm to dominate and become a monopoly. If tipping results in an increase in the size of the network, consumers can benefit. On the other hand, tipping can also increase the monopoly power of the dominant firm by creating significant barriers to entry. This is because "network market(s) tend to display inertia -- that is, once a technology is known to have a substantial lead in its installed base, it is hard for it to be displaced even by a technically superior and cheaper alternative."[5] A new entrant's network is limited by its lack of popularity and its inability to achieve network effects. Overcoming this Catch 22 is extremely difficult because "[a]lthough users are happy to jump on the 'bandwagon' of the new technology, too few may be willing to switch in advance of other users for fear of being stranded with an orphaned technology if others do not join them."[6]

Additionally, the difficulty of entry is exacerbated because consumers who use the Internet, like consumers of other products, may prefer to stay with the established technology because they are "locked-in" or tied to a particular product by significant investments into that product. These investments can range from time spent training employees how to use the product (e.g., computer software) to investments in complementary products (e.g., owning VHS video recorders and large

---

[3] "[D]e novo entry into a market occupied by vendors with large installed bases is exceedingly difficult." Nicholas Economides, The Economics of Networks 8, 15 (Nov. 1994) (New York University discussion paper EC-94-24).

[4] The cost of compatibility is either a loss of variety (if compatibility is achieved through standardization) or the cost of the adapter used to allow compatibility between the networks (either the actual cost of the adapter or the degradation of quality caused by the adapter).

[5] Stanley M. Besen & Joseph Farrell, Symposium, *Strategies and Tactics in Standardization*, at 15 (1993) (prepared for Journal of Economic Perspectives).

[6] Garth Soloner, *Economic Issues in Computer Interface Standardization*, 1 Economic Innovation & New Technology 135, 150 (1990).

collections of movies on VHS tapes). Such consumers will be even more reluctant to switch to a new entrant.

For these reasons, it is often difficult to reverse a tipping effect. Moreover, the possibility of obtaining significant and sustained market power creates an incentive for a firm to engage in predatory behavior to create a tipping effect. In a network industry, a likely form of such anticompetitive conduct would be for a firm seeking to obtain dominance to degrade its rivals' access to its network. By denying compatibility, a larger firm will have less to lose by decreasing compatibility than rival firms; the value of the rivals' networks will decrease more than the value of the larger firm's network, leaving the larger firm in a better relative position and increasing the likelihood that customers will switch to it. Also, by working to deny rivals or entrants access to its network, a larger firm will deny its rivals the benefits of network effects and raise a barrier to entry.

On the other hand, one of the ways that entry barriers can be overcome is by making products compatible or interoperable. If two firms' products are fully compatible, both are part of the same real or virtual network, and both can share in the economies of scale. As one might imagine, differently situated firms have different incentives regarding compatibility. If firms are relatively equally situated or if compatibility is critical to creating demand for a product, then the firms will likely favor compatibility.[7] In other words, if the two firms need each other to realize the benefits of network effects, they will likely make their products compatible. On the other hand, if the firms are not relatively equal, the dominant firm will prefer incompatibility. "[I]f one firm has a distinctly superior package, including its product offering, its installed base, and its reputation, that firm is likely to prefer incompatibility and may in fact spend resources to block compatibility."[8] Since the dominant firm's network benefits more from network effects than its challenger's, incompatibility is likely to increase the chance of the market tipping towards the dominant firm's product.

---

[7] Besen & Farrell, *supra* note 5, at 20.

[8] Michael L. Katz & Carl Shapiro, *Systems Competition and Network Effects*, Journal of Economic Perspectives, at 110 (1994).

Firms often have to weigh the costs of compatibility (decreasing the chance of the market tipping in their favor) against the benefits (increasing the size of the overall network). There are trade-offs either way. This is also true with respect to overall efficiency; interconnection or compatibility is not always the best or the least costly way to achieve network efficiencies. In some instances, the interconnection between firms could be more costly and less efficient than if the firms with incompatible products competed until the market tipped in favor of one or the other. Antitrust enforcement is designed to ensure that anticompetitive practices or anticompetitive mergers do not thwart the ability of free and vigorous competition to decide the winners and losers.

Overview of the Internet

This issue of compatibility is critical to understanding the Internet. The Internet, at its very core, is a way of interconnecting different computer networks; in other words, the Internet is a way of making different computer networks compatible. The term Internet comes from Interconnected Networks. With it roots going back almost 25 years, the Internet began as a government-sponsored network joined at different military and academic research sites by fiber telecommunications facilities.[9] Key to this network was the adoption of a single protocol, Transmission Control Protocol/Internet Protocol ("TCP/IP"), which allowed these many different types of computer networks to communicate. After federal funding for this backbone was discontinued in 1995, private companies began operating their own backbone networks and selling access to their networks and the Internet. After privatization, the Internet developed into a much more widespread and diverse connection of networks. As you know, it's been growing by leaps and bounds and no longer has a university or research orientation but has become highly commercial in nature. According to the FCC,[10] the Internet has grown from ten million users in 1995 to over 140 million today. In 1997,

[9] Kevin Werbach, *Digital Tornado: The Internet and Telecommunications Policy*, Federal Communications Commission (1997) (Office of Plans and Policy working paper).

[10] *Connecting the Globe: A Regulator's Guide to Building A Global Information Community*, Federal Communications Commission (1999).

Internet consumers purchased $6.2 billion in Internet services (such as providing access, hosting, and other communication services), an amount expected to increase to over $50 billion in 2002.

Today, the Internet is a network of interconnected public and private computer networks joined by privately owned fiber telecommunications facilities. Internet connectivity is provided directly to end users or on a wholesale basis to other Internet Service Providers (ISPs). End user connectivity can be either dial-up access to retail customers (residential or business users) or dedicated access to corporate connectivity customers. The connectivity being provided to customers enables them access to the entire Internet, including other end-users (such as by e-mail) and content providers (i.e. The WashingtonPost.com, Amazon.com, or USDOJ.gov).

The key to the Internet is that any ISP supplies access to the entire Internet. Without this interconnection, the Internet would lose much of its value because the network effects would be lost. Originally, when all the networks were connected by a single government-funded backbone, interconnection was not an issue. But as many different companies began to provide Internet backbone service, the government created Network Access Points ("NAPs") to facilitate interconnection. NAPs are simply a location set up to facilitate the interconnection of different private networks for them to exchange traffic. The companies that wished to exchange traffic at a NAP negotiated the terms and conditions of that interexchange through bilateral agreements. Two types of these agreements developed: "peering agreements" and "transit agreements."

A peering agreement is a bilateral agreement that allows two networks to exchange and terminate each other's traffic. It is a cooperation agreement where the two networks say, "I'll take your traffic if you take mine." It is important to note, however, that peering agreements refer only to traffic being delivered to an address on one of the two networks. The agreements do not allow one network to pass off traffic meant for a third network. For example, Network A peers with Network B and Network B peers with Network C, but Network A does not peer with Network C. Network A therefore cannot send traffic to Network C through its peering relationship with Network B.

At the beginning of privatization, most of the networks had peering agreements with each other. With the massive growth of the Internet, the NAPs became congested, slowing down the speed of the connection and resulting in more lost data, and lowering the quality of connection to the rest of the networks. The larger networks responded to this problem by investing in private dedicated connection points which provide faster and more accurate connections. Generally, only the big national networks have these private peering connection points. Over time, as individual networks grew, large nationwide backbone providers began to complain that small local or regional ISPs were free riding on the large providers' substantial network investments. To deal with the free-riding issues, the larger network providers began to create policies to restrict future peering arrangements with small and regional ISPs that had not invested in growing their networks. They stopped peering and entered into transit agreements where the national backbones charged the small network or ISP "transit fees" for carrying and terminating their traffic. In essence, the smaller networks became customers of the larger ones.

Overview of the MCI/WorldCom Transaction

The MCI/WorldCom transaction, as it was originally structured, involved WorldCom's acquisition of MCI through a stock tender offer valued at $37 billion. WorldCom was one of the largest telecommunications companies in the United States, providing local and long distance telephone services and Internet access services domestically and internationally. With annual revenues of about $7 billion, WorldCom was the fourth largest facilities-based interexchange carrier in the United States. Additionally, through its ownership of UUNET, MFS Communications, ANS Communications, and CompuServe Network Services, it was one of the leading providers of Internet backbone transmission services. MCI, with annual revenues of $18.5 billion, was the second largest long distance telephone service provider, a leading provider of Internet transmission services (iMCI), and a recent entrant into the provision of local telephone services.

Procedurally, the investigation itself was complicated because it involved reviews by a number of law enforcement entities--the DOJ, 16 states and the European Union--as well as a number of regulatory agencies--the Federal Communications Commission and state public utility commissions. While we and the EU conducted independent investigations, they were highly coordinated. With the parties' consent, the two agencies shared evidence with each other and held joint meetings with the parties. We also shared information about theories. The EU's investigation went into a Phase 2 proceeding, meaning that it issued a statement of objections and held a hearing on the merger. [11]

Substantively, the transaction initially raised competitive concerns in four principal areas: long distance telephone services, local telephone service, international telecommunications networks, and Internet backbone services. We ultimately determined that the area of most significant competitive concern was the provision of Internet backbone services, or the provision of ubiquitous connectivity to the Internet. The merger would have combined two of the four leading nationwide or worldwide Internet backbones; MCI and WorldCom were the leading providers of wholesale Internet transmission services to ISPs and of dedicated access services to large businesses. Our investigation focused on what effect this combination, which would have created a dominant player in the provision of backbone services, would have had upon interconnection and access to the various networks that make up the Internet. We also examined whether the merger would give rise to market power through the powerful network effects that characterize the Internet.

[11] The European Union has thirty days from notification of a merger to investigate whether the merger raises anticompetitive issues. If, after thirty days, the EU has determined that the merger raises no "serious doubts as to its compatibility with the common market," the EU will clear the merger. Otherwise it must initiate "proceedings," often called "second-stage" or "Phase 2" proceedings. The proceedings are commenced by the issuance of a formal written decision describing the serious doubts that caused the Commission to enter Phase 2. After entering Phase 2, the EU will continue to investigate the merger. After the conclusion of the investigation, a Statement of Objections is issued describing the Commission's competitive concerns. Shortly after issuance of the Statement of Objections, the Commission will hold a formal hearing at which testimony is taken from the parties and other interested persons. Finally, within four months after entering Phase 2, the Commission must issue a decision as to whether the merger should be cleared, prohibited, or cleared with "undertakings" (similar to a consent decree).

Analysis of the MCI/WorldCom Merger

While there have been changes in the Internet market since our investigation, at the time, we learned that the providers of Internet connectivity could be classified as a loose hierarchy broken down into roughly four tiers.[12] At the top are nationwide (or worldwide) Internet backbones, which provide nationwide Internet services using extensive owned or leased fiber facilities. They generally have peering arrangements or private peering connections with the other national backbone providers and are "transit-free," so they do not have to rely on transit agreements. UUNET (owned by WorldCom) and iMCI are examples of these large national backbone providers. The second group of providers are national Internet backbone networks that use facilities leased from underlying fiber telecommunications providers, but which pay transit fees to one or more national backbone providers. A third group comprises the Regional or local ISP Internet connectivity providers, which lease some regional or local network fiber facilities and equipment and interconnect with other small providers at the public NAPs make up another category. They typically purchase transit backbone services from any of the national backbone providers. The last group is made up of ISPs that do not have a network, but instead rely on others for wholesale Internet connectivity services. Small "Mom & Pop" ISPs are typical of this type.

Given this complex and highly technical web of relationships, and the highly dynamic nature of a market characterized by rapid technological change, one thing was clear--defining a relevant product market was going to be a challenge. But after talking to competitors, customers, industry experts, and the parties, there seemed to be a national backbone market.[13] Smaller regional backbone networks would not be adequate substitutes after the merger, because they would be dependent on MCI/WorldCom for Internet connectivity. Without MCI/WorldCom, the smaller networks would

[12] This method of describing the Internet industry is not uniformly accepted and it is certainly not perfect, but it does provides a useful conceptual framework in describing key differences between the major players and how the players are related. It is possible to describe the market in many different ways, but describing the market differently does not affect the competitive analysis.

[13] The EU and the FCC both determined that there was a national backbone market. The parties, on the other hand, argued that the market was considerably broader and included all participants in the provision of Internet access and, since the underlying fiber facilities are the same, all voice telecommunications.

be unable to offer customers sufficient connectivity to all sources of content on the Internet. Also, as an industry participant we talked to during our investigation explained it, "ISP customers want to know a backbone is large enough to peer with the other big backbones before becoming a customer."

The national backbone market was highly concentrated, with several significant competitors including UUNET, iMCI, and Sprint. The merger would have combined the facilities, personnel, and, perhaps most importantly, the customer bases of iMCI and UUNET, the two top backbone providers. The combined entity would have been by far the largest single nationwide backbone and Internet connectivity provider with an overall majority of customers (web sites, ISPs, and dedicated access corporate customers) connected to the Internet. Post-merger market shares for Internet connectivity ranged from 40-75%, depending on what measure of market share was used.[14]

Determining market shares was challenging because there was no commonly accepted method and there were legitimate questions about the accuracy of each method. In addition to public sources, we used a variety of other sources to evaluate market shares--interviews with industry players, internal documents from the parties and their competitors, and information we obtained through compulsory process. The two main public sources measured market share either according to shares of overall Internet industry revenues generated by ISPs that connected through various Internet providers, or according to the percentage of ISPs connected to a specific backbone versus the total number of ISPs connected to all of the backbones combined. According to the first measure of market share, 70% of the revenue generated by Internet providers would have purchased connectivity from MCI/WorldCom. According to the second method, used by *Boardwatch Magazine*, the combined MCI/WorldCom would hold an approximately 50% market share. Also,

[14] The parties, of course, disputed that estimate, claiming that they had only 20% of the Internet backbone market. They calculated market share based on a percentage of revenue. They included all revenues related to the Internet which means that they included revenue from sources other than their backbone services and double counted other revenue, such as revenues for ISPs who buy connectivity from others, thereby increasing the significance of their competitors' market share and diluting MCI/WorldCom's.

by this method, MCI/WorldCom and its next largest competitor would have together controlled a 75% market share, with the third largest competitor having only 4.4% of the market.

Since there were questions about the accuracy of these measures, we examined market shares using other methods as well: Internet traffic originating, terminating, or otherwise traversing an Internet backbone's network (a measurement of size and significance of a backbone relative to other competitors); a revised revenue share that attempted to eliminate the double counting and irrelevant revenues; the number and type of Internet Points of Presence ("POPs") on a backbone's network; the number of circuits connecting customers to a backbone (which would correct for differences in customer size/significance); the number of "routes advertised" (or terminating IP addresses)--the density of a provider's network and web of customers, and finally the number, type, and significance of each network's customers. While none of these measures was perfect, each of them, while resulting in different absolute numbers, exhibited the same pattern. They all indicated that after the merger, MCI/WorldCom would be the dominant player in the market, and substantially larger than any other player.

It was unlikely that entry would have eroded MCI/WorldCom's post-merger dominance because post-merger entry in the national backbone market would have been extremely difficult. Providing backbone services requires a large investment in telecommunication facilities. Even more significant is the need to obtain efficient interconnection with larger players. Without peering arrangements, a new entrant is substantially disadvantaged because it has to pay transit fees for interconnection, and many businesses are reluctant to become customers of a network that does not have a full set of peering arrangements. To secure such arrangements, however, the provider must have a large customer base. In this case, a new entrant would have to overcome the substantial advantage that a combined MCI/WorldCom would have had. Even John Sidgmore, who at the time was the Vice President of WorldCom and the CEO of UUNET, admitted that "[h]aving a big network is a huge barrier to entry for competitors."[15]

---

[15] Rajiv Chandrasekaren, *Making UUNet Into A Very Big Deal; With His Agreement With CompuServe and AOL, CEO John Sidgmore Takes It to Another Level,* The Washington Post, Sept. 29, 1997.

Competitive Effects of the Merger

Given the market structure and barriers to entry, what was the likely effect of the merger? In addition to a concern that the merger would facilitate tacit collusion, we were concerned about what effect it would have on the existing network. Prior to the MCI/WorldCom merger, no single backbone provider reached a disproportionate amount of destinations on the Internet relative to other major players. There was a rough equality, with each backbone provider depending on the other. Each backbone provider, therefore, had an incentive to support efficient interconnections because its failure to do so would have caused such a degradation of quality that it risked losing customers to the other networks. That incentive would change, however, if the two largest backbone providers were combined. But the MCI/WorldCom merger threatened to create a very large network with a huge size disparity. By representing a majority of the Internet customers, MCI/WorldCom would have been more valuable and been more important as a point of interconnection for other Internet providers, which would otherwise lose access to a great deal of the Internet. MCI/WorldCom would have far less need to depend on the other backbones than those backbones would have to depend on it. By giving MCI/WorldCom a disproportionately large customer base, the merger would have changed MCI/WorldCom's incentives from favoring compatibility toward favoring incompatibility. Recognizing this, there was widespread industry concern about the effects of the merger on peering arrangements and on interconnection prices.

MCI/WorldCom's changed incentives would have increased the likelihood that it would attempt to tip the market by charging existing peers for interconnection or by degrading the quality of interconnections. MCI/WorldCom would have been able to do this, either through unilateral action, or through collusion with the only remaining player with a significant market share. The disproportionate dependence that other backbones would have had on MCI/WorldCom would have given it bargaining leverage to dictate the pricing and terms of interconnection. MCI/WorldCom could have begun charging peers for interconnection to its network, either all at once or on an

individual peer-by-peer basis (by picking off the smallest rivals first), raising the costs of its rivals. MCI/WorldCom then could have chosen either to raise its own prices with that of its rivals, or to keep its price lower and let the market tip towards it, possibly leading to monopoly control of the Internet. Or MCI/WorldCom could have degraded the quality of its competitor's interconnections to its network. It could have done this either actively or passively, by not investing in the interconnections needed to keep up with the massive growth, and it could done this either to all competitors or on an individual basis. Interconnection points are constantly upgraded to keep up with the exponential growth of Internet traffic; any slowdown in the upgrading of these points would have serious effects on the quality of the connection. While this strategy would lower the quality of service for all networks, rivals' networks would suffer more degradation, allowing MCI/WorldCom either to increase its own prices, reflecting its better quality, or to gain market share. Again, with this strategy the market could have tipped to MCI/WorldCom, giving it monopoly control of the Internet. Under either scenario, WorldCom would have been able to purchase, through its acquisition of iMCI, market power and gain a monopoly, or at least a dominant, position in Internet backbone services.

A I explained earlier, interconnection of multiple firms is not always the best or least costly way of achieving network efficiencies, but the history of interconnection in this industry suggests otherwise. Moreover, the parties failed to present any evidence suggesting that interconnection was inefficient or that it would be more efficient for MCI/WorldCom to be a monopoly provider. At this early, but critical stage where the development of cost-based pricing and other terms and conditions for interconnection are expected to be developed through bargaining among the industry's participants, allowing one player to achieve dominance through acquisition could have had an irreversible anticompetitive impact on this market. So we either had to try to block the merger or find another way to address our competitive concerns.

Remedy

Since entry was not going to constrain a dominant MCI/WorldCom, any remedy had to create a viable competitor that would replace iMCI as a principal player in the national backbone market.

The only way this was possible was through the divestiture of MCI's entire Internet business. As a condition of the EU's and our approval, MCI/WorldCom sold iMCI to Cable & Wireless for $1.75 billion. The divestiture was structured to include all assets, except for long-haul lines, and included the transfer of all of MCI's contracts with wholesale and retail customers for the provision of Internet backbone services, the transfer of all necessary employees to support the iMCI business being transferred, and all other necessary support arrangements to fulfill existing contractual obligations of the iMCI business. MCI/WorldCom was to refrain from soliciting or contracting to provide dedicated Internet access services for a specified period. MCI/WorldCom was also required to assign to Cable & Wireless iMCI's peering agreement with WorldCom and agree not to terminate that agreement for a period of five years. These conditions were imposed to ensure that the new competitor would be a significant player with the ability to compete effectively with MCI/WorldCom. It is important to note that the relief we obtained does not preclude MCI/WorldCom from eventually reaching a monopoly position. It is possible that in the future the market may tip, having MCI/WorldCom as the dominant player, but if that does happen, it will be because the company out-competed the other networks, not because it bought customers.

Conclusion

This merger was important because, without the divestiture, it could have had a significant and negative effect on the Internet, an emerging industry that thus far has functioned successfully without regulation. Allowing one player to achieve dominance through acquisition could have had an irreversible impact on this market and could have stifled competition at a critical stage in the development of the industry.