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Antitrust Division

# ANTITRUST IN NETWORK INDUSTRIES

Address by

CARL SHAPIRO
Deputy Assistant Attorney General
Antitrust Division
U.S. Department of Justice

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## I. Introduction

It is a great pleasure to be here today in San Francisco, away from the snows and shutdowns of DC, with my very own U.C. Berkeley just across the Bay.

Today I would like to delve into a variety of business strategy and antitrust issues that arise in so-called *network industries*. Network industries are those in which consumers attach themselves to one or more networks. These networks can be *real* or *virtual*. Real networks include communications and transportation networks, such as telephone, facsimile, computer, railroad, or electricity networks. Virtual networks are collections of users who have adopted compatible technology, such as the network of users of MacIntosh computers, the network of users of Sega video game machines, or the network of users of VHS video tape machines. Both real and virtual networks tend to exhibit *positive feedback* due to *demand-side scale economies*: large networks are more attractive to buyers, and thus tend to get larger.

Many of today's most exciting network industries are information-based industries involving communications and/or computers. From computer software and hardware, to fax machines and video game systems, to compact discs and digital video discs, to communications networks and the Internet, technology is the driver and compatibility the navigator. Competition in these industries is qualitatively different than it was in the manufacturing industries of yesteryear.

As the Transamerica Professor of Business Strategy at Berkeley, I have long sought to understand how firms compete in network industries, and especially in high-tech network industries experiencing rapid technological progress.[1] As Deputy Assistant Attorney General for Economics

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I have been studying network industries for over a decade, largely with my colleagues Joseph Farrell and Michael Katz, the current and former chief economists at the FCC. For early contributions, see Michael Katz and Carl Shapiro, "Network Externalities, Competition, and Compatibility," *American Economic Review*, June 1985 and Joseph Farrell and Garth Saloner, "Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation," *American Economic Review*, December 1986. Over the past ten years, an extensive economics literature discussing business strategy and public policy in network industries has developed. A review of this literature circa 1990 is provided by Paul David and Shane Greenstein, "The Economics of Compatibility Standards: An Introduction to Recent Research," *Economic Innovation and New Technology*, 1990. Brian Arthur, "Positive Feedbacks in the Economy," *Scientific American*, February 1990, provides an entertaining and accessible introduction to positive feedback in network industries. My paper with Michael Katz, "Systems Competition and Network Effects," *Journal of Economic Perspectives*, Spring 1994, provides a relatively recent non-technical review of the literature. A companion paper, Stanley Besen and Joseph Farrell, "Choosing How to Compete: Strategies and Tactics in Standardization," *Journal of Economic Perspectives*, Spring 1994, contains a nice discussion of some basic business strategies in network industries. Here, I draw on this growing literature selectively for the purposes of articulating antitrust enforcement

at the Antitrust Division, I now am charged with helping enforce the antitrust laws in these same industries. In my view, sound antitrust policy depends upon a solid understanding of business strategy and economics, as well as the case law. I therefore welcome the opportunity to examine and evaluate the Division's enforcement policies anew in these unique and dynamic network industries.[2]

As I hope to make clear today, the mere fact that many of these industries are highly dynamic, and are experiencing rapid technological change, hardly implies that antitrust enforcers should sit on the sidelines, watching firms engage in technology and standards battles. To the contrary, our job is to ensure that incumbent firms do not use their power to block technological progress. At the same time, we must be careful not to impose any drag on the healthy competitive dynamic that prevails in many network industries.

I cannot imagine a more fitting locale than San Francisco to discuss the marriage of business strategy and antitrust in high technology industries.

## II. A Parable: Dynamic Competition with Network Externalities

To bring some of the key business strategy and antitrust ideas alive, let's follow the life cycle of a computer program, say a graphics program that runs on personal computers, from a first-person perspective.[3] So, imagine yourself a promising entrepreneur in the computer software industry, living in the Bay Area, of course. Our story begins with your frustration at the limitations of the existing graphics software. You are convinced that the leading program, UGraph, lacks several significant features that you can provide with a new program of your own design. You hire the necessary programmers and develop your improved program, ZipGraph, all the while trying to make it easy for users of UGraph and other existing programs to switch to yours. Your basic approach is to achieve as much compatibility as possible with existing programs, without violating the intellectual property rights of incumbents or sacrificing the performance and quality improvements

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policy in network industries.

Both the DOJ and the FTC are examining antitrust policy in network industries. At the recent FTC Hearings, a number of witnesses discussed the proper role for antitrust in network industries.

Prior to joining the Antitrust Division, I served as an economic expert for the FTC during its investigation of the Adobe/Aldus merger, which involved professional graphics software running largely on Apple MacIntosh computers. However, this parable is merely intended to illustrate some of the dynamic issues that arise in markets with network externalities, and does not reflect the actual fact pattern in the market for professional graphics software. I defer discussion of the antitrust issues raised in this parable until completing the parable.

that make your product attractive in the first place.

Knowing that users are unlikely to buy new hardware or change operating systems just to use your new software, you decide to create versions of ZipGrapher that will run on the one or two most popular hardware and operating system platforms. Since you do not sell hardware or operating systems, this requires some degree of cooperation and interaction with firms supplying hardware and operating systems. Fortunately for you, none of the platforms insists upon exclusivity.

In all likelihood, ZipGrapher will fail. Oh, it may well be superior to UGraph and other popular programs in a number of ways, But it is notoriously difficult for new programs to provide sufficiently great improvements in performance to justify the switching costs users would have to incur to adopt them. After all, learning a new graphics program is a real pain for most people, and few are inclined to venture out and try a new product, even if it claims to be able to transfer complex graphics files nicely from and to the more popular formats. Even if you price your wonderful ZipGrapher program very aggressively, to the point of giving it away to certain users you hope will be influential, the odds are still against your program catching on.

If your ZipGrapher program does fail, you may well attribute that failure, at least in part, to some of the tactics employed by USoft, the firm controlling the leading graphics program, UGraph. Perhaps USoft introduced an aggressive "competitive upgrade" pricing scheme for UGraph, targeted specifically at users who tried your product. You might complain that USoft "strategically" pre-announced new versions of UGraph, claiming that these new versions would match the performance of ZipGrapher, with the express aim of inducing the large installed base of UGraph users to wait rather than buy ZipGrapher. You might also complain that USoft went out of its way to sow fear, uncertainty, and doubt in users' minds about just how well UGraph files can be transferred into ZipGrapher format, or how difficult it would be for UGraph users to learn to use ZipGrapher. In fact, USoft might have denied you the opportunity to offer a fully compatible product in a timely fashion, either by withholding key information about their program, or by refusing to give you a necessary patent or copyright license. Perhaps USoft even threatened you with infringement actions based on what you regard as overly broad assertions of patents and copyrights. Maybe it is time to give a call to the Justice Department.

On the other hand, maybe, just maybe, your program will survive, and even prosper. Perhaps the incumbent programs, especially the market leader UGraph, have fallen far enough behind the cutting edge in technology to leave a real opening for you. Or, perhaps the established programs --

UGraph, and the older but still popular SlowGrapher -- each are bogged down by their desire to maintain compatibility with their own installed base of ever-older versions. It is even possible that you just had a great idea and a great development team, and leapt ahead of the incumbents. If some of these lucky circumstances apply, you may be able to attract enough interest for your new graphics program to survive.

What tactics will you employ to transform some initial interest in your novel ZipGrapher product into commercial success? The name of the game is to build and maintain an installed base of active users. Very likely you will be highly aggressive in your pricing, what with the tiny extra cost of making extra copies and the enormous value of building an active installed base. You certainly cannot rest on your laurels after ZipGrapher 1.0, but must press ahead to offer even better performance with ZipGrapher 2.0 to grow your installed base of users. If you are lucky as well as skillful, your product may do more than merely survive and appeal to a niche of loyal customers. It may grow to become the next dominant graphics program, just as UGraph at one time dethroned SlowGrapher. If you are really lucky or very skillful, you may succeed in initiating a bandwagon supporting ZipGrapher, and ride positive feedback to market leadership.

With success, your perspective changes radically, and antitrust looms larger. How do you protect your valuable position as industry leader and standard-bearer? You have not failed to notice that industry leadership has done wonders for your market capitalization. What's your next move?

Surely the best approach is to keep doing what got you here: anticipating user needs, offering the best performance, paying careful attention to distribution channels and marketing, foreseeing and exploiting further hardware improvements, and working effectively with your hardware and software partners. If you can achieve these goals, you may be able to defend your dominant position, all the while offering tremendous value to consumers.

But temptations arise. You know that there are any number of small, hungry companies out there just looking to dethrone you with their own HyperGrapher. You know the danger all too well: an upstart firm, with younger programmers and new ideas, just might outwit your crack software development team. Or, perhaps, an industry giant lacking a graphics program will enter the market, with all of its brand name equity, its distribution muscle, and its track record of writing innovative, object-oriented software programs. You are generous in funding R&D, but several large firms in the industry have abundant sources of internal financing, and the venture capitalists are ever looking for the next meteor to ride to an extraordinary return on capital. As if that were not bad enough,

there is always the risk that one of the firms selling the hardware or operating systems on which ZipGrapher runs will come out with their own graphics program.

So, even while you work tirelessly to improve your product, in no small part to drive upgrade sales, the very tactics that worried you when you were first getting started now begin to seem rather appealing. You are tempted to warn consumers of the dangers of switching to the new, incompatible HyperGrapher program. You are tempted to transform your intellectual property into a strategic advantage by blocking HyperGrapher from achieving full compatibility with ZipGrapher. You are tempted to tell consumers in advance when you are getting ready to introduce a new version of ZipGrapher. You are tempted to launch a "Come Back Home" campaign offering the latest version of ZipGrapher at rock-bottom prices to users who have recently tried HyperGrapher.

Now that you are the market leader, you feel a bit uneasy about employing the tactics you found so objectionable when you were new in the market. But some of these stratagems look promising from a strategy perspective, and some of your trusted lieutenants (the ones receiving significant compensation in the form of stock options) feel that a more aggressive stance would go far to solidify ZipGrapher's hold on the market. Perhaps it is time to seek antitrust counsel.

With your growing market presence, you are also thinking about acquisitions as a way to further strengthen your position. You are attracted to the idea of selling ZipGrapher in conjunction with the leading spreadsheet program, either through an exclusive joint marketing arrangement or an outright merger. Could either of those strategies run you afoul of the antitrust laws? In addition, you have been carefully watching the declining market share of SlowGrapher, which is now used by a mere 10% of the market; SlowGrapher's share of new shipments is even lower. You would like to get your hands on their customer list and migrate SlowGrapher users to ZipGrapher, both to grow your market share and to lock up a group of customers that might otherwise help support entry by HyperGrapher. But you wonder: with your 50% share of the installed base, and 70% share of new shipments, would an acquisition of SlowGrapher raise antitrust problems? Finally, you are trying to map out a strategy in case a large hardware firm or operating systems vendor expresses an interest in acquiring *your* firm. No doubt about it, you had better get some antitrust advice, and quickly.

## III. General Economic Principles

This little parable is meant to illustrate some very real strategic and legal issues that arise in certain network industries where competition is highly dynamic, such as the computer software industry and the video game industry, to name just two. Similar issues, as well as some quite novel questions involving the creation of jointly owned networks, and access to such networks, arise in other network industries, e.g., in the ATM and credit-card industries. Business strategies in all of these network industries are rich and complex.

What are the implications for antitrust enforcement? Even more so than in other areas, antitrust policy in network industries must pay careful attention to firms' business strategies, the motives behind these strategies, and their likely effects, with the ultimate aim of preserving competition, so as to promote efficiency and maximize consumer benefits in the long run. No simple rules are available, but we at the Antitrust Division are prepared to commit the resources necessary to investigate conduct in these industries that might harm competition. Furthermore, antitrust enforcers must be alert in these industries, because the very nature of the "positive feedback" cycle means that monopolization may be accomplished swiftly. And, once achieved, the network effects that helped create dominance may make it more difficult for new entrants to dislodge the market leader than in other industries lacking network characteristics.

Because our investigations in network industries are typically complex, fact-specific, and driven by changing technology, I cannot draw bright lines for you delineating pro-competitive from

anticompetitive behavior in network industries as a general matter. Still, I feel strongly that economic learning developed over the past decade can be tremendously valuable in informing sound antitrust enforcement efforts in these areas, and in reaching solid conclusions in specific investigations. My goal here today is to give you a sense of how this occurs at the Antitrust Division.[4]

To this end, I would like first to discuss a number of economic principles in network industries, drawing out their implications for antitrust enforcement policy. Then I shall apply these principles to several types of business conduct that arise in network industries, and to a handful of important antitrust cases in such industries.

### A. Innovation is King

The key driver of consumer benefits in information industries is technological progress. Thus, the primary mission of antitrust in these industries must be to promote and protect competition in the introduction of new and improved products and services. Of course, antitrust law seeks to insure that independent firms offering comparable technology compete vigorously on price, but very often the most potent form of competition is from new products, not just lower prices.

New products do not appear magically; and technological progress does not occur willy-nilly. Both require the investment of financial and human capital, which are attracted only if the winners are able to reap rewards. For these powerful reasons, there is no fundamental tension between antitrust law and intellectual property rights. This logic is well articulated in the DOJ and FTC "Antitrust Guidelines for the Licensing of Intellectual Property," which were issued in April 1995.

It is not infrequent for one firm to wrest industry leadership away from another as technology

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I must stress that I can only give you a glimpse here of how economics informs antitrust policy in network industries, for three major reasons. First, my topic is far too rich and complex to cover in a single speech; a closer look at the economics literature, at our enforcement actions, at the record from the recent FTC hearings, and at the case law, will do much to supplement my discussion here. Second, both the economics and the law in these areas are still evolving, as new research is conducted, and as new cases arise and are scrutinized by the enforcement agencies and the courts. Third, my discussion here is largely confined to unregulated industries, and thus omits many important antitrust issues in the telecommunications industry, the electricity industry, and other network industries subject to price or entry regulation.

advances from one generation to the next. This is Schumpeterian "creative destruction" at work to deliver ever-better products to consumers. The single most important goal of antitrust in network industries is to insure that competition from new products and new technologies is not stifled.

Because innovation is such a strong force in many high-technology markets, companies are tempted to defend their conduct by arguing that entry is easy or inevitable, and thus durable market power or monopoly power is unobtainable. Sometimes this argument may be quite valid, but beware of overusing it: there is no antitrust immunity for high-tech industries. The fact is, rapid technological progress does not equate to low entry barriers, especially if users find it very costly to switch to new brands that are incompatible in some way with the established technology.

### B. Cooperation is the Norm

Cooperation among participants in network industries is the norm, not the exception, and serves a variety of beneficial purposes. As a general rule, cooperation among suppliers of complementary products, which we might call "vertical cooperation," can be highly beneficial.[5] If anything, this principle applies even more strongly in network industries: hardware and software suppliers make sure their products work together smoothly, suppliers of operating systems provide development tools to software developers to promote the supply of compatible software, and cable television operators invest in programming to supply to their customers. Vertical cooperation raises antitrust dangers only when it contains an element of exclusivity.

Cooperation among direct rivals, which we might call "horizontal cooperation," is of course more likely to raise antitrust concerns than is vertical cooperation. However, horizontal cooperation also can be pro-competitive, in the proper circumstances. For example, rival firms may agree upon a new product standard to ensure compatibility, as when Sony and Philips jointly established

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Hardware and software are economic complements because the demand for hardware rises if software becomes better and cheaper, and vice versa. For example, a video game player and the (compatible) games that play on it are complements. Standard antitrust principles tell us that collusion, i.e., cooperation in pricing, among suppliers of *substitute* products, typically harms consumers. By very close analogy, cooperation among suppliers of *complementary* products typically benefits consumers. In the context of vertical integration, this is recognized under the rubric of solving the "double marginalization" problem, an argument for why vertical integration can lead to lower prices. This has been understood by economists since Cournot's work in 1838.

standards for compact discs around 1980.[6] Indeed, such cooperation may be critical for a new product to compete successfully with established products. If so, such cooperation to achieve compatibility cannot become anticompetitive merely because it is successful in establishing a new industry standard. Of course, horizontal cooperation for the purposes of standard setting does not justify cooperation in production, marketing, or pricing.

### C. Strategy is Dynamic

My computer software parable was quite consciously organized around the *life cycle* of an innovative product in a network industry. Taking a snapshot of competition at a single point in time would have been quite inadequate, either to understand the strategies involved or to assess the legality of various tactics. Having worked with dynamic, game-theoretic models of business strategy for my entire professional career, I am well aware of the pitfalls of employing static analysis in dynamic industries, and the information industries are nothing if not dynamic.[7] For example, pricing strategies in network industries are usually highly dynamic, due to the strategic importance of building and maintaining an installed base of users.

### D. Compatibility is Key

Compatibility determines the size and number of virtual or actual networks in a network industry; two products that are fully compatible belong to or benefit from the same real or virtual network. Therefore, a firm's ability to make its product compatible with other products affects the value, sometimes even the commercial viability, of its product. Compatibility can be a tremendous source of competitive advantage; incompatibility can constitute a stiff entry barrier.

When Borland introduced its Quattro Pro spreadsheet in the 1980s, it went to great efforts to make Quattro Pro compatible with the then-dominant spreadsheet, Lotus 1-2-3. In this case, there were two key aspects to compatibility: Borland wanted to make it easy for users of Lotus 1-2-3 to

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Such cooperation often takes place under the auspices of a formal standard-setting body, and may include safeguards to prevent one or a few firms from "controlling" the standard. However, in the case of Sony and Philips, the Digital Audio Disk Council declined to endorse the Sony/Philips CD standard, choosing instead to leave the selection of a standard to the market.

Indeed, I am bemused when economists are broadly criticized for using static models of perfect competition (read: basic supply and demand tools) to study complex, dynamic industries. Such critics just don't know what industrial organization economists and business strategy scholars have been doing the past twenty years.

learn Quattro Pro, call it "user compatibility," and Borland wanted to make it easy for data files to be transferred between Quattro Pro and Lotus 1-2-3, call it "file compatibility." In my lexicon, Borland quite naturally wanted *access* to Lotus's network, i.e., Lotus's installed base of users, which constituted a major portion of the market for spreadsheets. The litigation that ensued between Borland and Lotus involved the question of whether Lotus's copyright protection precluded Borland from offering certain types of user compatibility in Quattro Pro without Lotus's permission.

Many of the battles in network industries involve efforts to join existing networks, to protect established networks, and to establish new networks. As Michael Katz and I have shown, incumbent firms often wish to prevent rivals from hooking into their networks, while entrants typically strive to do just that, unless they can offer dramatic technical improvements on an incompatible basis.[8] Intellectual property rights, tempered by sound antitrust enforcement, often determine whether a network can be kept proprietary or not. Some of the most fundamental strategic questions revolve around firms' decisions to establish or participate in "open" networks or "closed," proprietary networks. While IBM has been criticized in business strategy circles for making its PC network too "open," and ultimately losing control of that network to Intel and Microsoft, Apple has likewise been criticized for keeping its network too "closed," refusing, until quite recently, to license hardware "clones" of the MacIntosh.

### E. Expectations are Critical

I presume that every one of you has purchased numerous consumer electronics devices -- either televisions, compact disk players, video tape players, or computers -- for your home. In making these purchases, I'm willing to bet that you gave at least some thought to the question of where technology was heading: Should you wait for prices to fall further? Will you be left stranded with a technology that might flop, such as quadraphonic sound, stereo AM radio, or certain brands of personal computer best left unnamed? Or, are you buying a product that will never develop much of a following, making it more difficult for you to get repair services, upgrades, or spare parts when your unit gets older?

My point is this: purchase decisions in network industries are heavily influenced by *buyers' expectations*. The positive feedback endemic to network industries derives in part from the

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See especially Michael Katz and Carl Shapiro, "Technology Adoption in the Presence of Network Externalities", *Journal of Political Economy*, 1986.

importance of expectations: a product that is expected to fail often *will* fail; a product that is expected to succeed often *will* succeed. For example, at some point in the late 1980s in the U.S. (earlier in Japan), users decided that fax machines would be widespread and thus quite valuable, and this became a self-fulfilling prophecy. Indeed, faxes still dominate e-mail for instant communications of text. Now the Internet is widely expected to continue to grow rapidly; these beliefs themselves make the Internet more attractive to users, and thus more likely to in fact grow rapidly in the future. This is the essence of the positive feedback of networks.

Because expectations are so critical, much business strategy in network industries is devoted to influencing expectations. At one point, WordPerfect sued Microsoft over Microsoft's claim that its word processing software was the most popular in the world. And Visa has had a long-running advertising campaign telling consumers that Visa cards are accepted "everywhere you want to be," whereas merchants "don't take American Express." Just recently, Sun assembled an impressive coalition of visible supporters for its Java software (including IBM, Apple, DEC, Adobe, Silicon Graphics, Hewlett Packard, Oracle, and Toshiba) to convince software developers that Java would indeed become the industry standard for authoring certain material for the Internet. Having a great product helps get a bandwagon going, but a great product can fail if it suffers from unfavorable expectations. From an antitrust perspective, a dominant firm that undermines expectations regarding the viability of an alternative product may strike a damaging blow to its upstart rival. Investigation may be warranted to determine whether the dominant firm is merely informing customers of the drawbacks of rival technology, or inaccurately maligning its would-be competitor. Thus, in my parable at the beginning of this speech, the Antitrust Division would be gravely concerned if USoft employed a campaign of fear, uncertainty, and doubt to cripple its rival ZipGraph by making false or misleading statements about ZipGraph.

## IV. Implications for Business Conduct

I am now ready to apply these general principles to specific types of business conduct in network industries. In doing so, I should stress that my focus, as an antitrust enforcement official, is on the conduct of firms that have or might obtain monopoly power. Some forms of business conduct can be legitimate for firms with small market shares, yet anticompetitive when employed by dominant firms. The fact that small firms employ particular tactics suggests that they involve some efficiencies, but these efficiencies may be outweighed by anticompetitive effects when a dominant firm acts similarly.

### A. Joint Standard Setting

Very often, a single firm is incapable of launching a new technology, especially if that technology is not compatible with existing products. I have already noted the example of Sony and Philips jointly promoting the compact disc technology. Cooperation of this sort has the advantage of avoiding a potentially unproductive standards war, in part by assuring consumers that they will not be stranded if they invest in the new technology.[9] Much like research joint ventures, cooperative standard setting also can permit the teaming firms to combine the best features of their technologies, as is claimed for the new high-definition television system.

At the Antitrust Division, all of these arguments are given serious attention, even while we look to make sure that rival firms are not using joint standard setting as an excuse to avoid competing directly against each other. This concern is greatest if two or more of the firms agreeing to a joint standard could independently have promoted comparable technology. Absent network effects or strong economies of scale, consumers are better served if the two rivals compete with their distinct product offerings, rather than agree to offer only a single product. With strong network effects, however, consumers may well be better off with a single network, i.e., with a *de facto* product standard, especially if two or more firms are able to offer products conforming to the standard without incurring any royalty liabilities. Even in this case, however, antitrust enforcers must ask whether competition to become the standard has been cut off prematurely, before technological avenues were adequately explored or before consumers realized the benefits of rivalry between firms jockeying to set the standard. Such concerns are lessened when the firms are genuinely combining complementary technology, so their joint standard is superior to anything either could have introduced on its own.

A somewhat different set of concerns arises when firms with a vested interest in current technology participate in the setting of standards for new and superior technology. In this situation, an incumbent firm may well have an incentive to slow down the arrival of the new technology, and thus preserve its proprietary advantage. As a matter of business strategy, the champions of the newer technology may have to break off from the incumbent firm and establish a new standard on

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For a more extensive discussion of the antitrust aspects of joint standard setting, see James Anton and Dennis Yao, "Standard-Setting Consortia, Antitrust, and High-Technology Industries," *Antitrust Law Journal*, 1995. Anton and Yao emphasize situations in which standard-setting bodies may abuse their position by excluding new products for failure to meet safety standards. My focus here is distinct: on cooperation in the establishment of compatibility standards for new technology.

their own, either in the market or through a standard-setting process. As a matter of antitrust policy, the incumbent firm is not compelled to endorse the newer technology, but it might generate antitrust liability if it engages in activity to block the new technology from being adopted. An investigation and fact finding will typically be necessary to determine the extent to which an incumbent is alerting industry participants to the genuine drawbacks of the new technology, protecting consumer benefits associated with compatibility by resisting splintering of an established standard, or baldly preserving its market power by blocking new, beneficial products or standards from emerging.

When firms cooperate to set standards, they may also set terms and conditions for the use of the technology embodied in the standard. For example, in many cases the *quid pro quo* for industry acceptance of a standard is an agreement by the sponsoring firms to charge no royalties, or specified low royalties, or unspecified but "reasonable and non-discriminatory" royalties, for use of the intellectual property embodied in the standard.[10] Offering long-term fixed-rate licenses to a new technology, in order to get a standard accepted initially, can be a highly attractive arrangement from an antitrust perspective: it allows consumers to enjoy the network benefits associated with compatibility, it enables many firms to compete to supply compatible technology, and it can greatly smooth the standards process, even while it permits the sponsoring firms to recover their R&D investments, either through the modest royalty payments or by virtue of their unique and superior knowledge of the underlying technology that may give them an ongoing technological edge. Still, market participants and antitrust authorities must be ever vigilant in markets with these features to prevent one firm from converting an initially open standard into a proprietary standard, unless such control is gained by genuine improvements and innovation that extend the open standard.

### B. Compatibility and Access[11]

I have already noted that compatibility, i.e., network access, is a key element of business strategy in network industries. As explored in my research with Michael Katz, incumbent firms often will find it profitable to deny access or compatibility to new entrants, and to seek to establish *de facto* standards for new products rather than participate in industrywide standard-setting efforts.

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The International Organization for Standardization (ISO) and the American National Standards Institute (ANSI) both require an innovator to agree to license on "reasonable" terms before they will incorporate proprietary technology into an official standard.

Let me stress that I am not addressing access issues in regulated industries here. In many regulated industries, including telecommunications, competitors' rights to access are well established as a matter of regulatory policy.

What are the antitrust implications of the fact that incumbents often wish to deny access or compatibility to would-be rivals? Requiring firms that control proprietary standards to open their technology up to others amounts to compulsory licensing, which runs the risk of undermining the purpose of the intellectual property laws. As stated in the DOJ and FTC Intellectual Property Guidelines, "Intellectual property law bestows on the owners of intellectual property certain rights to exclude others. These rights help the owners to profit from the use of their property." (p.3)

Recognizing the importance of intellectual property rights, the Guidelines immediately go on to make clear that these rights are circumscribed by antitrust law: "An intellectual property owner's rights to exclude are similar to the rights enjoyed by owners of other forms of private property. As with other forms of private property, certain types of conduct with respect to intellectual property may have anticompetitive effects against which the antitrust laws can and do protect. Intellectual property is thus neither particularly free from scrutiny under the antitrust laws, nor particularly suspect under them." However, while there is no presumption that intellectual property confers significant market power, it is worth noting that a firm owning intellectual property giving it control over a proprietary *de facto* network standard may well have such power.

Intellectual property rights are attenuated when a firm controlling intellectual property -- patents, copyrights, or trade secrets -- relevant to a standard has committed itself to an "open" standard in order to obtain industry support for the standard in the first place. In that situation, subsequent efforts to gain control of that standard by asserting these same intellectual property rights can implicate competition and raise antitrust concerns.

The FTC pursued this theory in its case against Dell Computer Corporation last November.[12] In that case, the FTC alleged that Dell had restricted competition and undermined the standard-setting process by threatening to exercise undisclosed patent rights against computer companies adopting the VL-bus standard. The VL-bus is a mechanism to transfer instructions between the computer's central processing unit and its peripherals, such as a hard disk drive or video display hardware. The FTC complaint states that Dell participated in the standard-setting process of the Video Electronic Standards Association (VESA) in 1992, that a Dell representative certified that he knew of no patent that the bus design would violate, and that Dell later contacted certain VESA

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In the Matter of Dell Computer Corporation, File No. 931-0097.

members and asserted that they were violating a 1991 Dell patent by using the VL-bus standard.[13]

The Antitrust Division shares the FTC's concerns that firms may manipulate or abuse the standard-setting process by asserting that complying with an agreed-upon standard violates their intellectual property rights. If indeed the standard lacks reasonable substitutes, monopoly power may be at stake, raising antitrust concerns, as well as intellectual property and contract issues. If a firm attempts to capture and control what had been an open standard, it may be guilty of actual or attempted monopolization in a relevant antitrust market, depending upon the specific conduct involved and the ability of other firms to use substitute technology.

The Antitrust Division is also concerned about situations in which a dominant firm alters its product in a manner that offers few or no consumer benefits but reduces the attractiveness of rival products by introducing incompatibilities with those products. So, in my parable, we would be very concerned if USoft took steps, such as modifying its file format, for the primary purpose of preventing ZipGraph from achieving file compatibility with the incumbent UGraph product.

### C. Product Pre-Announcements

In my parable, the incumbent allegedly employed the so-called "vaporware" tactic of strategically making "early" announcements of new releases, with the express purpose of freezing consumers in place to prevent them from buying software offered by the entrant. Product pre-announcements can indeed influence consumer expectations, and thus can have powerful effects in network industries. There should be no doubt that firms in network industries can often benefit by announcing their products in advance.

Complex antitrust issues may arise because such pre-announcements can serve a variety of purposes: they can inform partners of new products to promote interoperability, they can inform consumers of new products so they will not be left stranded buying inferior or obsolete products, they can favorably influence expectations to help establish new products, and, yes, they can deter the introduction of rival products. An investigation to determine the facts in any given case will be necessary in order to conclude that a given pre-announcement was anticompetitive. However, if our

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In another case, I understand that a standard was established under the auspices of the Electronic Industries Association for memory modules in personal computers. Later, the Wang Corporation, after participating in the standards process, asserted that this technology was controlled by their patents, and demanded royalties from Mitsubishi, Toshiba, and others. Litigation ensued.

investigation were to reveal that a product pre-announcement by an incumbent network monopolist was designed principally not to convey useful information to the buying public but rather to manipulate expectations in a manner inconsistent with current objective information, we might well conclude that the pre-announcement was anticompetitive. Other factors as well, such as whether the party making the announcement has market power in a relevant market, are also highly relevant.

### D. Enforcement of Invalid Intellectual Property

My parable also noted a possible defensive strategy by which an incumbent monopolist undermines the viability of an entrant's product by asserting that the entrant's product infringes upon the incumbent's intellectual property. If the incumbent's assertion is valid, or based in fact, it is hard to see how the assertion can, in and of itself, constitute an antitrust violation. However, as noted in the Intellectual Property Guidelines (Section 6), "Objectively baseless litigation to enforce invalid intellectual property rights may also constitute an element of a violation of the Sherman Act." Such litigation can be especially destructive in network industries if it is part of a FUD (fear, uncertainly, and doubt) strategy that adversely impacts expectations by convincing consumers that the entrant's product will not succeed. An investigation would be indicated to determine whether a party with monopoly power has engaged in such conduct; if the facts indicated that it has, and that competition has been harmed, antitrust liability might well be found.

### E. Leveraging

Once a firm controls an important standard, it may well seek to protect that position, and to extend its control if possible. Indeed, since technology is so dynamic, the primary method by which today's network monopolist can maintain its monopoly may well be to extend its control, at least in part, to the next generation of technology. For example, Sony and Philips have sought a key role in defining the standards for digital video discs, building on their control over audio disc standards. Likewise, video game manufacturers have historically tried to migrate their customers from one generation to the next.

In some cases, the leader in one generation of technology is able to perpetuate its dominance into the succeeding generation by offering the best technology to users; this represents healthy competition. But antitrust concerns quickly arise when a firm controlling the standard in one product area uses its dominance to set and control the standard for the next generation of that product, or for a second, complementary product. This leveraging strategy includes situations where a firm controlling one product incorporates a second product into its offerings and extends its control

to that second product.

At this point in my talk, it should be pretty clear why an incumbent firm controlling the standard for Product A enjoys a big advantage in establishing the standard for Product B, where Product B either complements Product A or replaces it, assuming that both products are subject to genuine network effects. First, the incumbent firm may enjoy some advantages flowing from vertical integration, allowing it to offer a version of Product B that works especially well with the A-standard, at least for some period of time. Second, since many of the target consumers for Product B are those already using Product A, the firm controlling Product A may be especially well-placed to obtain distribution for Product B. Third, the incumbent controlling Product A may be the commercially "obvious" choice to set the B-standard, which can tilt expectations dramatically in its favor. Even if rivals are able to coordinate to offer their own standard for Product B, consumers may still expect the A-incumbent to win, and thus it often will win, by the now-familiar positive feedback endemic to networks.

However, these advantages by no means imply that the monopolist controlling the A-standard *necessarily* will become dominant in the market for Product B. To the contrary, in many industries dominant firms fail to match the innovative efforts of others who are offering complementary or successor products, and consequently see their market positions erode. The Antitrust Division is dedicated to making sure that such competition on the merits is not stifled by dominant incumbents. For example, we are prepared to scrutinize and challenge various tactics, from pricing policies to bundling, that are employed by incumbents who are dominant in one market, if these policies are likely to lead to dominance in adjacent markets as well.

The extension of monopoly power from one market to the next through control of standards and networks is one of the most important battle grounds today and tomorrow for antitrust law. I cannot stand before you today and give you simple, clear guidance that you can use to counsel your clients, uncluttered by the necessarily complex facts specific to your industry or your company. My goal is more modest: to help provide a coherent framework for thinking about antitrust in network industries, to communicate as best I can how we think about these problems, to explain some of the enforcement actions the Antitrust Division has taken recently in these industries, and to identify some key questions that we, the FTC, or the courts may soon have to address.

In some cases, the generic leveraging strategy can be viewed for antitrust purposes in terms of tying. Suppose, for example, that a firm owning patents critical to the current generation of

technology licenses those patents only to users who agree also to adopt the firm's proprietary version of the *next* generation of technology. Through such tying, the firm could use its control of the current generation of technology to create an installed base of users who have adopted its proprietary version of the next generation of technology. This might be attempted in conjunction with penetration pricing, by giving the new technology away to certain key users in exchange for their agreement not to use rival standards. In this fashion, today's standard-bearer might be able to extend its control into the next generation of technology. The Antitrust Division could well challenge conduct fitting this fact pattern.

To give another example of how a firm controlling one standard might be able to employ bundling to extend the scope of its control, suppose that the owner of a current proprietary product standard bundles a new product with its standard-bearing product. The firm's goal in bundling might well be to establish a *de facto* standard for the new product, under the firm's control, or to extend the original product and standard to encompass the new product. The firm might well choose to give the new product away for free, planning to capture its revenues later once a new *de facto* standard is established under its control. At the very least, rivals selling the new product must be alert to this ploy and be prepared to respond promptly to the bundling strategy. As I have already noted, this conduct could give an enormous advantage in the new market to the incumbent standard bearer, in part because of that firm's powerful name, in part because of superior interoperability, and in part because the firm's new product would enjoy rapid and widespread distribution. Whether this bundling ultimately benefits or harms consumers and competition requires a further, fact-intensive analysis on a case-by-case basis.[14] If the facts showed that the bundling harmed consumers by monopolizing or threatening to monopolize the market for the new product, the Antitrust Division would likely challenge this conduct.

### F. Exclusive Dealing

The dangers of exclusive dealing in network industries are nicely illustrated in the video

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As noted above, there could well be consumer benefits associated with the joint supply of the existing standard product and the new product by the same firm. However, consumers may suffer if the new product standard is proprietary rather than open, and there is always the possibility that the incumbent's new product will succeed even if it is inferior to alternative new products available from other vendors.

game industry.[15] Nintendo dominated the video game market during the late 1980s, in no small part because it had developed a superior new product and employed brilliant marketing. Nintendo sold video game machines and developed a number of games internally, including the hit game Mario Brothers, but relied on outside developers for many of its games. As a condition for an independently-developed game to be allowed to play on Nintendo machines, Nintendo required that the game not appear on the rival systems sold by Atari and Sega for a two-year period.

Without delving into the details of that case (and Nintendo certainly offered a number of justifications for this practice), or laying out the steps in the economic analysis of exclusive dealing, let me simply point out how the network elements in the video game industry affect the antitrust analysis of Nintendo's exclusive dealing provision with game developers: Once Nintendo had a large installed base, it became very costly for developers of hit games to forsake the installed base of Nintendo users in order to make their games available on competing systems. As a result, Nintendo's exclusivity requirement reduced the attractiveness of the Atari and Sega systems, and made it all the more likely that the market would tip entirely towards Nintendo. At some point, consumer expectations regarding the decline of Atari and Sega (in that generation of systems) became self-fulfilling. In other words, exclusive dealing here affects not only the supply of inputs (hit games), but also consumer expectations, to the benefit of the market leader.[16]

The Antitrust Division had similar concerns in the Electronic Payments Systems (EPS) case. Among other things, the Division investigated a rule adopted by the MAC ATM network (now owned by EPS) that prohibited member banks from participating in other regional ATM networks. Even after MAC dropped this rule, the Antitrust Division was concerned that EPS was preventing small member banks from obtaining ATM processing services, so-called "ATM driving," from independent data processing firms, thereby making it more difficult for these banks to link with rival regional ATM networks. As stated in the Division's complaint filed in March 1994, "Once defendant drives a bank's ATM, defendant can prevent that bank from connecting its ATM to another network. To connect to a network other than MAC, MAC must establish the connection. MAC generally has not provided connections to the ATM networks that would be its strongest

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I testified in 1991 on behalf of Atari Corporation in their litigation with Nintendo. Nintendo was not found by the jury to have violated the antitrust laws.

It took a new "killer" game, Sonic the Hedgehog, and a new generation of 16-bit machines, for Sega to mount a serious challenge to Nintendo. I find it interesting that after Nintendo dropped its exclusivity requirement, some hit games began to appear on both the Sega and Nintendo systems. Last I checked, the market was experiencing healthy competition between these two systems, with neither firm demanding exclusivity of outside game developers.

competitors." Some recent trade press indicates that since the decree a number of rival networks have made inroads into MAC's area and attribute their success to the decree.[17]

Our August 1995 consent decree with FTD, the floral delivery network, further illustrates these principles. FTD had required its member florists to be exclusive back in the 1950s, leading to a 1956 consent decree in which FTD agreed not to exploit its dominant position in floral wire services to induce florists to forego membership in competing wire associations. In January 1995, FTD introduced an incentive program, known as "FTD Only," to induce florists to use FTD floral wire services exclusively. This program provided financial incentives to qualifying FTD members. To qualify, a florist was required to terminate its membership in competing wire clearinghouses and clear 100% of its flowers-by-wire orders through FTD's clearinghouse. Over 750 florists had done this by May 1995. FTD agreed last August to terminate its "FTD Only" program. The consent decree states that FTD is "enjoined and restrained from offering any financial incentives or financial rewards to any FTDA member or user of the FTDI clearinghouse that are conditioned upon terminating or forgoing membership or participation in any competing wire association, or other entity or mechanism that transmits or facilitates wire orders."

Finally, the Antitrust Division is prepared to challenge a dominant firm's contracts with its customers or suppliers if these contracts have the same economic effect as would exclusive contracts, even if the exclusivity is not explicit. Microsoft's per-processor licenses, the subject of the Department's 1994 consent decree with Microsoft, fell into this category, because they had the economic effect of inducing OEMs to deal exclusively with Microsoft.

### G. Mergers with Installed Bases

What about mergers and acquisitions in network industries? As usual, the 1992 Merger Guidelines provide a valuable starting point. But it is worth pausing to discuss how some of the unique aspects of network industries affect merger analysis. I shall illustrate my points by analyzing

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See specifically "EPS Hires Dealmaker to Oversee Aggressive Expansion Strategy," in the *American Banker*, August 8, 1995, indicating that several third-party processors had been certified to drive the terminals of MAC customers.

mergers in the computer software industry.[18]

First, claims that entry is easy will not necessarily protect computer software mergers from antitrust challenge, for those claims are not necessarily valid. The fact is, in a number of software categories, on a variety of hardware platforms and operating systems, market shares show some stability over time and incumbents have shown the ability to hold on to their market share. Please don't argue that six programmers could write the necessary code in one year so your client's merger must be just fine. The bit about the programmers may be true, but we still need to know whether consumers will switch to the program they have written in response to a modest discount. The fact is, no matter how good the programmers are, they cannot build up an *installed base* overnight, and an installed base is a key attribute affecting the attractiveness, and even the viability, of software programs.

Indeed, our recent experience with software mergers has taught us that entry into computer software is not nearly as easy as the merging parties would have us believe. In the Microsoft/Intuit case, both Microsoft's own experience with Microsoft Money, and Computer Associate's experience with Simply Money, showed how hard it is to successfully establish a new personal financial software product. Despite Microsoft's obvious advantages, and despite the fact that Computer Associates offered large numbers of copies of Simply Money at very low prices, neither was able to make significant inroads into the market. In the Computer Associates/Legent merger, we found that substantial programming resources would be required over a significant period of time to write new security software, tape management software, disk management software, job scheduling software, and automated operations software, for IBM mainframe computers. In that case, entry was especially difficult because these types of software are "mission critical," making it more difficult for an entrant to convince users to accept an untested product.

If entry is indeed difficult, horizontal mergers in computer software have much in common with other mergers involving branded goods. The fact that consumers bear costs in switching from

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I confine my attention here to computer software mergers, in large part because most of my own personal merger experience in network industries has involved computer software. I should note, however, that the Division also regularly reviews telecommunications, railroad and electricity mergers, each of which involves networks. A serious discussion of mergers in these industries will have to wait for another day, along with a discussion of antitrust in *regulated* network industries. Indeed, many readers will note that I am only able to scratch the surface here regarding computer software mergers themselves.

one brand to another is a form of brand loyalty, and suggests that the demand facing each brand is relatively inelastic. The conclusion that each brand of software faces relatively inelastic demand is consistent with the very high gross margins observed for computer software generally. These high gross margins make it more likely that a merger of rival brands will lead to a significant post-merger price increase.[19] In addition, product repositioning by brands already in the market may be somewhat harder in computer software than in other branded goods markets, because of the desire to maintain full compatibility with earlier versions of the product.

This is a good point to discuss the measurement of market shares in computer software mergers. In particular, what is the relevance of installed-base figures, and what is the relevance of new shipments data? The primary measure of market share should be new shipments data, using either units or dollars. New shipments tell us about the current market presence of each brand. To interpret these shares, it is important to account for the fact that shipment shares typically shift as new products and upgrades are released. What about the installed bases? These are absolutely crucial strategic variables: a brand with a large installed based is attractive, both because of the now-familiar advantages associated with a popular product in a network industry, and because brands with large installed bases are, *ceteris paribus*, expected to remain popular, and expectations tend to be self-fulfilling in network markets. For all of these reasons, we often see brands with large installed bases enjoying the lion's share of new shipments, including both upgrades and new sales. If, however, this correlation between prior sales (installed base) and current sales is absent, that is a signal that the installed bases are, for some reason, less important in assessing current competitive conditions.

Computer software is much like an extremely durable capital good: once a consumer owns the program, that consumer has little reason to make further purchases unless the product is improved (or unless the consumer adds new machines). As a consequence, the supplier of a computer software program has a considerable incentive to improve its product simply to make sales to its own installed base, i.e., to drive sales of upgrades. Thus, for programs with large installed bases relative to new shipments, competition with other programs may not be the primary driver of product improvement, especially if users find it very costly to switch brands.

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My November 1995 speech "Mergers with Differentiated Products," explains why high gross margins, *ceteris paribus*, imply larger post-merger price increases, assuming there is significant direct pre-merger competition between the merging brands. A revised and expanded version of this speech is just about to appear in the *Antitrust* magazine.

This same logic does not apply to pricing competition. Rather, there may be substantial pricing competition, either in the form of competitive upgrades to attract consumers from rival programs' installed bases, or to attract new, unattached customers. This competition can be especially intense if rival brands are jockeying to take the lead in terms of installed base, perhaps with the hope of tipping the market in their favor. Competition of this type would be lost due to a merger of the competing programs.

One way to gauge competition is to look at what happens when a new version of one computer program is introduced. Assuming the new version offers significant new capabilities, its introduction causes a sudden increase in performance, which is comparable to a sudden drop in price. These episodes offer an excellent opportunity to measure the extent of direct competition between the two brands of software, as captured by the Diversion Ratio between the two merging brands.[20]

Rather different issues arise when evaluating vertical mergers in the computer industry. As I noted above, vertical cooperation, including vertical integration, can be beneficial to consumers. For example, if a hardware vendor acquires a software supplier, this merger of complements can well lead to lower overall prices for the combined hardware and software "system." But vertical mergers also raise issues of foreclosure.[21] In a hardware/software merger, the Antitrust Division will investigate to determine the impact of the merger on competition in both the hardware and the software markets.

The recent acquisition of two software firms, Alias and Wavefront, by hardware manufacturer Silicon Graphics raised both horizontal and vertical issues.[22] Both Alias and Wavefront write sophisticated, high-end graphics software, largely for Silicon Graphics workstations. Alias and Wavefront competed directly with each other, suggesting that a merger between the two of them alone would have led to a reduction of competition. However, my analysis

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For an extended discussion of how the Diversion Ratio is defined and used to assess unilateral competitive effects in differentiated-product mergers, see my November 1995 speech, "Mergers with Differentiated Products," or my forthcoming article in the *Antitrust* magazine.

For a more complete discussion of vertical mergers, see the speech by then-Deputy Steven C. Sunshine, "Vertical Merger Enforcement Policy," text published May 11, 1995.

Prior to my employment at the Antitrust Division, I consulted for Silicon Graphics in this merger, which was reviewed by the FTC.

showed that Silicon Graphics, because of its strong financial interest in making hardware sales, in fact had an incentive to *lower* the overall hardware/software system price after the acquisition, so long as the purchase would not hinder the ability of other hardware/software *systems* to compete with the Silicon Graphics system. The FTC consent decree dealt with this latter concern by requiring Alias to "port" some of its key software products to a competing hardware platform.[23]

Finally, moving beyond computer software to networks generally, let me address the argument that a merger will allow two networks to be joined together, and thus benefit consumers by enhancing network effects. It certainly is possible that the merger will facilitate the linking of the two networks, e.g., by enhancing the compatibility of the two computer programs, or by facilitating the handling of railroad traffic on end-to-end routes. And such enhanced compatibility does indeed count as a consumer benefit. But, as with other merger efficiencies, this leaves open the question of why a *merger* is needed to generate these network benefits. For such benefits to be counted as merger-specific efficiencies, we at the Antitrust Division need to know what prevents the two merging firms from improving the compatibility of their programs, either individually or in cooperation, *without* a full-scale merger.

## V. Conclusion

Business strategy in network industries is rich, complex, and exciting. No less so for antitrust policy. Antitrust enforcement in network industries must be informed by the strategic realities of competition in high-tech markets. I feel strongly that economics and business strategy can go a long way to frame antitrust thinking regarding high-technology industries generally and network industries in particular.

I hope I have been able to communicate some lessons for antitrust policy in network industries, based on economic principles. In a nutshell, our attention must be on preserving technological competition, we must recognize the myriad benefits of cooperation among market participants, we must pay careful attention to compatibility and expectations, and we must be ever vigilant to prevent firms from extending their control of one product or standard to another, except by providing the best value to consumers. Sound and alert antitrust enforcement in these industries is necessary to protect competition and innovation.

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In the Matter of Silicon Graphics, Inc., Docket No. C-3626, File No. 951-0064.

My goal here has been to offer an economic framework for antitrust enforcement policy in network industries, and to place several important antitrust cases into this framework, including but not limited to enforcement actions by the Antitrust Division. If I have done my job well, my remarks here will help clarify how we at the Antitrust Division are likely to analyze a variety of matters involving network industries.

Thank you for your attention and your patience.