CASE 14

Technology Cross-Licensing Practices: *FTC* v. *Intel* (1999)

Carl Shapiro

INTRODUCTION

When do hardball negotiating tactics constitute violations of the antitrust laws? Consider the following fact pattern, which reflects real-world events during the 1997–1998 time frame:

> Intel is the leading manufacturing of high-end microprocessors, the brains of personal computers and workstations. Intergraph Corporation makes computer workstations that use Intel's microprocessors. Intel gives Intergraph, a valued customer, access to Intel's trade secrets (which are very useful when building computers based on Intel's chips) and advance samples of new Intel microprocessors.
>
> Intergraph sues Intel, asserting that Intel's microprocessors infringe on Intergraph's patents. As negotiations fail, the relationship between Intel and Intergraph deteriorates. Intel withdraws the special benefits that Intergraph had been enjoying. Intergraph asserts that Intel has monopoly power over the supply of microprocessors, that Intel's withdrawal of these benefits will greatly damage Intergraph's business, and that Intel's conduct is anticompetitive. Intel claims that its commercial response to Intergraph's lawsuit does not harm competition in any relevant market and that the Courts should not intervene to favor Intergraph in their patent dispute.

Is Intel's conduct anticompetitive and thus illegal under the antitrust laws? That is the central question explored in this chapter.

The author served as an expert witness of behalf of Intel in the litigation brought by the FTC against Intel, which is the subject of this case study. The views expressed here are those of the author alone and should not be attributed in any way to the Intel Corporation.

After an investigation lasting several months, in June 1998 the Federal Trade Commission (FTC) brought an antitrust lawsuit against Intel Corporation based on Intel's conduct toward Intergraph, and similar conduct toward Digital Equipment Corporation and Compaq, all in the context of disputes where Intel was accused of patent infringement. The FTC charged that Intel's practices were an abuse of Intel's monopoly position in microprocessors.[1] The Chairman of the FTC described the FTC's case against Intel as "one of the most widely noted antitrust enforcement actions involving intellectual property" (Pitofsky 2001).

The case attracted enormous media attention, in part because it took place contemporaneously with the Justice Department's monopolization case against Microsoft. Commentators asked whether the FTC was heading in a whole new direction with antitrust, since Intel's conduct was directed primarily at its *customers* rather than at its competitors, the normal (direct) victims in monopolization cases (Weinstein 1998, 1999). The FTC and Intel settled their dispute in March 1999, literally on the eve of trial. The FTC's case against Intel, in conjunction with a related private lawsuit described below, helped to define the antitrust limits on what dominant firms can do to gain competitive advantage using their intellectual property.

The next section provides some background for the case by discussing the tension between intellectual property rights and antitrust law, a tension that is evident in the FTC's dispute with Intel, and by describing the role of patents in the semiconductor industry. Subsequent sections provide a succinct summary of the facts surrounding Intel's conduct in each of the three patent disputes identified by the FTC; explain the FTC's theory of how Intel's conduct was anticompetitive; present Intel's response; and describe the settlement reached between the FTC and Intel. The final section discusses legal and economic developments since the case was settled and remarks on the lasting implications of the Intel case.

THE ROLE OF PATENTS IN THE SEMICONDUCTOR INDUSTRY

The FTC's case against Intel is first and foremost a case about *intellectual property and antitrust:* where do intellectual property rights end and antitrust limits begin? Before we turn to the antitrust issues that are central to the Intel case, we must first understand the role of patents, both in general and in the semiconductor industry.

[1]The FTC's website contains a trove of information about the case; see www.ftc.gov/alj/D9288/index.htm.

The Tension between Intellectual Property Rights and Antitrust

Patents, copyrights, and trade secrets—the primary forms of intellectual property—play an increasingly central role in our economy. Many companies consider their intellectual property to comprise their corporate crown jewels. Pharmaceutical companies place great value on the patents that protect their blockbuster new drugs. Hollywood is tireless in defending its copyrighted movies and music from unauthorized use. Microsoft zealously guards the copyrighted source code for its Windows and Office software. IBM earns substantial revenues each year by licensing its patents and trade secrets. Intel attaches enormous value on the patents that it has obtained, and the trade secrets it controls, in the semiconductor field.

The central role played by intellectual property reflects the fact that economic growth is often driven by innovation, and corporate competitive advantage often results from research and development (R&D) activities that give rise to patents, trade secrets, or copyrights. Large companies such as Microsoft and Intel invest billions of dollars each year in R&D.

Strong or dominant companies increasingly rely on intellectual property rights to earn a return on their R&D investments and to protect their market positions. Under these conditions, the tension that has always existed between intellectual property law—which grants innovators certain rights to exclude others from practicing their inventions—and antitrust law—which seeks to limit monopoly power and to promote competition—has become more visible and more important to our economy. As noted by Shapiro and Varian (1999), the proper treatment of intellectual property rights under the antitrust laws has become a more pressing and more central policy topic as we move into the "Information Age." Gilbert and Tom (2001) document that innovation and intellectual property rights became more common elements of antitrust cases brought by the FTC and the U.S. Department of Justice (DOJ) during the 1990s.[2]

In recognition of the growing importance of intellectual property in our economy, and the need to articulate how intellectual property rights intersect with the antitrust laws, in April 1995 the DOJ and the FTC jointly issued their "Antitrust Guidelines for the Licensing of Intellectual Property."[3] These "IP Guidelines" seek to inform the business community as to how licensing arrangements will be evaluated by the two antitrust enforcement agencies.

While the IP Guidelines have been well received, guidelines by their nature involve general principles and hypothetical situations; they cannot substitute for actual cases. Intel believed that its licensing practices com-

[2]Gilbert and Tom (2001) also provide a thoughtful discussion of the Intel case itself. Gilbert and Shapiro (1997) also discuss the antitrust treatment of licensing practices.

[3]These Guidelines are available at http://www.usdoj.gov/atr/public/guidelines/ipguide.htm. See also Klein (1997).

plied with the FTC's own Guidelines; the FTC felt otherwise. The FTC's case against Intel, along with the related private case involving Intel and Intergraph, provide additional guidance, above and beyond that in the IP Guidelines, to companies seeking to use their intellectual property rights to gain commercial advantage.

The Patent Thicket

With this background, we can ask how patents are actually used in the semiconductor industry, the industry in which Intel competes. Hall and Ziedonis (2001) provide a detailed discussion of precisely this issue.[4] They summarize their results as follows:

> Recent survey evidence suggests that semiconductor firms do not rely heavily on patents to appropriate returns to R&D. Yet the propensity of semiconductor firms to patent has risen dramatically since the mid-1980s. We explore this apparent paradox by conducting interviews with industry representatives and analyzing the patenting behavior of 95 U.S. semiconductor firms during 1979–1995. The results suggest that the 1980s strengthening of U.S. patent rights spawned "patent portfolio races" among capital-intensive firms, but it also facilitated entry by specialized firms. (Hall and Ziedonis, p. 101)

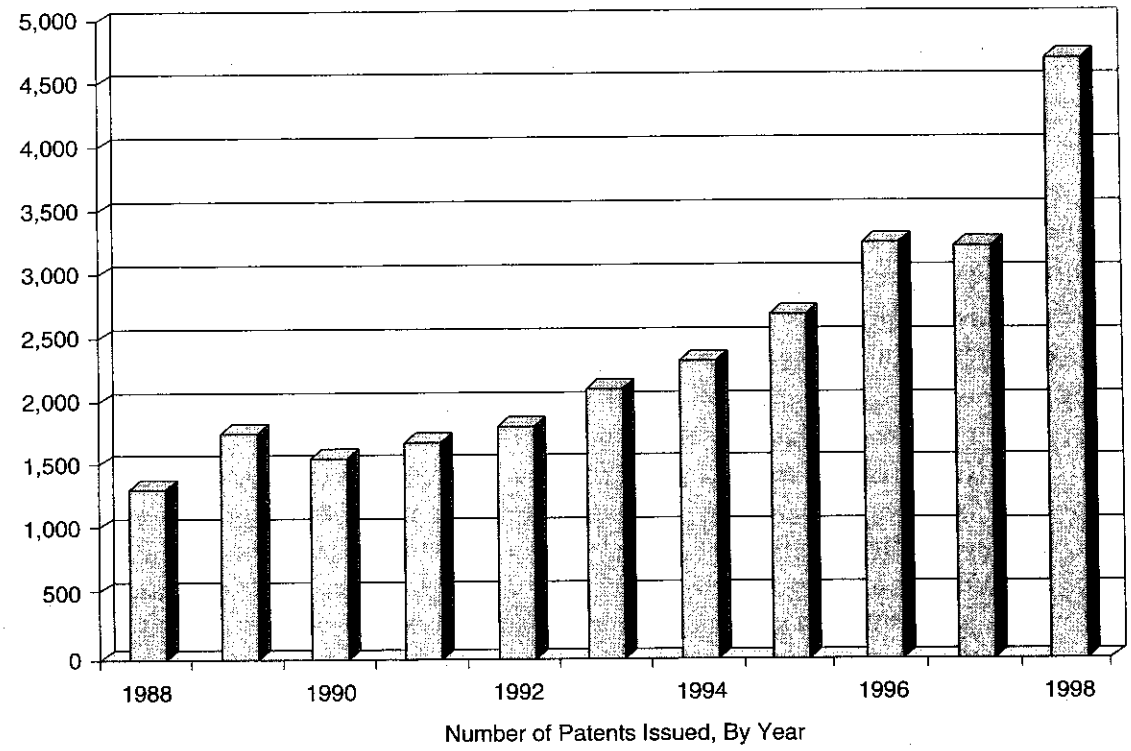
The increased patenting activity has created a "patent thicket" in the semiconductor industry.[5] The extent of the problem can be seen by looking at some basic data on patenting. Figure 14-1 shows that the number of U.S. patents issued each year containing the word "microprocessor," "processor," or "CPU" in their abstracts more than doubled during the 1990s to 4714 in the year 1998. Table 14-1 gives a breakdown for a number of companies in the microprocessor industry. The cumulative effect: more than 25,000 microprocessor patents were issued from 1988 to 1998.

To some extent, this surge in patenting simply reflects the highly innovative nature of the semiconductor industry. For the purposes of the FTC's case against Intel, however, the key point is that the role of patents in the semiconductor industry in the 1990s bore little resemblance to the "classical" role of patents on which the FTC's theory was based. According to the classical (one might say romantic) view of patents, inventors responsible for major inventions rely on the patent system to prevent others from copying their discoveries. While this view fits the pharmaceutical industry reasonably well, patents play a radically different role in the semiconductor industry. To see why, one must first understand three important ways in which

[4]Grindley and Teece (1997) provide further information about patenting in the semiconductor industry. Their evidence further supports the conclusions presented here.

[5]See Shapiro (2002) for a more complete discussion of the patent thicket and its implications for business strategy and antitrust policy. Heller and Eisenberg (1998) describe the "tragedy of the anti-commons" that can result from a thicket of patents.

FIGURE 14-1 U.S. Microprocessor Patents, 1988–1998



patents in our economy today differ from the classical role of patents just described.

First, many companies rely comparatively little on patents to appropriate the returns from their R&D activities (Levin et al. 1987; Cohen et. al. 2000). Instead, companies in many industries rely on trade secrets and time-to-market advantages to earn returns on their R&D expenditures.

Second, the propensity to patent (patents issued per dollar of R&D) has risen as more companies engage in *defensive patenting.* Defensive patenting refers to the practice of seeking patents in order to defend oneself from patent infringement actions brought by others. Under this strategy, the company does not plan to assert its patent proactively against others, but it can counterattack with its own patent infringement claims if sued for infringement (Kortum and Lerner 1998; Hall and Ziedonis 2001).

Third, there have been increasing concerns about the operation of the patent system itself (Merges 1999). The general thrust of the criticism is that the Patent and Trademark Office (PTO) has been too generous in granting patent rights. A common criticism is that the PTO lacks sufficient expertise to determine whether many patent applications in fact represent new and useful inventions as required under patent law.

Opportunism and "Hold-Up" by Patent Holders

Consider what all this means from the perspective of a successful company such as Intel. Each time Intel designs and produces a new microprocessor,

TABLE 14-1
U.S. Patents Containing the Words "Microprocessor", "Processor", or "CPU" in their Abstracts, Issued per Year to Selected Companies

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998*	Total
AMD	8	13	14	8	7	12	13	14	30	51	98	268
DEC	6	17	18	23	35	38	46	31	40	22	28	304
Hewlett Packard	12	10	15	19	17	26	31	38	46	37	55	306
Hitachi	37	45	56	54	70	58	82	81	91	74	102	750
IBM	60	68	73	67	99	149	149	162	221	228	307	1,583
IDT	0	0	0	0	1	0	2	1	4	3	3	14
Intel	4	9	4	10	14	23	45	69	114	112	146	550
Motorola	27	24	27	32	27	41	42	75	71	86	123	575
National/Cyrix	1	2	1	2	3	9	10	8	17	38	30	121
Rise Technology	0	0	0	0	0	0	0	0	0	0	0	0
Silicon Graphics	1	0	0	1	1	2	0	2	8	11	10	36
STMicroelectronics	0	1	1	2	2	1	2	2	9	6	13	39
Sun Microsystems	1	4	3	2	7	18	17	13	24	29	54	172
Texas Instruments	17	13	9	15	24	27	29	33	51	54	60	332
Total U.S. patents**	1,326	1,771	1,549	1,681	1,820	2,128	2,323	2,686	3,241	3,234	4,714	26,473

* Individual company counts for 1998 only include patents issued prior to October 31, 1998. Total U.S. patents reported for 1998 includes the entire year.

** Total U.S. patents refers to all patents issued by the U.S. Patent and Trademark Office, not just those received by the companies listed in this table.

Source: Data gathered from U.S. Patent and Trademark Office web site (http://www.uspto.gov). Year refers to patent issue date.

Intel faces some risk that it will be sued for patent infringement. A company suing Intel for patent infringement can be expected to ask the court for an injunction forcing Intel to stop shipping its microprocessors; both Intergraph and Digital sought such injunctions. Once Intel has invested billions of dollars in R&D and in a fabrication facility designed to make its latest chips, the losses Intel would suffer, were it forced to shut down production, would be staggering. In this very real sense, a type of "judo economics" is at work in the industry: The larger are a company's revenues, the more vulnerable is that company to a patent infringement lawsuit, other things equal.

If the classical view of patents applied, this would be a minor problem. Intel would merely refrain from copying patented technology, and it could avoid the risk of a devastating injunction against its flagship products. In the presence of the patent thicket, however, it is much harder for Intel to avoid this risk. A single microprocessor can potentially infringe on hundreds if not thousands of patents, many of which were not yet issued, and thus were invisible to Intel, when Intel was designing that microprocessor. Since many companies are working on similar aspects of semiconductor technology in parallel, and since patent applications are secret, it is common for one company to obtain a patent on a process or design element that was simultaneously developed and used by another company. The combination of simultaneous discovery, secrecy of patent applications, lags in the issuing of patents, a patent office that is generous to patent applicants, and the presumption of validity afforded to patents creates a potent mix.

F. M. Scherer stressed the danger of hold-up in his testimony at the FTC's Hearings on Global Innovation-Based Competition in 1995:

> Smaller firms, and even some rather large firms trying to develop a new product, are essentially finding themselves in a situation just like walking through a mine field: There are lots of unexploded patents out there, and you might just step on one and have your corporate leg blown off. . . . I find it a rather scary situation, to be honest. (see www.ftc.gov/opp/global/GC112995.htm)

Clearly, some patent holders will be in a position to engage in opportunistic behavior relative to Intel. Intel is keenly aware of the dangers of hold-up and attempts to manage those risks, in part by entering into broad cross-licenses with others in the industry, such as IBM. Under these cross-licenses, each company can design and produce its products without fear of infringing on the other's patents. These licenses thus afford "design freedom," but not the freedom to copy. The rapid pace of technological advance in the industry in the presence of many such cross-licenses attests to their pro-competitive nature. As Hall and Ziedonis (2001) note, semiconductor companies seek patents in large part to be in a better position to negotiate these cross-licenses.

While cross-licenses between major players in the industry have proven effective, they are not as well suited to situations where the revenues at risk

on the two sides are sharply different. When cross-licenses are negotiated, each side makes the case that its patent portfolio is strong and that the other side is earning substantial revenue (and profits) selling products that infringe these patents. When one side has few or no revenues at risk, that party gains an advantage in bargaining. For this reason, patent infringement actions brought by industry outsiders, or by firms with small market shares, can be the most difficult to resolve through cross-licensing. Texas Instruments is widely seen as having decided to exploit its patents to earn licensing revenues after its business took a turn for the worse (Grindley and Teece 1997). The extreme case of this tactic occurs when a firm that holds patents, but engages in no design or manufacturing activities, brings suit against a major industry player. For example, TechSearch sued Intel in 1998 asserting that Intel's Pentium chips infringed patents owned by TechSearch.[6]

INTEL'S CONDUCT DURING INTELLECTUAL PROPERTY DISPUTES

The facts surrounding the episodes giving rise to the FTC's case are relatively simple and for the most part undisputed.[7] For this reason, the FTC's case was largely about the proper legal and economic standard for conduct by a dominant firm, not a messy dispute over the facts, which makes the case especially attractive from the perspective of the antitrust economist.

Intergraph Corporation

The basic facts of the Intergraph dispute were described above. Some additional detail is useful, however, to understand better just how the dispute arose between Intergraph and Intel.

In 1987, Intergraph acquired the "Clipper" microprocessor technology from Fairchild Industries. Until 1993, Intergraph developed this technology for use in Intergraph's computer systems. Beginning in 1993, Intergraph gradually shifted from using the Clipper technology to building workstations and servers based on Intel's Pentium microprocessor architecture. By 1996, all of Intergraph's hardware sales were Intel-based systems.

In 1997, Intergraph informed a number of makers of computer systems (original equipment manufacturers, or OEMs) that they were allegedly in-

[6]TechSearch engages in no R&D, design, or manufacturing activities; rather, it buys patents and attempts to maximize their value. TechSearch acquired the patents it asserted against Intel from International Meta Systems (IMS), which had attempted (but failed) to develop a chip that was compatible with Intel microprocessors. In 1994, IMS filed a patent for a Reduced Instruction Set Computer (RISC) that could read Intel instructions; the patent was granted in 1996. Intel's spokesman has been quoted as saying about TechSearch: "This company exists solely for the purpose of purchasing patents and extorting funds from another company" (Takahashi 1999).

[7]The basic fact patterns below are taken largely from the FTC's complaint against Intel; see http://www.ftc.gov/os/1998/9806/intelfin.cmp.htm.

fringing certain Intergraph patents. These OEMs requested indemnification from Intel because the alleged infringement was based on these OEMs' use of Intel's microprocessors. Following these OEM requests, Intel sought to negotiate a cross-license with Intergraph. After the two companies were unable to reach agreement on the terms of a cross-license, Intel exercised its right under nondisclosure agreements (NDAs) with Intergraph to seek the return of intellectual property previously disclosed by Intel to Intergraph in the form of trade secrets and advance samples of unannounced products. Following indications that Intergraph was willing to negotiate with Intel, Intel withdrew this request for the return of its intellectual property and renewed its effort to obtain a cross-license with Intergraph. In November 1997, Intergraph filed a patent infringement suit against Intel in Federal District Court in Alabama.[8] In response to Intergraph's lawsuit, Intel demanded the return of its intellectual property from Intergraph. In April 1998, the court handling the private action between Intergraph and Intel issued a preliminary injunction requiring Intel to provide Intergraph with advance product information, advance samples, and production microprocessors on terms available to certain other large Intel customers.

According to the FTC's Complaint, "Intel cut off Intergraph's access to any of the Intel technical information necessary to continue developing in a timely and efficient manner new computer systems incorporating new Intel microprocessors" (FTC Complaint, p. 29). In particular, the FTC Complaint states that Intel: "cut off technical information that Intergraph needed in order to design systems based on Intel's newest chips"; "demanded return of microprocessor prototypes and refused to supply additional prototypes"; "failed to inform Intergraph of a bug Intel had previously discovered in an Intel chip that Intergraph was purchasing"; "acted to create uncertainty about Intergraph's future source of supply of Intel microprocessors"; and "otherwise engaged in conduct to create a perception in the computer industry that Intergraph was no longer capable of bringing to market in a timely manner new computer system products that incorporate Intel's latest microprocessor technology" (FTC Complaint, p. 29).

Compaq Computer Corporation

Compaq Computer Corporation ("Compaq") was the largest manufacturer of personal computers in the world during the mid-1990s. Compaq's 1997 revenues were $24.6 billion. The majority of Compaq's revenues during this time period were based on sales of Intel-based computers. Compaq was Intel's largest customer in 1997, purchasing more than $2 billion worth of Intel microprocessors. As stated in the FTC Complaint Counsels' Pretrial

[8]This private action, *Intergraph Corporation* v. *Intel Corporation*, 3 F. Supp. 2d 1255 (Northern District of Alabama), eventually led to an important ruling by the Court of Appeals for the Federal Circuit. The Intergraph case is discussed towards the end of this case study.

Brief (p. 36): "By manufacturing complementary components such as chipsets and motherboards, Compaq seeks to add value to its products—more features, greater reliability, and lower production costs." However, the FTC states that "Compaq's strategy of differentiating its computer systems came into conflict with Intel's strategy for expediting the adoption of new Intel microprocessors by the largest number of OEMs." More specifically:

> In 1994, Intel accelerated the expansion of its business from microprocessors into the systems area. Intel began to manufacture and sell chipsets and motherboards, and in some cases complete computer systems. It did so in order to provide OEMs with a vehicle for launching new generations of Intel microprocessors. By providing OEMs with a complete set of the building blocks needed to design Intel-based systems, Intel can speed the dissemination of each new generation of microprocessors. Intel's increased activity in the systems area heightened the risk that Intel would bump up against Compaq's portfolio of system-level patents. (Complaint Counsels' Pretrial Brief, p. 37)

As this quote reveals, the FTC recognized that Intel's strategy of selling chipsets and motherboards—*complements* to Intel's microprocessors—was designed to increase the sales of Intel's microprocessors, clearly a procompetitive goal.

In November 1994, Compaq sued Packard Bell (another PC maker) for using patented Compaq technology in Packard Bell computer systems. Since the allegedly infringing technology was part of Intel-supplied motherboards, Packard Bell requested indemnification from Intel. In May 1995, Intel formally intervened in the suit between Compaq and Packard Bell. Intel then stopped supplying Compaq with access to its trade secrets regarding Intel's Pentium II and Merced microprocessors, both of which were then in the design stage. Intel did not cut off the flow of all confidential information, and it did not demand the return of all Intel confidential information held by Compaq. Intel and Compaq executed a cross-license in January 1996, which ended the dispute between the two companies.

The FTC alleged that Intel's conduct "had a significant adverse effect on Compaq's ability to develop and bring to market in a timely manner computer systems based on Intel microprocessors, and would have posed an even more significant long-term threat to Compaq's business if Compaq had not agreed to license its technology to Intel" (FTC Complaint, p. 37). Intel asserted that Compaq was not in fact delayed in introducing the products to which the trade secrets withheld by Intel related.

Digital Equipment Corporation

Digital Equipment Corporation ("Digital") also designs and sells computer systems that incorporate Intel microprocessors. In 1997, Digital's sales of Intel-based systems accounted for roughly $2 billion of Digital's $14 bil-

lion of revenues. Digital purchased about $250 million worth of Intel microprocessors in 1997.

Unlike Intergraph and Compaq, Digital designed, developed, manufactured, marketed, and sold its own microprocessor products under the trade name "Alpha." Digital's Alpha microprocessors made relatively few sales, but they achieved a high level of performance during the mid- to late-1990s. As the FTC noted:

> Alpha has been able to garner only a small share of the microprocessor market, in significant part because software developers have generally not created Alpha versions of their Windows NT applications. In network industries parlance, Alpha has been unable to generate the "positive feedback" necessary to establish itself as a standard architecture. (Complaint Counsels' Pretrial Brief, p. 32)

Although not Intel's primary competitor, the Alpha microprocessor was one of the rivals of the new IA-64 microprocessors under development at Intel, including the "Merced" microprocessor, since introduced as Intel's high-end Itanium chip.

In May 1997, Digital sued Intel, alleging that Intel's Pentium processors infringed ten of Digital's patents. According to the FTC, "Intel responded to Digital's lawsuit by publicly denying Digital access to any of the Intel technical information needed to continue developing in a timely and efficient manner new computer systems incorporating new Intel microprocessors" (FTC Complaint, p. 19). As in the Intergraph case, Intel exercised its rights under its NDA with Digital, demanding that Digital return Intel's technical information and prototypes.

In November 1997, Intel and Digital settled their dispute. This settlement had three key components. First, the two companies entered into a cross-license, giving each company a license to the other's patents. Second, Intel purchased an underutilized chip fabrication facility from Digital at book value, arguably well above its market value. Third, Intel granted favorable pricing to Digital for future purchases of Intel microprocessors. Intel also assured Digital a continued supply of Alpha chips from the chip fabrication plant that Intel was acquiring.

The FTC investigated Digital's settlement with Intel separately, because the settlement involved the acquisition by Intel of a Digital fabrication facility. The FTC's basic concern with the *settlement itself* was that Digital would become dependent upon Intel for making Digital's Alpha chips, and thus that Digital would become a less effective or less independent competitor to Intel as a result of their settlement. The FTC resolved these concerns by entering into a consent order with Digital in April 1998 to ensure that Digital would retain sources for the design and production of Alpha chips that were independent of Intel.[9] Subsequent events have shown

[9]The consent order was announced on April 23, 1998; see www.ftc.gov/opa/1998/9804/digital.

that Digital's Alpha microprocessor was not in fact an especially attractive product in the microprocessor market. Compaq later acquired Digital and phased out the Alpha microprocessor, which never attracted a large base of customers.

The FTC's approval of the Digital/Intel settlement did not, however, end Intel's entanglements with the FTC. To the contrary: partly as a result of its inquiry into the Digital/Intel settlement, the FTC's attention became focused on the tactics that Intel had used in its negotiations with Digital. The FTC's approval of the Digital/Intel *settlement* did not imply the FTC's approval of the *tactics* used by Intel in reaching that settlement. Instead, finding that Intel had employed similar tactics in prior disputes with Intergraph and Compaq, the FTC decided to bring an antitrust case against Intel for its conduct in these three episodes.

THE FTC's THEORY

Although some within the FTC felt that Intel's conduct was clearly "unfair," the FTC fashioned a complaint against Intel that contained the standard elements of a Sherman Act monopolization case: monopoly power in a relevant antitrust market combined with anticompetitive conduct to fortify that monopoly.[10]

Intel Had Monopoly Power

Since the FTC's case was based on the claim that Intel's conduct constituted monopolization, the FTC needed first to show that Intel had monopoly power in some well-defined relevant antitrust market. The FTC alleged that Intel had monopoly power in the market for general-purpose microprocessors.

The FTC supported this proposition by stating that "sales of Intel microprocessor products have accounted for approximately 80 percent of the total dollar sales of general-purpose microprocessors worldwide for each of the last five years" (FTC Complaint, p. 6). The FTC also described the entry barriers into the microprocessor market. The FTC listed sunk-cost investment and long development times, economies of scale, network effects, intellectual property rights, and reputational barriers as barriers to entry.

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htm. For the FTC's complaint in the Digital/Intel matter, see www.ftc.gov/os/1998/9804/9810040.cmp.htm. The consent order itself can be found at www.ftc.gov/os/1998/9804/9810040.agr.htm. The FTC's analysis to aid public comment is available at www.ftc.gov/os/1998/9804/9810040.ana.htm.

[10]The most complete description of the FTC's case available to the public is Complaint Counsels' Pre-Trial Brief [Public Version], filed February 25, 1999; see http://www.ftc.gov/alj/D9288/990225ccpb.pdf. There the FTC states "Sherman Act standards are the logical starting point in the analysis of unfair conduct" (p. 4).

Intel's Conduct Harmed Competition

Next, the FTC claimed that Intel's conduct harmed competition in Intel's monopoly market, namely the market for general-purpose microprocessors. But how could Intel's conduct have an adverse impact on competition in the market for general-purpose microprocessors, where Intel's most direct competitor was Advanced Micro Devices (AMD), who was not a customer of Intel and not subject to the tactics at issue? The FTC Complaint (p. 39) stated:

> Because patent rights are an important means of promoting innovation, Intel's coercive tactics to force customers to license away such rights diminishes the incentives of any firm dependent on Intel to develop microprocessor-related technologies. Because most firms who own or are developing such technologies are vulnerable to retaliation from Intel, the natural and probable effect of Intel's conduct is to diminish the incentives of the industry to develop new and improved microprocessor and related technologies. Consequently, Intel's conduct entrenches its monopoly power in the current generation of general-purpose microprocessors and reduces competition to develop new microprocessor technology and future generations of microprocessor products.

This was the essence of the FTC's complaint: That the "natural and probable effect of Intel's conduct" would be to discourage "the industry" from developing "microprocessor-related technologies" and thereby entrench Intel's monopoly power. Notice that the FTC's theory was based on the proposition that "most firms who own or are developing such technologies are vulnerable to retaliation from Intel." This proposition will be tested below.

At the time that the FTC issued its complaint against Intel, its press release further articulated the FTC's theory of harm to competition:

> Innovation is critical to economic progress, and patents play a crucial role in encouraging that innovation. Intel's great contributions to this country's economic growth have been encouraged and protected by patents in the design and manufacturing processes for its semiconductor products. But if Intel can use its monopoly position in the market for microprocessors to prevent other firms from enforcing their own patents, other firms will have little incentive to invent new features to challenge Intel's dominance. As a monopolist, Intel can compete by producing better, cheaper and more attractive products. It cannot act to cement its monopoly power by preventing other firms from challenging its dominance. Intel has acted illegally. It has used its monopoly power to impede innovation and stifle competition.[11]

[11]FTC Press Release, June 8, 1998, "Intel Abuses its Monopoly Power in Violation of Federal Law: Agency Charges World's Largest Microprocessor Manufacturer Cut Off Customers and Competitors in Order to Stifle Competition and Impede Innovation." See http://www.ftc.gov/opa/1998/9806/intelc.htm.

In short, the FTC saw Intel's conduct as a form of expropriation of the patent rights of others through "coercion." If Digital could not protect its innovations from copying by Intel, the FTC argued, Digital would have less incentive to innovate in the future. Similarly, the FTC argued that OEMs such as Compaq and Intergraph might use their own "microprocessor-related" innovations to help sponsor competition by an Intel rival, but such sponsorship would be less attractive if other OEMs using Intel's chips could match these same innovations.

Intel's Conduct Had No Efficiency Basis

Under the antitrust laws, even a dominant firm that has acted in a manner that excludes competitors can defend itself by showing that its conduct served a legitimate business purpose. The FTC asserted that Intel's conduct, in each of the three disputes described above, "was not reasonably necessary to serve any legitimate, procompetitive purpose."[12]

In fact, the FTC went even further, inferring *anticompetitive* intent from Intel's actions. Specifically, the FTC took the view that Intel sacrificed short-term profits by disrupting its relationships with valuable customers, and doing so could only have been profitable because Intel stood to benefit over the longer run by protecting its monopoly.

INTEL'S RESPONSE TO THE FTC's THEORY

Intel had a radically different view than the FTC on all of these issues.[13]

Competition Faced by Intel

Intel argued that it lacked monopoly power over microprocessors. Intel emphasized two aspects of the microprocessor market. First, the price reductions and performance improvements for microprocessors have been simply extraordinary. Moore's Law, which states that microprocessor performance doubles roughly every eighteen months, has been operating for some twenty years. One is hard-pressed to find a market where consumers have experienced greater improvements in performance, and reductions in price, over such a sustained period of time. Intel, a great manufacturer, has continually pushed prices down and introduced dramatically faster and faster chips. Intel questioned whether this is the behavior of a monopolist.

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[12]FTC Complaint, p. 30 (Intergraph), p. 36 (Compaq), p. 20 (Digital).

[13]The most complete description of Intel's position available to the public is Respondent Intel's Trial Brief [Public Version], filed February 25, 1999; see http://www.ftc.gov/alj/D9288/intelbrief.pdf.

Second, there have been regular price wars and market-share skirmishes between Intel and its most direct rival, Advanced Micro Devices (AMD). Here is one rendition from a *New York Times* article (Fisher 1999) reporting the price war that broke out between Intel and AMD just one month before the FTC was set to go to trial against Intel:

> Anyone who has watched the semiconductor industry for a while has seen this chain of events play out time and time again. Intel brings out a new generation of microprocessor; Advanced Micro rushes to offer a compatible product but manufacturing glitches keep volume low. Then, when Advanced Micro catches up and is ready to ship increased quantities, Intel cuts prices and prepares for the next generation of products.

In short, Intel argued that it was an aggressive and successful competitor in a market that was generating enormous benefits to consumers.

Although Intel disputed the FTC's assertion that Intel had monopoly power in the market for general-purpose microprocessors, the analysis below of Intel's conduct assumes that Intel indeed had such power.[14] In the context of the disputes described above, this assumption implies that Intergraph, Compaq, and Digital had limited ability to replace Intel's microprocessors with microprocessors from other suppliers. The analysis below further assumes, as alleged by the FTC, that Intel's refusal to provide trade secrets and advance product samples imposed substantial costs on Intergraph, Compaq, and Digital.[15]

Intel's "IP for IP" Policy

Intel also had an entirely different perspective than the FTC regarding the rationale behind its conduct and the competitive effects of the tactics it used when faced with patent infringement lawsuits by Intergraph, Compaq, and Digital. From Intel's perspective, the episodes with Intergraph, Compaq, and Digital were just three of many instances in which Intel had to deal with the exploding number of patents in the semiconductor industry and the ever-present danger of being held-up by patent holders acting opportunistically.

Keenly aware of the patent thicket, Intel had developed a policy of "IP for IP." Under this policy, Intel would use its intellectual property rights to negotiate cross-licenses and to defend itself if sued for infringement. The FTC's case was a direct attack on Intel's "IP for IP" policy. From Intel's perspective, the FTC wanted Intel to disarm unilaterally by continuing to

[14]The author's assignment in the litigation was to analyze the effects of Intel's conduct under the assumption that Intel had monopoly power, as alleged by the FTC.

[15]This proposition does not follow from the assumption that Intel had monopoly power, since Intel never refused to sell its microprocessors to these companies.

provide trade secrets and other valuable IP to companies that were asserting their IP against Intel.

Intel believed that its policy of "IP for IP" was a natural—and legal—way to use its valuable intellectual property to gain design freedom so that it could make the very best chips, to reduce its payments of royalties, and to limit its exposure to hold-up. While far from perfect as a defense—Intel was still at a strategic disadvantage by virtue of its enormous microprocessor revenues—this policy helped Intel be a more effective competitor without involving the offensive use of Intel's patents. In other words, Intel saw its policy of "IP for IP" as appropriate in the context of the wave of defensive patenting, and in the presence of the patent thicket in its industry. Intel's documents and the testimony of Intel's executives consistently supported this view that Intel's policy of "IP for IP" was a defensive strategy to deal with the patent thicket and was not designed to deter other industry members from engaging in innovation.

In contrast, the FTC's position was that Intel had no legitimate business justification for its actions. As noted above, the FTC took the position that Intel had previously benefited from offering technical assistance and confidential information to Intergraph, Compaq, and Digital, so Intel's decision to restrict or reduce the supply of confidential information and technical support to these companies was unjustified:

> From Intel's perspective, this aggressive strategy directed against its customers made sense because its objective was the preservation of its monopoly, and it was willing to reduce its short-run profits to do so (Complaint Counsels' Pretrial Brief, p.2).

> By terminating Intergraph's, Digital's, and Compaq's access to product information and samples, Intel gave up the benefits it obtained from the cooperative relationship it had previously enjoyed with each company. . . . *Aspen* teaches that the sacrifice of short term benefits is evidence of anticompetitive purpose and nature. (Complaint Counsels' Pretrial Brief, pp. 46–47)

The central economic issue here is not especially complex. Let us suppose that Intel's tactics had the purpose and effect of allowing Intel to negotiate more favorable terms for cross-licenses with Intergraph, Compaq, and Digital than Intel could have obtained had it continued to provide its trade secrets and advance product samples to those companies. In other words, suppose that Intel's tactics allowed Intel to lower its royalty costs and perhaps improve the quality of its chips by achieving greater design freedom. Are these "legitimate business justifications"?

The ability to achieve lower costs and improved product quality is the essence of "competition on the merits." Intel's efforts to reduce its royalty costs and to achieve greater design freedom by bargaining using its own intellectual property should at the very least count as a pro-competitive bene-

fits, against which any anti-competitive effects should be balanced. In short, there is no economic basis for the FTC's position that Intel's attempt to lower its costs and to obtain design freedom should not count as a "legitimate business objective."

This conclusion is strengthened by knowledge of the perils facing Intel and other companies that are vulnerable to hold-up as a result of the patent thicket. Recall that both Intergraph and Digital sought injunctive relief to enjoin Intel from selling its flagship microprocessor products, while Compaq sought to enjoin Intel's sales of motherboards. As noted earlier, once Intel has sunk substantial costs in the design and production of its microprocessors, Intel may be subject to hold-up by patent holders whose actual contributions fall far short of the royalties they can extract from Intel. In fact, Intergraph fit the hold-up pattern quite well: Intergraph had already exited the microprocessor business and was trying to mine older patents. The Digital situation also fits the hold-up pattern: Digital's Alpha microprocessor had not been selling well, Digital appeared to be trying to make a graceful exit strategy, and Digital gained considerable financial benefits from its settlement with Intel, as described above.

The FTC's theory seemed especially strained in the cases of Compaq and Intergraph, which were simply not microprocessor rivals of Intel. The FTC did manage to construct a theory of how Intel's conduct towards Compaq and Intergraph could harm competition in the microprocessor market, but a far simpler explanation of Intel's conduct fit the facts very well: Intel was using its own IP as a bargaining chip in negotiations with others who were asserting their IP against Intel.

The FTC's "no business justification" position (a) did not seem to reflect accurately the role of patents in the semiconductor industry, especially the patent thicket; (b) gave little or no weight to the necessity and pro-competitive effects in this industry of cross-licenses that enable design freedom and reduce royalty payments, and (c) appeared to discount the very real danger of "hold-up" faced by Intel and other semiconductor manufacturers.

The Effect of Intel's Conduct on Microprocessor Competition

Intel also hotly disputed the FTC's claim that Intel's conduct had harmed competition in the microprocessor market.

The FTC asserted that "Intel's conduct preserved its monopoly by guaranteeing Intel's access to innovative technology" (Complaint Counsels' Pretrial Brief, p. 42). In other words, by insuring that it could offer the most advanced microprocessors, the FTC stated that Intel's monopoly position would be preserved. This notion—that it is anti-competitive for a monopolist to use its monopoly power to negotiate for better or cheaper inputs and thus to improve its product—is misguided. True, such cost reductions and product improvements will make it harder for others to topple the monopoly; but lower costs and higher quality are the essence of competition

and should be encouraged. Exchanging one's own intellectual property to lower royalty costs and to help gain the necessary IP rights to make improvements is therefore also pro-competitive.

The FTC also asserted that "Deterring innovation was another means for Intel to preserve its monopoly." "The evidence will show that the ability of Intel to force licenses to the technology it desires will, over time, dull the incentive of other firms to innovate" (Complaint Counsels' Pretrial Brief, pp. 43–44). Here we have a coherent theory that can in principle be tested: Did Intel's conduct induce Intel's microprocessor rivals to reduce their innovative effects? The FTC's theory of harm to innovation failed to hold up to empirical testing.

The starting point for testing the FTC's theory is the identification of Intel's primary microprocessor rivals. As noted above, the most direct rival was AMD. Other companies with the capability to engage in microprocessor innovation included IBM, Sun, Hewlett-Packard, Digital, Samsung, Motorola, Silicon Graphics, Texas Instruments, Toshiba, and Hitachi.[16] We can sharpen the test of the FTC's theory by asking the following question: Did Intel's conduct induce these companies, who have the capability to engage in microprocessor innovation, to reduce their innovative efforts?

Observe that two conditions must hold for the FTC's theory even to get off the ground with respect to a specific microprocessor company: (1) the company in question must be a customer of Intel that receives Intel's trade secrets and advance product samples; and (2) the company must *not* have a cross-license with Intel, or else it would already have licensed its patents to Intel in return for a license to Intel's patents.[17] In fact, none of Intel's competitors identified by the FTC met these two conditions. AMD and Sun, for example, do not purchase microprocessors from Intel; and IBM, for example, has a cross-license with Intel (Intel's Trial Brief, pp. 28–29).

Despite this formidable obstacle, the FTC attempted to prove that Intel's conduct "chilled" innovation activity. But the evidence obtained during the discovery process simply did not support the "chill" theory. One after another, the major innovators in the microprocessor field, including IBM, Sun, Hewlett-Packard, and Digital, testified that their R&D efforts were *not* affected adversely by the Intel conduct at issue (Intel's Trial Brief, p. 5). The FTC acknowledged that it had no evidence linking Intel's conduct to R&D decision making at AMD, National Semiconductor (Cyrix), IBM, Sun, Hewlett-Packard, Samsung, Silicon Graphics, NEC Electronics, or several smaller companies, which together with Intel and Digital comprised all companies identified by the FTC as microprocessor innovators

[16]Recall that the analysis here assumes that Intel has monopoly power. Therefore, this list of rivals is best thought of as the list of firms that are best placed to engage in innovation that will erode Intel's monopoly power.

[17]It is theoretically possible that the future innovation incentives of a company that has signed a cross-license with Intel could be affected by Intel's conduct, since these cross-licensees have finite duration.

(Intel's Trial Brief, p. 13). The evidence was especially strong that Digital's innovation had not been adversely affected by Intel's conduct.[18]

The FTC was forced to take the position that the harm to innovation would take place gradually, and could simply not be detected yet, despite the fact that Intel had been following its policy of IP for IP for some time. As the FTC's economic expert stated, the consequences of Intel's actions would "unravel over a period of probably ten or so years, and it's just too early to assess those consequences" (Intel's Trial Brief, p. 29).

SETTLEMENT AND CONSENT ORDER

Following the FTC's procedures, the FTC action against Intel went before an administrative law judge (ALJ) at the FTC. Once the FTC's complaint was issued in June 1998, a docket was opened with the ALJ presiding. The actual hearing before the ALJ was scheduled to begin in March 1999. The FTC and Intel announced a settlement of their dispute on March 8, 1999.[19] Under the consent order negotiated by the FTC and Intel,[20] Intel agreed to continue to provide its trade secrets and advance product samples to customers that were suing Intel for patent infringement, with one significant exception: Intel would have such an obligation only if the customer agreed not to seek an injunction against Intel's manufacture and sale of its microprocessors. According to the FTC's Analysis to Aid Public Comment,[21] this exception

> strikes an appropriate balance, on a prospective basis, between the interests of Intel and its customers. If a customer chooses to seek an injunction against Intel's microprocessors, it cannot, under the provisions of this Order, be assured of continuing to receive advance technical information about the very same microprocessors that it is attempting to enjoin. If an

[18]Digital's Chairman, Robert Palmer, "testified that the company did not cancel, curtail, delay, defer, scale back, reduce, or otherwise limit any research and development related to microprocessors as a result of Intel's conduct" (Intel's Trial Brief, p. 12). Palmer also testified that Digital's settlement with Intel had left the Alpha microprocessor in a stronger position to compete than it had been prior to the dispute with Intel, and that Digital's ability and incentive to advance Alpha technology had increased as a result of the settlement with Intel (Intel's Trial Brief, p. 13). William Strecker, Digital Chief Technology Officer prior to Compaq's acquisition of Digital, testified that Intel's conduct had no effect on R&D related to the Alpha microprocessor. (Intel's Trial Brief, p. 13) Digital in fact signed a long-term cross-license with Intel. Even if Digital had received a higher lump-sum payment from Intel in the absence of Intel's tactics, this would have no effect on Digital's incentives to innovate during the long term of the cross license. Alternatively, if Digital had received running royalties, we would expect Intel's prices to be higher, harming consumers.

[19]For the FTC Press Release announcing the settlement, see http://www.ftc.gov/opa/1999/9903/intelcom.htm.

[20]The Consent Order can be found at http://www.ftc.gov/os/1999/9903/d09288intelagreement.htm.

[21]See http://www.ftc.gov/os/1999/9903/d09288intelanalysis.htm.

> Intel customer nevertheless wishes to seek injunctive relief against Intel's manufacture, use, sale, offer to sell or importation, it remains free to do so, but without the protections in this Order. In all other circumstances, Intel is required to continue supplying technical information and product under the Proposed Order.

The beauty of this compromise is that it met the essential needs of both the FTC and of Intel. In particular, the FTC obtained some protections for customers suing Intel for patent infringement, under the theory that customers' ability to bring such lawsuits would serve to encourage their innovative efforts. From Intel's perspective, the settlement ended the FTC case against Intel and allowed Intel to bring its own intellectual property rights to bear in negotiations if the other party were seeking an injunction against Intel's microprocessors, the very type of hold-up that was of greatest concern to Intel. Both the FTC and Intel expressed satisfaction with the settlement, although Intel continued to assert that its conduct had not violated antitrust laws.

SUBSEQUENT DEVELOPMENTS

Although it had settled with the FTC, Intel's litigation with Intergraph continued. Recall that Intergraph had obtained a preliminary injunction from a federal district court requiring Intel to continue to provide it with trade secrets and advance samples. Intel had appealed this injunction to the Court of Appeals for the Federal Circuit (CAFC), the appeals court that specializes in intellectual property disputes.

In a major decision issued in November 1999, the CAFC ruled in Intel's favor.[22] The Court strongly supported Intel's view of its rights as a holder of intellectual property and of the limitations of Intergraph's antitrust case against Intel. In particular, the CAFC emphasized that Intergraph was not a competitor of Intel in the market in which Intel was alleged to have a monopoly, namely the microprocessor market. Citing substantial precedent, and relying on the fact that Intergraph and Intel were in a customer/supplier relationship instead of a competitive relationship, the CAFC could find no likelihood that Intel's conduct, even if it harmed Intergraph, violated the Sherman Act.[23] Here are three key quotes from the CAFC decision:

> However, the Sherman Act does not convert all harsh commercial actions into antitrust violations. Unilateral conduct that may adversely affect another's business situation, but is not intended to monopolize that business,

[22] *Intel Corp.* v. *Intergraph Corp.*, 195 F. 3d 1346 (1999).

[23] On remand, the District Court dismissed Intergraph's antitrust case against Intel in March 2000.

> does not violate the Sherman Act. . . . Intel's conduct with respect to Intergraph does not constitute the offense of monopolization or the threat thereof in any market relevant to competition with Intergraph. (*Intel* v. *Intergraph,* 494 F. 3d 1346, 1354-5, 1356)
>
> Intergraph provided no support for its charge that Intel's action in withholding "strategic customer" benefits from Intergraph was for the purpose of enhancing Intel's competitive position. . . . No threat or actual monopolization is asserted to flow from the various rejected patent license proposals. Commercial negotiations to trade patent property rights for other consideration in order to settle a patent dispute is neither tying nor coercive reciprocity in violation of the Sherman Act. Although the district court calls Intel's actions "hardball," it is not the judicial role to readjust the risks in high-stakes commercial dealings. (*Intel* v. *Intergraph,* 494 F. 3d 1346, 1359)
>
> Despite the district court's sensitive concern for Intergraph's well-being while it conducts its patent suit against Intel, there must be an adverse effect on competition in order to bring an antitrust remedy to bear. The remedy of compulsory disclosure of proprietary information and provision of pre-production chips and other commercial and intellectual property is a dramatic remedy for antitrust illegality, and requires violation of antitrust law or the likelihood that such violation would be established. In the proceedings whose record is before us, Intergraph has not shown a substantial likelihood of success in establishing that Intel violated the antitrust laws in its actions with respect to Intergraph, or that Intel agreed by contract to provide the benefits contained in the injunction. (*Intel* v. *Intergraph,* 494 F. 3d 1346, 1367)

Intel's perspective also has gained ground at the Federal Trade Commission. The current Chairman of the FTC, Timothy Muris, has in the past been quite explicit in his criticism of the approach taken by the previous Commission leadership to monopolizations cases, including the Intel case:[24]

> FTC officials have pronounced their view regarding monopolization in court papers, speeches, and articles. The agency appears to believe that in monopolization cases government proof of anticompetitive effects is unnecessary. . . . In this article, I intend to demonstrate that the FTC's position on this issue is wrong: wrong on the law, wrong on policy, and wrong on the facts. [footnotes omitted] (Muris 2000, p. 694)

The Intel case thus leaves us with a question that is central to the antitrust law and economics of monopolization cases: What must the govern-

[24]Muris explicitly identifies concerns about hold-up as an area where the FTC is "wrong on the facts": "In rejecting suits by Intel's customers as a justification for Intel's refusal to supply information, the FTC appears to have ignored the implication of the relational contracts literature discussed [above]" (Muris 2000, p. 717).

ment show in terms of competitive effects before a monopolist's conduct is branded anti-competitive and thus illegal under the Sherman Act? The FTC's case against Intel may prove to have been the high-water mark for those who would set a low hurdle of proof of anticompetitive effects for the government in monopolization cases and for those who would take a narrow view of what constitutes a "business justification" for conduct alleged by the Federal antitrust agencies to be anticompetitive.

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