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**STANDARDS, INTELLECTUAL PROPERTY DISCLOSURE, AND
PATENT ROYALTIES AFTER *RAMBUS***

Stanley M. Besen & Robert J. Levinson¹

The U.S. Federal Trade Commission found that Rambus, a developer of computer memory technologies, failed to disclose information about its intellectual property holdings to other participants in the Joint Electron Device Engineering Council (JEDEC), a private standard-setting organization, during the period in which JEDEC was developing Dynamic Random Access Memory (DRAM) standards. According to the Commission, this failure prevented JEDEC from considering the patent royalties that Rambus would charge in determining whether to incorporate its technology into the standard. The Commission also found that Rambus, once its technology had been selected and users were “locked-in” to that standard, exploited its market power by demanding high license fees. The Commission concluded that lock-in might have been prevented if all technology sponsors, including Rambus, had disclosed their intellectual property holdings and negotiated license fees before the adoption of the standard. In the wake of the FTC’s decision, the U.S. Department of Justice (DOJ) issued Business Review Letters in which it attempted to clarify the manner in which standard-setting organizations (SSOs) could take patent license fees into account in setting standards without incurring antitrust liability. Subsequently, however, the Court of Appeals for the D.C. Circuit struck down the FTC’s decision on the grounds that JEDEC’s disclosure rules were unclear, and that the FTC had failed to show that JEDEC would not have included the Rambus technology in its

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standard even if Rambus had disclosed its patent holdings. The U.S. Supreme Court recently denied the FTC's petition for review of the D.C. Circuit's decision. This article examines the logic of both the FTC's and the D.C. Circuit's decisions. It also explains why collective negotiations may be necessary to exploit fully ex ante competition among technology sponsors, explores the complications posed for collective negotiations by heterogeneity among technology users, and analyzes the effects of collective negotiations on the incentives of sponsors to develop technologies for inclusion in future standards. Finally, it examines the implications of the decision by the D.C. Circuit for the future behavior of participants in SSOs and for patent royalties for technologies that are included in standards.

I. INTRODUCTION

The U.S. Federal Trade Commission (FTC or Commission) and the courts have recently grappled with the question of whether members of private voluntary standard-setting organizations (SSOs) may conceal their intellectual property rights while participating in a standards-setting process. These decisions consider whether an SSO member can escape antitrust liability when: (1) such conduct leads other SSO members to believe that one or more of the firm's proprietary technologies are non-proprietary; (2) the SSO adopts that technology as part of an industry standard while under such a false impression, causing that technology to become "essential" from the perspective of industry participants; and (3) the IP holder subsequently exploits these outcomes by asserting its hitherto concealed IP rights by requiring firms that practice the standard to pay supracompetitive royalties.

In finding against Rambus, the FTC added the failure of SSO participants to disclose information concerning their ownership of intellectual property, and the exploitation of any resulting market power, to the list of "bad acts" by participants in SSOs that have been condemned by the courts and antitrust agencies.² The FTC's

² In re Rambus, Inc., Docket No. 9302 (Fed. Trade Comm'n, Aug. 2, 2006), available at <http://www.ftc.gov/os/adjpro/d9302/060802commissionopinion.pdf> [hereinafter "FTC Decision"]. Many of the same issues had been adjudicated

decision in *Rambus* also made clear that it is not necessarily anticompetitive for members of an SSO to consider patent license fees when choosing which technologies to include in a standard, although the Commission did not necessarily endorse collective negotiations of fees.

In the wake of the FTC's decision, the U.S. Department of Justice ("DOJ") considered, in Business Review Letters issued to two standards bodies, the VMEbus International Trade Association (VITA)³ and the Institute of Electrical and Electronics Engineers (IEEE),⁴ the related question of how an SSO can avoid running afoul of the antitrust laws when it takes patent license fees into account in setting standards. Subsequently, the U.S. Court of Appeals for District of Columbia Circuit overturned the FTC's decision.⁵ After the D.C. Circuit declined an FTC petition for a rehearing, the Commission petitioned the U.S. Supreme Court to review the judgment.⁶ The Supreme Court recently denied that petition.⁷

earlier in *Rambus Inc. v. Infineon Technologies AG*, 318 F.3d 1081 (Fed. Cir. 2003). In *Hynix Semiconductor Inc v. Rambus, Inc.*, a jury found that Rambus's conduct before JEDEC had not resulted in monopolization. See *Hynix Semiconductor Inc. et al v. Rambus Inc.*, 2008 WL 2951341 (N.D. Cal. 2008) (denying manufacturer's motion for a new trial). The Court entered final judgment on March 10, 2009 and Hynix entered a Motion for a Stay of Execution of Money Judgment on March 24, 2009. *Hynix Semiconductor, Inc. v. Rambus, Inc.*, 2009 U.S. Dist. LEXIS 18171 (N.D. Cal. 2009). A second case involving the same issues but later technologies has been stayed pending resolution of a conflict between the *Hynix* court and the court in *Micron Tech., Inc. v. Rambus Inc.*, 255 F.R.D.135, (D. Del. 2009) regarding spoliation of evidence. See *Hynix Semiconductor, Inc. v. Rambus Inc.*, 2009 WL 292205 (N.D. Cal. 2009). Earlier cases involving "bad acts" are discussed in Section III, below.

³ Letter from Thomas O. Barnett, Assistant Att'y Gen., to Robert A. Skitol, Esq. (Oct. 30, 2006) [hereinafter "VITA Business Review Letter"], available at <http://www.usdoj.gov/atr/public/busreview/219380.pdf>.

⁴ Letter from Thomas O. Barnett, Assistant Att'y Gen., to Michael A. Lindsay, Esq. (Apr. 30, 2007) [hereinafter "IEEE Business Review Letter"], available at <http://www.usdoj.gov/atr/public/busreview/222978.htm>.

⁵ *Rambus, Inc. v. Fed. Trade Comm'n*, 522 F.3d 456 (D.C. Cir. 2008), cert. denied, 129 S. Ct. 1318.

⁶ Petition for Writ of Certiorari, *Fed. Trade Comm'n v. Rambus, Inc.*, 129 S. Ct. 1318 (Nov. 24, 2008) (No. 08-694). See also Brief for Respondent-

This article explains why the FTC's decision in *Rambus* and the DOJ Business Review Letters held significant promise for improving the process in which SSOs choose standards. SSOs can mitigate the potential for opportunistic price increases by the owners of technologies that are embodied in standards if the SSOs are permitted to negotiate license fees *before* they commit to including technologies in the standards. However, such negotiations cannot occur when the ownership of the technologies in question are unknown to the SSO or to its members, or are (incorrectly) believed by them to be in the public domain. The FTC's decision in *Rambus* and the guidance provided by the DOJ Business Review Letters would have required intellectual property rights holders to disclose their ownership of candidate technologies. This would have created an environment in which SSOs could negotiate licensing arrangements with rights holders before deciding which technologies to incorporate into their standards.

The D.C. Circuit's decision in *Rambus* will likely reverse this progress. The decision substantially increases the burden—perhaps to an insurmountable degree—that SSOs will face in considering the licensing costs of the various technical alternatives among which they choose. As a result, license fees are likely to be higher than they would be if there was vigorous competition among potential licensors to have their technologies incorporated in a standard. More generally, the D.C. Circuit's decision is likely to increase the cost and complexity of the standard-setting process if SSOs are unable to rely on the representations of members concerning their intellectual property holdings.

Section II of this article sets the stage for the economic analysis of SSO license fee negotiations by summarizing the fundamental logic of the FTC's decision in *Rambus* and by placing that decision

Appellee, Fed. Trade Comm'n v. Rambus, Inc., 129 S. Ct. 1318 (Jan. 23, 2009) (No. 08-694), and Reply Brief for the Petitioner-Appellant, Fed. Trade Comm'n v. Rambus, Inc., __ S.Ct. __ (Feb. 4, 2009) (No. 08-694).

⁷ See Letter from William K. Suter, Clerk, Supreme Court of the United States, to Paul R.Q. Wolfson (Feb. 23, 2009) *available at* <http://investor.rambus.com/downloads/2009-02-23%20Letter%20from%20Supreme%20Court%20denying%20cert.pdf>.

in the context of related cases. This section also explains why the behavior condemned by the Commission—the failure of an SSO participant to disclose material information concerning its ownership of intellectual property while a standard is being set—may allow it to exploit its ownership of that intellectual property after the standard has been adopted. Such “hold-up” behavior can, if implemented successfully, enrich the rights holder at the expense of its licensees by enabling it to charge higher license fees than otherwise. To the extent that license fees affect the marginal cost of producing downstream products reliant on the standard, hold-up can also cause consumers to pay higher prices. Section III shows that the FTC’s decision in *Rambus* is consistent with a line of cases in which the behavior of participants in standards organizations has been found to be anticompetitive, usually on the grounds that the behavior violates certain procedural norms.

Section IV discusses the decision of the Court of Appeals for the D.C. Circuit in *Rambus*.⁸ We are sympathetic to the D.C. Circuit’s view that SSO rules must clearly define participants’ obligations to disclose their intellectual property holdings if there is to be a finding that a failure to disclose is anticompetitive.⁹ We are less sympathetic to the D.C. Circuit’s holding that, as a condition for imposing antitrust liability, an SSO must demonstrate that disclosure would necessarily have led it to adopt an alternative technology.¹⁰ Such a requirement is likely to place an insurmountable burden on SSOs and lead to excessive license fees for technologies that are included in standards. Moreover, by focusing only on the effect of non-disclosure on the choice of technology that is included in the standard, the decision ignores the fact that non-disclosure can harm consumers by raising license fees even if it does not affect the ultimate technology choice.

Section V provides an economic analysis of how the effects of the behavior for which *Rambus* was condemned may be ameliorated or avoided. In particular, when an SSO implements procedures that require intellectual property rights holders to

⁸ *Rambus v. Fed. Trade Comm’n*, 522 F.3d 456 (D.C. Cir. 2008).

⁹ *Id.* at 468.

¹⁰ *Id.* at 463-64.

disclose the extent and nature of their relevant holdings, the potential for anticompetitive hold-up can be reduced or eliminated, provided that these rights holders bargain with the SSO, or its members, over license fees before a standard is adopted.¹¹ This section also describes a number of instances in which proposed patent license fees were reduced during such negotiations.

Because joint consideration of prices or other business terms by a group of buyers can potentially raise concerns regarding competition, SSOs would naturally seek advice as to the permissibility of these discussions. Section VI explains how the DOJ Business Review Letters issued to two standards bodies, VITA and IEEE, attempted to specify the conditions under which an SSO can deal with the hold-up problem identified by the FTC in *Rambus* without subjecting itself to the antitrust liability that might arise if the members of an SSO jointly consider intellectual property royalties before it sets a standard. Although these Letters did not explicitly endorse collective fee negotiations, they did not explicitly reject them either.

Section VII analyzes the determination of license fees in a prototypical setting in which SSO members jointly take license fees into account during the standard-setting process. Section VIII discusses various concerns that may arise if license fees are determined collectively and explore how these concerns might be assuaged.

Section IX shows how the prototypical setting can be extended to allow for: (1) differences in the technical characteristics of competing technologies; (2) differences among users in the values

¹¹ Although we are very aware that standards usually rely on a number of essential technologies, for the sake of simplicity this paper focuses on a hypothetical situation in which an SSO's choice is limited to that among a number of competing technologies that perform the same function. Where a standard is based on multiple essential patents that are held by different entities, ex ante negotiations are likely to be even more complex than suggested here, particularly, since each individual intellectual property owner can be expected to ignore the fact that increases in its license fees adversely affect the demands faced by owners of complementary essential patents. We ignore this complication in order to emphasize that ex ante fee negotiations are critical even in a relatively simple setting.

that they place on the various technological alternatives; (3) the presence of users that are also sponsors of particular standards; (4) the effect of license fees on the incentives for developing new technologies; and (5) the uncertainty faced by technology sponsors both about the likelihood of winning a standards competition and future market developments. Section X provides a conclusion.

II. THE FTC'S *RAMBUS* DECISION

Rambus develops and licenses computer memory technologies¹² and participated as a member of the Joint Electron Device Engineering Council (JEDEC) during the period in which JEDEC was developing various DRAM standards.¹³ The FTC found that: (1) JEDEC required participants to disclose any intellectual property holdings that might be included in its standards; (2) Rambus failed to disclose such information and, indeed, had attempted to increase its holdings (while not disclosing relevant information about them) to conform more closely to the technologies that were being considered for inclusion in JEDEC standards; (3) alternatives existed to the Rambus technologies that were ultimately included in JEDEC's DRAM standards; (4) Rambus disclosed its intellectual property holdings only after users were "locked in" to the JEDEC standards; (5) JEDEC members could, and would, have negotiated "reasonable" license fees with Rambus for the use of its intellectual property or, if such "reasonable" fees could not have been agreed to, employed alternative technologies before lock-in to Rambus's technologies had occurred; and (6) Rambus's behavior was anticompetitive and resulted in excessive license fees.¹⁴

¹² FTC Decision, *supra* note 2, at 3.

¹³ *Id.* at 8.

¹⁴ *Id.* at 118–19. In response to these conclusions, Rambus contended: it was not obligated under either JEDEC rules or antitrust standards to disclose pending or future patent applications; its failure to disclose was justified by its need to protect trade secrets; it was no longer a member of JEDEC when the standards were adopted; JEDEC's members were aware of Rambus's patent holdings when the DDR2 SDRAM standard was adopted; and the Rambus technologies would have been included in the JEDEC standards even if Rambus had

A. *The Requirement of Disclosure*

The FTC found:

An SSO may elect to require disclosure of patent positions before standardization decisions are made, because this enables SSO participants to make their choices with more complete knowledge of the consequences—including the potential that those practicing the standard may be liable for patent infringement, unless they negotiate licenses and pay royalties. If the SSO members prefer a given technology, notwithstanding the prospect of royalties, they can vote to incorporate it into the standard. If, in light of likely royalty payments, members prefer an alternative technology, they can vote against inclusion of the patented technology.¹⁵

The Commission made clear, however, that it did not hold:

[T]hat all SSOs should require disclosure of relevant intellectual property If, however, an SSO does require such disclosures, then non-disclosure—followed by adoption of a standard incorporating the intellectual property, and royalty demands against those practicing the standard—may be considered a material omission and may constitute deceptive conduct under Section 5.¹⁶

The Commission reviewed what it entitled Rambus's "Chronology of Concealment."¹⁷ This Chronology included instances in which the FTC alleged that Rambus had been less than forthcoming about its patent holdings. Moreover, the Commission found that Rambus had used information obtained through its participation in JEDEC deliberations "by tailoring its patent claims to facilitate hold-up"¹⁸

Significantly, the FTC rejected the conclusion of its Administrative Law Judge that, because JEDEC's rules did not expressly require disclosure of patents and patent applications,

disclosed its patent interests. *See* Reply Brief for the Petitioner, Fed. Trade Comm'n v. Rambus, Inc., 129 S. Ct. 1318 (Feb. 4, 2009) (No. 08-694).

¹⁵ FTC Decision, *supra* note 2, at 35. Of course, SSOs cannot require disclosure by non-participants. We later consider the impact of a disclosure requirement on the incentives of intellectual property owners to participate in the activities of SSOs.

¹⁶ *Id.* at 34–35.

¹⁷ *Id.* at 37–48.

¹⁸ *Id.* at 67.

Rambus was not required to make such disclosure.¹⁹ Instead, the Commission found:

JEDEC's policies (fairly read) and practices, as well as the actions of JEDEC participants, provide a basis for the expectation that JEDEC's standard-setting activity would be conducted cooperatively and that members would not try to distort the process by acting deceptively with respect to the patents they possessed or expected to possess.²⁰

In short, the FTC found that, even in the absence of explicit rules requiring information disclosure, Rambus had a duty to disclose its patent holdings to other members of JEDEC, and that it had failed to do so.²¹

B. *The Significance of Competitive Alternatives*

The FTC also found that Rambus's behavior led to excessive license fees. The basis for this conclusion was the Commission's finding that, at the time the DRAM standards were being adopted by JEDEC, there existed technological alternatives for each of the Rambus technologies at issue.²² In particular, the Commission found:

¹⁹ A similar disagreement existed between the majority and the dissent in *Rambus Inc. v. Infineon Technologies AG*, 318 F.3d 1081 (Fed. Cir. 2003). The majority held: "JEDEC could have drafted a patent policy with a broader disclosure duty. It could have drafted a policy broad enough to capture a member's failed attempts to mine a disclosed specification for broader undisclosed claims. It could have. It simply did not." *Id.* at 1102. By contrast, the dissent held: "there is more than sufficient evidence upon which the jury could have concluded that Rambus had a duty to disclose pending and issued patents that might be involved in JEDEC's development of the SDRAM standard and that Rambus violated that duty." *Id.* at 1118.

²⁰ FTC Decision, *supra* note 2, at 66.

²¹ Even in light of the subsequent D.C. Circuit decision, SSOs may still decide to be more explicit about the requirements for disclosure that they place on their participants. We understand that many SSOs are currently reviewing their disclosure policies.

²² See David J. Teece & Edward F. Sherry, *Standards Setting and Antitrust*, 87 MINN. L. REV. 1913, 1936 (2003) ("Ex ante, prior to the adoption of the standard, there typically will be a range of feasible alternatives available."). Note, however, that Damien Geradin and Miguel Rato claim that "in many instances of standard development no suitable alternative technology would have been found to exist." Damien Geradin & Miguel Rato, *Can Standard-Setting Lead to Exploitative Abuse? A Dissonant View on Patent Hold-Up*,

In the early 1990s, several types of latency technology were available²³

. . . .

In the early 1990s several alternatives to programmable burst length were available.²⁴

. . . .

When JEDEC was considering whether to adopt dual-edge clocking technology as part of its DDR SDRAM standard, several alternatives were available.²⁵

. . . .

One alternative approach to on-chip PLL/DLL involved placing a PLL/DLL circuit on the memory controller that synchronizes all DRAMs. Another approach involved placing one or more PLL/DLL circuits on the memory module. Still other alternatives involved the use of vernier circuits, which introduce static delays on a signal to reduce timing uncertainties in a memory system, or reliance on a data strobe to signal the memory controller the timing of data capture. These alternatives . . . were considered by JEDEC prior to its adoption of on-chip PLL/DLL²⁶

Finally, the Commission found that:

[B]ut for Rambus's deceptive course of conduct, JEDEC either would have excluded Rambus's patented technologies from the JEDEC DRAM standards, or would have demanded RAND [reasonable and non-discriminatory] assurances, with an opportunity for ex ante

Royalty Stacking and the Meaning of FRAND, SSRN, April 2006, available at <http://ssrn.com/abstract=946792>. The Geradin and Rato perspective is likely to apply only when the sponsor's technology is itself a de facto standard when the SSO begins its work, so that there are no viable substitutes for that technology ex ante. Under such conditions, no competition from other technologies would exist prior to or during the SSO process. In instances that do not involve this sort of de facto standardization—that is, where an SSO can decide which technology to adopt—the Teece-Sherry approach is more appropriate. Indeed, the FTC quotes an internal Rambus communication as stating that “[I]t makes no sense to alert [the members of JEDEC] to a potential problem [involving Rambus's patent position] they can easily work around.” See Reply Brief for the Petitioner-Appellant, *Fed. Trade Comm'n v. Rambus, Inc.*, 129 S. Ct. 1318 (Feb. 4, 2009) (No. 08-694).

²³ FTC Decision, *supra* note 2, at 9.

²⁴ *Id.* at 10.

²⁵ *Id.* at 11.

²⁶ *Id.* at 12.

licensing negotiations²⁷ Evidence that a properly-informed JEDEC may have selected a substitute technology suggests a causal link between Rambus's deceptive course of conduct and JEDEC's decision-making process. This evidence—combined with the evidence of Rambus's strategy, JEDEC members' overriding concern with costs, and the magnitude of the potential royalties in the absence of RAND assurances or the opportunity to negotiate *ex ante*—is enough to show that JEDEC's adoption of the SDRAM and DDR SDRAM standards was linked to Rambus's exclusionary conduct.²⁸

III. EARLIER STANDARDS CASES INVOLVING “BAD ACTS”

Rambus is not the first instance in which the behavior of participants in standard-setting organizations has been condemned as anticompetitive. Two of the leading cases in this area are *American Society of Mechanical Engineers v. Hydrolevel Corporation*²⁹ and *Allied Tube & Conduit Corp. v. Indian Head, Inc.*³⁰ In addition, the Federal Trade Commission entered into a consent agreement with Dell Computer Corporation resolving similar charges.³¹ In each of these cases, the behavior of a

²⁷ *Id.* at 74. As of this writing, the precise meaning of RAND royalties has yet to be determined by the courts. Economists have recently expressed the view that “courts should interpret the fair and reasonable prong of FRAND [as RAND is referred to in Europe] as the royalties that would have been voluntarily negotiated before users became committed to using the patented technology.” See Joseph Farrell, John Hayes, Carl Shapiro, & Theresa Sullivan, *Standard Setting, Patents and Hold-Up*, 74 ANTITRUST LAW JOURNAL 603, 637 (2007). When viewed in this light, the *ex ante* negotiations that we analyze in this paper can be seen as a mechanism by which to achieve “fair and reasonable” royalty rates. Alternatively, the courts may wish to use the outcomes of hypothetical *ex ante* negotiations as the basis for determining such FRAND royalty rates.

²⁸ FTC Decision, *supra* note 2, at 77. Strictly speaking, disclosure can result in lower license fees even if there are no technological alternatives since an SSO can always choose not to adopt a new standard if it deems the license fee demanded by the sponsor of the technology to be excessive. Nonetheless, the presence of alternatives will increase the SSO's bargaining power, perhaps substantially. Indeed, a SSO may have relatively little bargaining power if there are no technological alternatives and the sponsor's technology is clearly significantly better than the existing one.

²⁹ 456 U.S. 556 (1982).

³⁰ 486 U.S. 492 (1988).

³¹ *In re Dell Computer Corp.*, 121 F.T.C. 616 (May 20, 1996).

participant in the standard-setting process was condemned because it distorted competition among competing technologies.

In *Hydrolevel*, McDonnell & Miller (M&M), the leading supplier of low-water fuel cutoffs, a safety device for heating boilers, was found to have exploited an employee's position as vice chairman of the ASME committee that drafted, revised, and interpreted the relevant standard to obtain an interpretation that Hydrolevel's competing product did not conform to the ASME standard.³² After reciting the actions taken by the M&M employee, the Supreme Court concluded that "M&M successfully used its position with ASME in an effort to thwart Hydrolevel's competitive challenge."³³ The Court, including the concurring opinion which held that ASME should not be found liable for damages, found that M&M and the committee chairman had engaged in "anticompetitive" behavior.³⁴

Allied Tube involved a challenge to actions taken by members of the National Fire Protection Association (NFPA), a private voluntary organization that sets product standards and codes

³² American Society of Mechanical Engineers v. Hydrolevel Corporation, 456 U.S. 556, 560-61 (1982). The Supreme Court found that: (1) M&M officials met with the chairman of the committee; (2) that the vice chairman, an M&M employee, and the chairman drafted a letter to be sent to the committee inquiring whether the Hydrolevel product met the standard; (3) that the letter was mailed by an M&M employee to the committee; (4) that the letter was referred to the chairman of the committee, one of its original drafters; and (5) that the chairman had issued an "unofficial communication" condemning the Hydrolevel technology. *Id.*

³³ *Id.* at 562.

³⁴ *Id.* at 570-71. The Court's findings included the following points: "[W]e do not face a challenge to a good-faith interpretation of an ASME code reasonably supported by health or safety considerations." *Id.* at 577; "As a result of a fraudulent answer given by an ASME subcommittee chairman to one of these thousands of inquires, the entire organization has been exposed to potentially crippling liability." *Id.* at 579; "The fraudulent activity of Hardin and James, on behalf of McDonnell & Miller, Inc., was not within the scope of any authority of ASME." *Id.* at 587-88, n.13; and "[t]he primary beneficiary in this case was McDonnell & Miller, the manufacturing company that arranged for the fraudulent ruling by the ASME subcommittee chairman. The sole purpose of the fraud was to disadvantage McDonnell & Miller's competitor." *Id.* at 590-91.

related to fire protection.³⁵ These members, who manufactured steel conduits that conformed to the NFPA safety standard, recruited large numbers of people to join the Association and vote against a proposal to include polyvinyl chloride conduit in the standard.³⁶ The Supreme Court found that:

When . . . private associations promulgate safety standards based on the merits of objective expert judgments and through procedures that prevent the standard-setting process from being biased by members with economic interests in stifling competition . . . those private standards can have significant procompetitive advantages.³⁷

That rounding up supporters is an acceptable and constitutionally protected method of influencing elections does not mean that rounding up economically interested persons to set private standards must also be protected.³⁸

What petitioners may not do . . . is bias the process by, as in this case, stacking the private standard-setting body with decisionmakers sharing their economic interest in restraining competition.³⁹

Although the *Dell Computer Corp.* matter resulted in a settlement rather than an adjudicated outcome,⁴⁰ it merits consideration, not only because it involved the alleged abuse of the standard-setting process to anticompetitive ends, but also because it is highly analogous to the *Rambus* case. In the early 1990s, the Video Electronics Standards Association (VESA), a non-profit standard-setting organization, was involved in setting standards for a high-performance bus architecture, known as the VL-bus, to enable fast graphics performance on personal computers.⁴¹ As were “virtually all major U.S. computer hardware and software

³⁵ *Allied Tube & Conduit Corp. v. Indian Head, Inc.*, 486 U.S. 492, 495 (1988).

³⁶ *Id.* at 496–97.

³⁷ *Id.* at 501.

³⁸ *Id.* at 504.

³⁹ *Id.* at 511. A recent press report indicates that European Union antitrust authorities are questioning similar behavior by Microsoft Corporation. Microsoft allegedly had its “resellers and other allies” join standards bodies en masse in order to promote its Office software file formats as international standards. See Charles Forelle, *Microsoft’s Office Push Scrutinized by EU*, WALL ST. J., Feb. 8, 2008, at B4.

⁴⁰ *In re Dell Computer Corp.*, 121 F.T.C. 616, 619 (May 20, 1996).

⁴¹ *Id.* at 617.

manufacturers,”⁴² Dell was a member of VESA during this process. VESA finalized and adopted its VL-bus standard in 1992.⁴³ At that time, “a Dell representative allegedly certified that he knew of no patent, trademark or copyright that the bus design would violate.”⁴⁴

According to the FTC, “[a]fter the VESA VL-bus design standard became successful and computer manufacturers had sold more than 1.4 million personal computers incorporating the VL-bus, Dell contacted certain VESA members and asserted that it obtained a patent in 1991 that they were violating by using the VL-bus standard,” with the effect of, among other things, chilling innovation anticompetitively.⁴⁵

Dell settled with the Commission by agreeing not to enforce its patents against computer makers that employed the VL-bus in

⁴² Press Release, FED. TRADE COMM’N, Dell Computer Settles FTC Charges; Won’t Enforce Patent Rights for Widely Used Computer Feature, (Nov. 2, 1995), <http://www.ftc.gov/opa/1995/11/dell.htm> (last visited Aug. 17, 2006) [hereinafter “FTC Dell Press Release”].

⁴³ *In re Dell*, 121 F.T.C. at 617.

⁴⁴ FTC Dell Press Release, *supra* note 42. Commissioner Azcuenaga’s dissent emphasized that the Complaint did not allege that Dell had “intentionally and knowingly misled VESA” about its patent holdings. *In re Dell*, 121 F.T.C. at 629. However, a majority of the Commission held that “there is reason to believe that Dell’s failure to disclose was not inadvertent.” *Id.* at 625–26.

⁴⁵ FTC Dell Press Release, *supra* note 42. The Commission’s press release at the time it issued the proposed consent order for public comment alleged in particular that:

Dell’s actions were unfair and that they unreasonably restrained competition in the following ways:

- Industry acceptance of the VESA VL-bus standard was hindered pending a resolution of the patent issue;
- Companies avoided using systems incorporating the VL-bus design because they were concerned that the patent issue would chill its acceptance as the industry standard;
- Uncertainty about acceptance of the design standard raised the cost of implementing the VL-bus design and the costs of developing competing bus designs; and
- Willingness to participate in industry standard-setting efforts has been chilled.

their devices.⁴⁶ In addition, Dell agreed that, for a period of ten years, it would not enforce any patent rights:

by asserting or alleging that any person's or entity's use or implementation of an industry design standard, or sale of any equipment using an industry design standard, infringes such patent rights, if, in response to a written inquiry from the standard-setting organization . . . [Dell] intentionally failed to disclose such patent rights while such industry standard was under consideration.⁴⁷

Significantly, the FTC found that "there is evidence that [VESA] would have implemented a different non-proprietary design had it been informed of the patent conflict during the certification process."⁴⁸ Indeed, the Commission found that VESA could have chosen "an equally effective, non-proprietary standard."⁴⁹

In each of these cases, the conduct of a participant in the standard-setting process was condemned because it distorted competition among competing technologies. Just as the *Hydrolevel* court found that exploiting an official position within a standards body to exclude competitors was anticompetitive, the court in *Allied Tube* found that "packing" a meeting with supporters in order to achieve the same purpose also violated the antitrust laws. Although the *Dell* matter did not directly involve the exclusion of competitors, Dell's behavior was condemned by the FTC because

⁴⁶ *In re Dell*, 121 F.T.C. at 616. Teece & Sherry argue that "the antitrust authorities have shown what we believe to be an unfortunate tendency to propose royalty-free as a remedy in cases where the antitrust authorities have contended that the patent holder violated the antitrust laws by failing to disclose its patents (or patent applications). A more appropriate remedy would be to require a patent holder to license its patents to others on terms that are 'reasonable' in the ex ante sense" Teece & Sherry, *supra* note 22, at 1959–60. However, the requirement that Dell provide a royalty-free license may be interpreted as punishment for its "bad acts," similar to the imposition of punitive or treble damages. However, in *Rambus*, the FTC described its remedy as attempting to determine "reasonable approximations of hypothetical *ex ante* negotiated rates . . ." See Brief for Respondent-Appellee, *supra* note 6, at 71.

⁴⁷ *In re Dell*, 121 F.T.C. at ¶ IV.

⁴⁸ *Id.* at 624.

⁴⁹ *Id.* at 624, n.2.

it had the effect of restraining competition among technologies, giving Dell the ability to engage in ex post opportunistic conduct.⁵⁰

It is apparent from its decision in *Rambus* that the FTC believed that Rambus had violated JEDEC's procedural norms.⁵¹ However, exactly what is required of participants in SSO deliberations is not always clear. As discussed later in this article, SSOs are seeking greater clarity both in what they can demand of their participants and what behavior they can undertake themselves. One issue that must be resolved is how, and to what extent, SSO members should be able jointly to consider the license fees offered by the intellectual property rights owners whose technologies are candidates for inclusion in a standard.

⁵⁰ An early case in which the behavior of a standard setting organization was condemned was *Radiant Burners, Inc. v. Peoples Gas Light & Coke Co.*, 364 U.S. 656 (1961). In *Radiant Burners*, members of the American Gas Association were alleged to have failed to approve a competitor's product "although it is safer and more efficient than, and just as durable as, gas burners which AGA has approved." *Id.* at 658. The allegation further held that "[the AGA's] tests are not based on 'objective standards,' but are influenced by respondents, some of whom are in competition with petitioner, and thus its determinations can be made 'arbitrarily and capriciously.'" *Id.* Although it did not say so explicitly, the Supreme Court appeared to find that behavior of the AGA and its members was, in this instance, *per se* illegal.

⁵¹ See FTC Decision, *supra* note 2, at 32-48 (detailing the "Chronology of Concealment"). However, Teece and Sherry suggest that others knew, or could have known, about the Rambus patents that were not disclosed to JEDEC.

The fact that the JEDEC committee adopted the standard despite this knowledge suggests that the other JEDEC members were not concerned about Rambus's pending patent applications either because they believed that the patent would not issue, because they felt that the Rambus technology was sufficiently superior to the alternatives, or because they believed that they would be able to obtain licenses from Rambus.

Teece & Sherry, *supra* note 22, at 1968. Needless to say, this characterization is substantially at odds with the FTC's description of the matter. Note that Teece was the damages expert for Rambus in *Rambus, Inc. v. Infineon Technologies, AG*, 318 F.3d 1081 (Fed. Cir. 2003). See Teece & Sherry, *supra* note 22, at n.179.

IV. THE COURT OF APPEALS FOR THE D.C. CIRCUIT'S DECISION

The Court of Appeals for the D.C. Circuit set aside the FTC's Order in *Rambus*. First, it concluded that the Commission had "taken an aggressive interpretation of rather weak evidence"⁵² in finding that Rambus had a duty to disclose its patent holdings. In particular, the Court quoted approvingly the finding by the Court of Appeals for the Federal Circuit in *Rambus, Inc. v. Infineon* that "[o]ne would expect that disclosure expectations ostensibly requiring competitors to share information that they would otherwise vigorously protect as trade secrets would provide 'clear guidance' and 'define clearly what, when, how, and to whom the members [of an SSO] must disclose.'"⁵³ Presumably, the D.C. Circuit's opinion has now put SSOs on notice that their rules must be clear on the disclosure obligations that they wish to impose.⁵⁴

The D.C. Circuit also appears to have reached more troubling conclusions. Imagine that an SSO participant fails to disclose its IP holdings and the SSO, which is ignorant of the participant's IP rights, adopts its technology as part of its standard. The court appears to hold that such a failure to disclose is not an antitrust violation unless the SSO (or a government antitrust agency) can demonstrate that the technology would *not* have been included in a standard had its sponsor disclosed its IP rights over that technology.⁵⁵

[I]f JEDEC, in the world that would have existed but for Rambus's deception, would have standardized the very same technologies, Rambus's alleged deception cannot be said to

⁵² *Rambus v. Fed. Trade Comm'n*, 522 F.3d 456, 469 (D.C. Cir. 2008).

⁵³ *Id.* at 468 (quoting *Rambus Inc. v. Infineon Technologies, AG*, 318 F.3d at 1102).

⁵⁴ We also note that JEDEC should have been more wary about Rambus's intentions when it withdrew from JEDEC stating that the terms on which it would license its technology "may not be consistent with the terms set by standards bodies, including JEDEC." *Id.* at 460. That is, it would have been reasonable for JEDEC to infer from Rambus's withdrawal and statement that it had proprietary technology that it did not intend to license on RAND terms.

⁵⁵ *Id.* Although we disagree with this conclusion, we agree with the court's holding that "if Rambus's more complete disclosure would have caused JEDEC to adopt a different (open, non-proprietary) standard, then its failure to disclose harmed competition and would support a monopolization claim." *Id.* at 463.

have had an effect on competition in violation of the antitrust laws; JEDEC's loss of an opportunity to seek favorable licensing terms is not as such an antitrust harm. Yet the Commission did not reject this as being a possible—perhaps even the more probable—effect of Rambus's conduct. We hold, therefore, that the Commission failed to demonstrate that Rambus's conduct was exclusionary, and thus to establish its claim that Rambus unlawfully monopolized the relevant markets.⁵⁶

Thus, the D.C. Circuit concluded, Rambus's non-disclosure could not be judged to be anticompetitive, even if its effect was to raise license fees, because the Commission had not shown that JEDEC would, absent such non-disclosure, have chosen an alternative to the Rambus technology.

This conclusion is disturbing. The court itself noted that “[b]efore an SSO adopts a standard, there is often vigorous competition among different technologies for incorporation into that standard.”⁵⁷ The FTC had found that there were alternatives to Rambus's technology.⁵⁸ If Rambus had disclosed its holdings, JEDEC would have been able to consider the benefits and costs, including licensing costs, of these alternatives. In doing so, it might or might not have chosen the Rambus technology. Under such conditions, Rambus might have had incentives to commit to lower royalty rates than it ultimately was able to demand. Rambus's failure to disclose prevented this market test from taking place and, as a result, it denied to the members of JEDEC the full benefits of competition among the various alternative technologies that JEDEC might have considered. Although one cannot be certain what the outcome of that competition would have been, the failure to disclose prevented that competition from taking place.⁵⁹

⁵⁶ *Id.* at 466–67.

⁵⁷ *Id.* at 459. Contrary to the court's later claim, competition is not limited to “open, non-proprietary” technologies. Other proprietary technologies may also be candidates.

⁵⁸ *Id.*

⁵⁹ As we discuss below, *see infra* Section V(A), disclosure or even disclosure combined with RAND licensing commitments may not be sufficient to prevent hold-up. For that reason, we favor disclosure combined with specific ex ante license fee commitments. Without such commitments, it is as if consumers are

The reason that the D.C. Circuit's decision is so troubling is that it seems to invite the very type of opportunistic behavior that the FTC sought to prevent. An SSO participant that knowingly fails to disclose its holdings, even if its obligation to do so is clear, can always claim that its technology might have been chosen even if its patent holdings had been disclosed, and an SSO is unlikely ever to be able to prove the contrary. Indeed, SSOs are hardly likely to be able to demonstrate what they would have done had they known of facts of which they were unaware. In a legal environment that tolerates such withholding of information by their members, SSOs might find it necessary either to incur the costs of detailed patent searches in order to attempt to avoid hold-up of the sort practiced by Rambus or to attempt to limit their choices to older technologies that are more likely to be in the public domain. The result would be either higher costs of standardization or poorer technology choices.

After the D.C. Circuit issued its decision, the FTC petitioned the court for a rehearing.⁶⁰ When the court rejected this petition,⁶¹ the FTC petitioned the U.S. Supreme Court to review the judgment of the D.C. Circuit.⁶² That petition was recently denied.⁶³

We note here that significant tension exists between the decision of the Court of Appeals for the D.C. Circuit in *Rambus* and that of the Court of Appeals for the Third Circuit in

being forced to make choices among competing products without knowing the prices that will ultimately be charged for them.

⁶⁰ Petition for Respondent Federal Trade Commission for Rehearing *En Banc*, *Rambus, Inc. v. Federal Trade Comm'n*, 522 F.3d 456 (D.C. Cir. 2006) (Nos. 07-1086, 07-1124).

⁶¹ See Reuters, *U.S. Trade Commission Loses Bid for Rambus Appeal*, August 27, 2008, <http://www.reuters.com/article/marketsNews/idUSN2748830020080827> (last visited Nov. 17, 2008). The order denying the FTC's petition for rehearing *en banc* is unreported.

⁶² See Petition for a Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit, *Rambus, Inc. v. Fed. Trade Comm'n*, No. 08-694 (2008).

⁶³ See Letter from William K. Suter, Clerk, Supreme Court of the United States, to Paul R.Q. Wolfson, Feb. 23, 2009.

Qualcomm.⁶⁴ In the latter case, Qualcomm was accused of reneging on a commitment to license its technology on FRAND terms after SSOs had incorporated its technology into their standards. The Third Circuit, in reversing the decision of a lower court and remanding the case for further hearings, held that:

(1) in a consensus-oriented private standard-setting environment, (2) a patent holder's intentionally false promise to license essential proprietary technology on FRAND terms, (3) coupled with a [Standards-Determining Organization's] reliance on that promise when including the technology in a standard, and (4) the patent holder's subsequent breach of that promise, is actionable anticompetitive conduct Deception in a consensus-driven private standard-setting environment harms the competitive process by obscuring the costs of including proprietary technology in a standard and increasing the likelihood that patent rights will confer monopoly power on the patent holder Deceptive FRAND commitments, no less than deceptive nondisclosure of IPRs, may result in such harm.⁶⁵

Three things are notable about this holding. First, the Third Circuit decision focused on harm to the competitive *process*, noting that deception obscures the costs of including a technology in a standard. Thus, it was concerned with whether the behavior at issue distorted the competitive process and did not appear to require that the plaintiff demonstrate that another technology would have been chosen but for the deceptive conduct. Second, the Third Circuit treated the effects of deceptive non-disclosure of patents the same as the effects of deceptive commitments regarding licensing terms. As a result, it would apparently condemn behavior like Rambus's in the same way that it condemned Qualcomm's behavior.⁶⁶ Finally, the Third Circuit identified the potential harm as conferring market power on the patent holder, evidently meaning that the patent holder could charge higher prices than it otherwise have been able to do. This

⁶⁴ *Broadcom Corp. v. Qualcomm, Inc.*, 501 F.3d 297 (3rd Cir. 2007). The FTC petition to the U.S. Supreme Court identified this conflict as one reason that the decision of the D.C. Circuit should be reviewed. Brief for Petitioner-Appellant at 27-30, *Fed. Trade Comm'n v. Rambus, Inc.*, 125 S. Ct. 1318 (2009)(No. 08-694) [hereinafter "FTC Brief"].

⁶⁵ FTC Brief, *supra* note 64, at 24.

⁶⁶ Like the D.C. Circuit, the Third Circuit would most likely inquire about whether JEDEC's behavior required Rambus to disclose its patent holdings.

harm would obviously exist even if the deceptive behavior at issue did not affect the standard that was chosen but did raise the license fee that the winning sponsor could charge.

V. EX ANTE LICENSE FEE SETTING

Despite its reversal by the D.C. Circuit, the FTC's decision in *Rambus* nevertheless may tend to discourage participants in SSOs from withholding information about their relevant patent holdings.⁶⁷ This would be expected at least in cases where the SSO could demonstrate that it likely would have chosen an alternative technology had it known that the intellectual property in question was in fact proprietary.⁶⁸ However, mere disclosures of patent

⁶⁷ See, e.g., Testimony of Amy A. Marasco, Vice President and General Counsel, American National Standards Institute ("ANSI") before the Federal Trade Commission and the Department of Justice, *Standards-Setting Practices: Competition, Innovation, and Consumer Welfare*, at 9, Apr. 18, 2002. A number of commentators have argued that a requirement of disclosure would be unduly burdensome both because technology sponsors have potentially large numbers of patents and patent applications that would have to be searched and because the company personnel who are sent to SSO meetings often are not well informed about their employers' patent holdings. Although this may be true, it is instructive that the Rambus delegate to JEDEC communicated in some detail to Rambus's legal counsel about deliberations concerning the SDRAM standard. For example, the dissent in *Rambus v. Infineon* notes that "Crisp [Rambus's delegate] . . . met with Rambus's patent attorney to 'add claims to our patent application broad enough to cover the SDRAM if the SDRAM uses mode register and programmable CAS latency.'" *Rambus, Inc. v. Infineon Tech. AG*, 318 F.3d 1081, 1116 (Fed. Cir. 2003). Apparently the costs of communication between technical and legal personnel were not so great as to prevent it from occurring in this case. We should also note here that, just as the behavior in *Hydrolevel* and *Indian Tube* was condemned because it was especially egregious, Rambus's behavior may have been so outside the norms of the SSO that it was easy for the FTC to censure it.

⁶⁸ An interesting question is whether an SSO would have redress under an alternative legal regime against a non-disclosing technology sponsor in cases where the SSO cannot demonstrate that it would have chosen an alternative technology if disclosure had occurred. For example, the World Intellectual Property Organization notes that "in the case of a failure to comply with the IPR policy of the SSO by the participants of such SSO, such as a failure to submit a patent disclosure statement or a submission of false information, contractual remedies may be sought under the applicable contract law." World Intellectual

holdings may not have a large effect on the technical characteristics of the standards that are adopted, or on the license fees that are paid, unless competition among sponsors to have their technologies included in the standard is based, in part, on license fees that have been disclosed and committed to *ex ante*.⁶⁹ Although the FTC's decision in *Rambus* indicated that SSO members should be allowed to consider royalty rates when setting standards,⁷⁰ the decision does not provide much detail about how rates might be disclosed or how they might be set. Here, we describe how competition among sponsors might occur and what the outcome of competition is likely to be. We show that, in many circumstances, *ex ante* licensing reliant on timely disclosures of the existence of patented technologies and the royalty rates that would be sought by patentees if their technologies are included in a standard can increase economic efficiency.

A. *Lock-In and the Significance of ex ante License Fee Negotiations*

Throughout its analysis, the FTC emphasized the importance of "lock-in." In the Commission's analysis, the adoption of a standard, together with standard-specific investments by industry participants, may lead to anticompetitive results even when initially a number of technologies compete for inclusion in the standard. This may occur if the owners of patents that are included in the standard acquire monopoly power after the standard is established, allowing them to charge supracompetitive royalty rates. In the Commission's words:

Property Organization, Standing Committee on the Law of Patents, *Standards and Patents*, SCP/13/2, ¶ 126 (Feb. 18, 2009).

⁶⁹ An exception could arise, however, if the members of an SSO take account of the reputations of technology sponsors in deciding which technologies to include in a standard. That is, they may be less likely to include a technology if, in the past, its sponsor had engaged in "holdups" after a standard was adopted.

⁷⁰ The Commission held that "[i]f, in light of likely royalty payments, members prefer an alternative technology, they can vote against inclusion of the patented technology." FTC Decision, *supra* note 2, at 35. As noted later, FTC Chairman Deborah Majoras has separately indicated that collective discussions of licensing can be procompetitive. See *infra* Section VIII.

At the beginning of a standard-setting process, if there are a number of competing technologies, and if any one of them could win the standards battle, then no single technology will command more than a competitive price. Once the standard has been set, however, the dynamic changes . . . [I]ndustry participants likely will start designing, testing, and producing goods that conform to the standard . . . [As] the industry commits greater levels of resources to developing products that comply with the standard, the costs of switching to alternative technologies begin to rise. Industry members may find themselves 'locked in' to the standardized technology once switching costs become prohibitive. Once lock-in occurs, the owner of the standardized technology may be able to 'hold up' the industry and charge supracompetitive rates.⁷¹

Rambus apparently also recognized the value of lock-in. The FTC quotes one internal Rambus communication that advised waiting "to assert patents against Direct partners until ramp reaches point of no return" and another that instructs Rambus executives not to tell customers that a proposed standard may infringe on Rambus intellectual property because "our leverage is better to wait."⁷²

As Rambus seems to have understood, a rights owner may be able to exploit "lock-in" if it conceals its ownership of intellectual property until after a standard has been adopted and users have made investments that rely on that standard. At that point, because the owner no longer faces competition, it may be successful in demanding royalty rates that are higher than those it could have

⁷¹ FTC Decision, *supra* note 2, at 4. Significantly, the Commission did not condemn Rambus's behavior with respect to the DDR2 standard (in contrast to its condemnation of Rambus's behavior regarding the SDRAM and DDR standards) because it found that Rambus had disclosed its patent holding relevant to that standard at least two years before the standard was adopted. FTC Decision, *supra* note 2, at 113. We note here that the FTC was not very precise as to the meaning it attached to "supracompetitive" prices, other than to suggest that "competitive" prices would not result if information about patent holdings was not disclosed. Below, we attempt to clarify the meaning that should be attached to these terms.

⁷² Brief for Respondent-Appellee at 20, *Fed. Trade Comm'n v. Rambus, Inc.*, 129 S. Ct. 1318 (Jan. 23, 2009) (No. 08-694).

obtained had it revealed its intellectual property holdings prior to the adoption of the standard.⁷³

To eliminate the possibility of surprise, a standard-setting organization should, *before* a standard is adopted, require that all participants make their relevant intellectual property holdings known *and* make binding commitments as to the license fees they would charge if their technologies are included in that standard.⁷⁴ In particular, the members of an SSO should exploit competition among sponsors of competing technologies to limit the fees that licensees must pay before a standard has been adopted and firms in the industry have made investments that commit themselves to that standard. Although only a single technology might be chosen as a specification within a standard, such that ex post competition among sponsors does not exist,⁷⁵ ex ante competition for inclusion in the standard can, under these circumstances, still serve to limit the license fees that can be charged.⁷⁶

The most obvious way to accomplish this would be for SSOs to require each technology owner to commit to the royalty rate it would require if its technology were adopted or, in the alternative, to a specific formula that would be applied in setting that rate, prior to the setting of the standard. Alternatively, an SSO could require rights holders to make binding commitments to the

⁷³ It is the removal of the competitive constraints imposed by these alternatives that makes non-disclosure, and the effect of the resulting "lock in," appropriate subjects for treatment under the antitrust laws.

⁷⁴ We later discuss, see *infra* Section IX, the problems that may exist in reaching agreement on license fees if different users place different values on the same technology or if license fee negotiations place the interests of some users ahead of those of others.

⁷⁵ In some circumstances, a standard specification may allow for more than one type of implementation, thus preserving some ex post competition. See Joseph Farrell & Tim Simcoe, *Choosing the Rules for Consensus Standardization*, Mar. 26, 2009, at 30, available at <http://www.econ.berkeley.edu/~farrell/ftp/ConsensusRules.pdf>.

⁷⁶ The idea that competition *for* the market can substitute for competition *within* the market was first advanced by Harold Demsetz. Harold Demsetz, *Why Regulate Utilities?*, 11 J.L. & ECON. 55 (1968). Demsetz argued that regulation of natural monopolies could be replaced by competition among firms to be the monopolist. One of Demsetz' proposals was to award a monopoly franchise to the firm that offered the service at the lowest price. *Id.*

maximum royalty rates they could demand if and when their technologies are included in a standard or to a formula that would be applied in setting those maximum rates.⁷⁷ Although the resulting outcomes might not be as competitive as the outcome that would result if rights holders made firm pricing commitments,⁷⁸ they would still avoid some of the effects of post-standardization opportunism discussed above.⁷⁹

Indeed, the FTC explicitly noted the benefits of exploiting the possibility of *ex ante* competition:

[A]n SSO member expecting to sell products that conform to the standard, who gains knowledge of potential patent exposure, may have powerful economic incentives to negotiate a license *before* the technology becomes standardized, based on the lower, *ex ante* value of the patented technology. Similarly, the owner of the patented technology may prefer to offer an *ex ante* license—even at a lower *ex ante* rate—knowing that the other SSO participants might engage in a cost/benefit analysis and opt to standardize an entirely different technology. Indeed, under certain circumstances, members of an SSO may even collectively negotiate these types of *ex ante* licenses, without necessarily running afoul of the antitrust laws.⁸⁰

⁷⁷ As we discuss below, this is the approach taken in *VITA* and *IEEE*.

⁷⁸ One reason for this is that the actual rate charged, which is presumably determined after the standard has been set, may be lower than the maximum rate that was quoted by the winning bidder. Thus, the members of an SSO must decide between technologies based not only on the maximum rates that are bid by each sponsor but on the members' views of how the actual and maximum rates might differ.

⁷⁹ Teece and Sherry acknowledge that "[o]nce the patented technology is adopted as a standard . . . firms may commit to the standard and invest in complementary assets needed to make and produce the newly standardized products. Ex post, the cost of switching to the unpatented technology may now be much greater, as the industry is 'locked in' to the patented standard." Teece and Sherry, *supra* note 22, at 1957. However, they also contend that "from a societal standpoint [patent royalties] are best seen as a transfer payment rather than a (social) cost." *Id.* at 1933. We disagree. To the extent that lock-in enables rights holders to charge supracompetitive patent royalty rates to SSO members, this can cause the marginal costs associated with the production and sale of products that adhere to the SSO's standard to be higher than otherwise. In such cases, this would lead to reduced output of such goods and, therefore, impose a social cost.

⁸⁰ FTC Decision, *supra* note 2, at 35–36 (italics in original, footnotes omitted).

Although we agree with the Commission about the benefits of license fee negotiations prior to the adoption of a standard, we are skeptical of the feasibility of bilateral negotiations between individual SSO members and intellectual property rights holders. This is because of the potentially large number of negotiations that would be required and the correspondingly high transactions costs that might arise as a result. Moreover, given the real possibility that different SSO members will have different interests, bilateral negotiations may actually inhibit the adoption of an industry-wide standard. For that reason, collective dealings will, in our view, often be preferred, although that approach is not without its own difficulties, as we discuss in some detail below.

B. Some Examples of Fee Renegotiations

Ex ante competition can serve to prevent “hold-up.” To illustrate this point, we briefly review instances in which standard-setting bodies have successfully negotiated lower license fees after they had (tentatively) included a technology in a standard but before the industry has become locked in to the standard. Indeed, the FTC itself identified two such instances in the case of JEDEC.

In the first such case identified by the FTC, a company called SEEQ had proposed adoption of a silicon signature standard.⁸¹ According to the Commission, SEEQ had disclosed and provided licensing assurances for one of its patents but had failed to disclose information about another.⁸² When JEDEC learned of the existence of the second patent, it unsuccessfully sought assurances that SEEQ would license according to RAND standards.⁸³ When SEEQ refused to provide these assurances, JEDEC chose to include another technology in its standard.⁸⁴

In the second case identified by the FTC, Texas Instruments (“TI”) sought to enforce a previously undisclosed patent on Quad CAS technology.⁸⁵ After JEDEC learned of the patent, its

⁸¹ *Id.* at 58.

⁸² *Id.* at 58.

⁸³ *Id.* at 58.

⁸⁴ *Id.* at 58.

⁸⁵ *Id.* at 58.

members voted to withdraw a pre-existing standard.⁸⁶ JEDEC dropped the withdrawal only after TI agreed to comply with JEDEC's licensing terms.⁸⁷

In another instance in which such behavior occurred, a committee of the CCITT⁸⁸ was able to persuade IBM and Unisys to reduce their license fee demands for the compression algorithm to be used in the V.42bis data compression standard.⁸⁹ As explained by the chair of the committee that had selected the standard from among four data compression schemes, "[w]hen Unisys was made aware by the committee and other companies of the possible impact of their original price on acceptance of the V.42bis standard, they relented. IBM basically followed suit."⁹⁰

These examples all stand for the proposition that a standards body continues to maintain leverage even after a standard has been adopted but before an industry has become locked in to the standard. Moreover, they demonstrate that standards bodies may be able to use that leverage to obtain lower fees by threatening either not to adopt a standard or to amend the standard to permit the use of an alternative technology.⁹¹

⁸⁶ *Id.* at 58.

⁸⁷ *Id.* at 58.

⁸⁸ The Comité Consultatif International Téléphonique et Télégraphique (CCITT) sets standards in the area of telecommunications. CCITT was renamed ITU-T (for the Telecommunications Sector of the International Telecommunications Union) in 1992. See, e.g., About International Telecommunications Union, <http://www.itu.int/net/about/history.aspx> (last visited Mar. 11, 2009); and CCITT: 50 YEARS OF EXCELLENCE, at 14 (2006) available at http://www.itu.int/ITU-T/50/docs/ITU-T_50.pdf (last visited Mar. 11, 2009).

⁸⁹ Terry Lefton, *IBM, Unisys Reduce Fees For Modem Compression*, ELECTRONIC NEWS, January 1, 1990, at 1, 34.

⁹⁰ Interestingly, British Telecom, whose technology was also required to implement the proposed standard, initially offered a relatively low license fee, but withdrew its offer when it learned about the fees being demanded by IBM and Unisys. After IBM and Unisys lowered their demands, British Telecom offered its technology for a fee that was *higher* than the one that it had initially proposed. *Id.* at 34 (providing a direct quote).

⁹¹ For a related theoretical analysis, see Joshua Lerner & Jean Tirole, *A Model of Forum Shopping*, 96 AM. ECON. REV. 1091, 1104-05 (2006) (presenting a model in which sponsors voluntarily commit to lower licensing fees, or make

VI. THE VITA AND IEEE DOJ BUSINESS REVIEW LETTERS

The previous discussion makes clear that there are circumstances in which SSOs may take license fees into account in determining which standard to adopt. Nevertheless, many standards bodies are concerned that doing so may subject them to antitrust liability or, at least, may require them to incur the cost of defending themselves against charges of anticompetitive behavior even where those charges are ultimately rejected.⁹² In order to reduce these risks, some SSOs have sought reviews of their licensing practices by the antitrust agencies in order to clarify which practices may be found to be pro-competitive or, at least, benign.⁹³

other concessions to users, in order to increase the probability that their technology will be chosen as a standard).

⁹² For an interesting discussion of why SSOs are concerned about the risks of antitrust liability and the costs of defending against claims of anticompetitive behavior if they were to discuss license fees during the standard selection process, see John J. Kelly & Daniel I. Prywes, *A Safety Zone for the Ex Ante Communication of Licensing Terms at Standard-Setting Organizations*, THE ANTITRUST SOURCE, March 2006, at 1–11, available at <http://www.abanet.org/antitrust/at-source/06/03/Mar06-Prywes3=22f.pdf>. They note that “[t]he mere possibility of an antitrust challenge, even under the rule of reason standard, inhibits many SSOs from allowing most forms of ex ante royalty communications.” They then propose a number of “principles” which, if adopted, might mitigate the fear of antitrust challenges to SSO behavior. *Id.* at 5; see also Gerald F. Masoudi, Deputy Assistant Attorney General, Efficiency in Analysis of Antitrust, Standard Setting, and Intellectual Property, Address Before the High-Level Workshop on Standardization, IP Licensing, and Antitrust, Tilburg Law & Economic Center, Tilburg University (Jan. 18, 2007), available at <http://www.usdoj.gov/atr/public/speeches/220972.pdf>.

⁹³ Antitrust concerns may arise when SSO members jointly negotiate with IP rights holders not only because such conduct might facilitate the exercise of monopsony power against rights holders but also because it might facilitate collusive pricing by SSO members in downstream markets. See, e.g., ROGER D. BLAIR & JEFFREY L. HARRISON, *MONOPSONY: ANTITRUST LAW AND ECONOMICS* 124 (Princeton University Press 1993) (“Since the parties are permitted to gather for the purpose of determining a uniform purchase price, it would be more difficult to detect when they had crossed over to at least a tacit agreement on selling price. This decreased likelihood of detection lowers the risk associated with the price fixing collusion.”). Both the DOJ and the FTC have made it clear that they would regard the use of royalty negotiations as occasions to reach agreements on selling prices as *per se* illegal. See, e.g.,

In one instance, the Department of Justice approved rules proposed by VITA, a trade association “comprised of developers, vendors, and users of real-time modular embedded computing systems originally based on the VMEbus computer architecture,”⁹⁴ and its standard development subcommittee. These rules would require each member of a VITA working group to “identify all patents or patent applications that he knows about and that he believes may become essential to the implementation of the future standard.”⁹⁵ They would also require the member to “declare the maximum royalty rates and most restrictive non-royalty terms that the VITA member company that he or she represents will request for any such patent claims that are essential to implement the eventual standard.”⁹⁶

The rules prohibit “joint negotiation and discussion of patent licensing terms,”⁹⁷ apparently in order to avoid the charge that members have abused their collective monopsony.⁹⁸ Instead, under the rules, users would negotiate fees and other terms individually, subject to the maximum rates and most restrictive terms that patent

Remarks of Chairman Deborah Platt Majoras, Federal Trade Commission, “Recognizing the Procompetitive Potential of Royalty Discussions in Standard Setting,” Remarks prepared for Standardization and the Law: Developing the Golden Mean for Global Trade, Stanford University, Stanford, California (Sep. 23, 2005) at 10 [hereinafter “Majoras Remarks”]; VITA Business Review Letter, *supra* note 3.

We should also note that antitrust concerns are not the only reason that some SSOs may have avoided *ex ante* license fee negotiations. The DOJ and FTC have noted, for example, that “the increased administrative costs associated with [a more transparent licensing process] and delays associated with such transparency led many panelists to disfavor *ex ante* discussions for practical reasons, independent of antitrust concerns.” U.S. DEP’T OF JUSTICE & THE FED. TRADE COMM’N, ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS 50 (April 2007), *available at* <http://www.ftc.gov/reports/innovation/P040101PromotingInnovationandCompetitionrpt0704.pdf>.

⁹⁴ VITA Business Review Letter, *supra* note 3, at 1.

⁹⁵ *Id.* at 4 (footnote omitted).

⁹⁶ *Id.*

⁹⁷ *Id.* at 9.

⁹⁸ A monopsony is said to exist in markets characterized by a single buyer of a well-defined good or service. *See, e.g.*, BLAIR & HARRISON, *supra* note 93, at 4. Monopsony, or buyer, power exists when the sole buyer of a product or service can force its price below the competitive level. *Id.* at 47.

holders had proffered to the standards organization at the time that the standard was being adopted. In approving VITA's proposed rules, the DOJ noted that:

Early in the standard-setting process, VITA working group members often can choose among multiple substitute technological solutions, some of which may be patented. Once a particular technology is chosen and the standard is developed, however, it can be extremely expensive or even impossible to substitute one technology for another Thus, those seeking to implement a given standard may be willing to license a patented technology included in the standard on more onerous terms than they would have been prior to the standard's adoption in order to avoid the expense and delay of developing a new standard around a different technology. Requiring patent holders to disclose their most restrictive licensing terms in advance could help avoid this outcome by preserving the benefits of competition between alternative technologies that exist during the standard-setting process.⁹⁹

Thus, the VITA Business Review Letter was intended to permit an SSO to avoid the problem of non-disclosure of patents that are essential to employing a standard while also providing information to its members about the potential licensing costs of alternative technologies.

The DOJ later approved similar rules proposed by the Institute of Electrical and Electronics Engineers ("IEEE").¹⁰⁰ Under the then-existing IEEE rules, members that may hold patents that are essential to implementing a proposed standard were required to commit "(1) that they will not enforce their essential patent claims used to implement the standard, or (2) that they will license the essential patent claims to implement the standard on reasonable and nondiscriminatory (RAND) terms."¹⁰¹ However, because it had found that such RAND commitments "are inherently vague,"¹⁰² the IEEE proposed to modify its rules to permit a patent holder that committed to licensing on RAND terms to voluntarily specify "a not-to-exceed license fee or rate commitment, other material licensing terms, or a sample licensing agreement."¹⁰³

⁹⁹ VITA Business Review Letter, *supra* note 3, at 8–9.

¹⁰⁰ IEEE Business Review Letter, *supra* note 4.

¹⁰¹ *Id.* at 3.

¹⁰² *Id.* at 4.

¹⁰³ *Id.* at 6.

The proposed IEEE rules would permit members of standards working groups to “discuss the relative costs of the proposed technological alternatives, and these costs may include the relative costs of licensing the essential patent claims needed to implement the technologies under consideration.”¹⁰⁴ Presumably to avoid antitrust concerns, however, the rules would prohibit “discussion of specific licensing terms” as well as “joint negotiations of licensing terms” in standards development meetings.¹⁰⁵

Consistent with the FTC’s position in *Rambus*, the Department of Justice recognized in both the VITA and IEEE Business Review Letters the value of the disclosure of essential patents prior to the selection of a standard. Moreover, both letters made clear that SSOs can take proposed license fees into account during the standard setting process, although they differed somewhat in how this might be accomplished. Significantly, although both letters stopped short of endorsing collective negotiations of license fees between users and patent holders, the VITA Letter indicated that it does not necessarily forbid collective negotiations and, in fact, indicated that “if the proposed policy did allow such negotiations and discussions, the [Antitrust] Division likely would evaluate any antitrust concerns about them under the rule of reason because such actions could be procompetitive.”¹⁰⁶

Although this outcome is superior to an outright ban on collective price negotiations, or to the earlier situation in which SSO members could not judge even in a general way their potential for antitrust liability, even this rule of reason approach could tend to discourage SSO participants from engaging in collective negotiations. This would be the case if the expected costs associated with either investigations by the competition authorities or possible legal actions brought by intellectual property rights holders are significant. In what follows, we explain why collective negotiations of license fees may be desirable, if not essential, in certain circumstances. In such circumstances, rules—or even perhaps a lack of rules—that discourage collective action

¹⁰⁴ *Id.* at 8.

¹⁰⁵ *Id.* at 11.

¹⁰⁶ VITA Business Review Letter, *supra* note 3, at 9.

by SSO members can reduce economic efficiency and consumer welfare.

VII. DETERMINING LICENSE FEES: A PROTOTYPE

To describe how ex ante competition might occur, consider the following hypothetical:¹⁰⁷

- There exist a number of technologies, each of which is the intellectual property of its owner (which we will refer to as its “sponsor”) and all of which are equally capable of performing the same function;¹⁰⁸
- None of the sponsors produce the product in which the technologies are used, *i.e.*, they are “pure-play” suppliers of technology to the producers of that product;
- All investments in research and development required to develop the various technologies have already been made. The sponsors bear no other incremental costs;
- This is the “last round” of standards competitions involving these technologies, *i.e.*, there is no possibility of future “refinements” to the standard;¹⁰⁹
- There is no uncertainty about the conditions that will prevail in the product market after the standard has been adopted and production has begun;
- Technology sponsors commit to the license fees that they would charge, and users commit to the license fees that they would pay, prior to the time at which the standard is adopted;¹¹⁰

¹⁰⁷ A version of this hypothetical was originally presented in *Standard Setting and Intellectual Property: An Outline of the Issues*, DOJ/FTC Hearings on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy, Session on Licensing Terms in Standards Activities (2002) (statement of Stanley M. Besen, Charles River Associates, Inc.), available at <http://www.ftc.gov/opp/intellect/020418stanleymbesen.pdf>.

¹⁰⁸ We relax this assumption below in Section IX.

¹⁰⁹ It often takes several years for a standard to be developed, so it may not be known whether a license for a particular patent will be required to practice the standard until such a prolonged process nears completion. Nonetheless, as the previous discussion makes clear, it may be possible to revise a standard quite late in the standard-setting process in response to license fee demands that the SSO finds excessive. However, we acknowledge that this may not be easy, especially where many patents are involved.

¹¹⁰ In a recent case, by a three-to-two majority, the FTC found that the assignee of a patent had attempted to raise its license fee after users had been

- Standardization is required if the market is to develop, perhaps because network effects discourage users from committing to a technology without the assurance that many others are also doing so.¹¹¹ For similar reasons, *de facto* standardization, *i.e.*, standardization through the market and without recourse to the SSO process, is impractical. As a result, the market for the product would not develop unless a standard is adopted by the SSO;
- While each of the technologies is equally capable, the licensee will incur different costs of producing products depending on which technology is selected. That is, ignoring licensing fees, the licensee's marginal "manufacturing cost" of the final product depends on which technology is employed;
- For any given technology, and again ignoring license fees, these "manufacturing costs" are identical across all prospective licensees; and

"locked in" to its technology despite the fact that the original patent holder had disclosed its patent holdings *and* committed to a license fee during the standard-setting process. Fed. Trade Comm'n, *In re Negotiated Data Solutions LLC*, FTC File No. 0510094, at 1 (Jan. 23, 2008), *available at* <http://www.ftc.gov/os/caselist/0510094/080122statement.pdf>. The issues in this case may have been clouded somewhat because the patent had been assigned to another party, the SSO may not have responded promptly to an attempt by the assignee to change the terms of the license, and other patent holders had apparently altered the terms of their licensing commitments. *See* Fed. Trade Comm'n, *In the Matter of Negotiated Data Solutions LLC*, Dissenting Statement of Chairman Majoras, FTC File No. 0510094, at 2 (Jan. 23, 2008), *available at* <http://www.ftc.gov/os/caselist/0510094/080122majoras.pdf>. We note, however, that there is little economic difference between deceiving an SSO about the existence of patent holdings and deceiving it about the license fee that the patent holder will charge. Both can distort the competitive process. Perhaps the FTC would have been more unified had the patent not been assigned and the SSO been more forceful in demanding that licensing commitments be honored. In any event, this case emphasizes that patent disclosure without binding licensing commitments may provide only a limited solution to the "holdup" problem.

¹¹¹ In this context, network effects are said to exist when the benefits to individual users of a given technology increase with the number of other users of the same technology. Under such circumstances, when many other users have adopted a given technology, the cost to a user of choosing a different technology for the same purpose can be large. For a general discussion of network effects, *see, e.g.*, CARL SHAPIRO & HAL R. VARIAN, *INFORMATION RULES* 13–14, 173–225 (1999).

- Membership of the SSO includes the firms that produce the final product (*i.e.*, the potential customers for the technologies at issue) but *not* the sponsors (*i.e.*, owners) of the technologies.¹¹²

In these circumstances, the SSO must select a standard because otherwise the market for the product would not develop. Because the technologies are assumed to be equally capable, the only basis on which to choose among them, and therefore to determine the appropriate license fee, is their respective manufacturing costs. Assuming further that the SSO is well informed about the various technologies and their associated intellectual property, before it adopts the standard the SSO should negotiate a license fee with the supplier of the lowest-cost technology.¹¹³ In doing so, its fallback position is to use the technology that has the second lowest cost, so that the difference between the manufacturing costs of the two lowest-cost technologies sets a ceiling to the license fee if it is negotiated *ex ante*.¹¹⁴ For example, if manufacturing costs are \$9 per unit using the lowest-cost technology and \$10 per unit using

¹¹² We are aware, of course, that the membership of SSOs often includes firms that are technology sponsors but not users. We deal with this issue below.

¹¹³ Some observers have expressed concern that the requirements of disclosure and *ex ante* fee negotiations might, by raising the costs of participation, discourage sponsors from joining SSOs. *See, e.g.*, ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS, *supra* note 93, at 50. However, sponsors will still have an incentive to participate to the extent that doing so increases the probability that their technologies will be incorporated into the standard. Nonetheless, it must be recognized that a *non-participating* owner might obtain significant market power if it reveals its ownership of intellectual property after it is fortunate enough to have its technology included in the standard. This might occur, for example, when a standards body incorrectly assumes that a particular technology is in the public domain. Moreover, we cannot rule out the possibility that, in particular cases, an owner of intellectual property who has no knowledge that a standard is being adopted, and therefore cannot be thought of as having failed to meet an obligation to disclose, later discovers that his patent is needed to practice the standard. In such cases, the owner may be able to obtain substantial royalties *ex post* even if he could not have done so *ex ante*.

¹¹⁴ *See, e.g.*, HAL R. VARIAN, INTERMEDIATE MICROECONOMICS 314, (7th ed. 2006), for an explanation of why the supplier with the technology that has the "second" lowest cost constrains the maximum license fee that can be charged by the supplier with the technology that has the lowest cost. For an extended discussion of the factors that would determine license fees if negotiations were to occur before a standard is adopted, *see generally* Farrell, et al., *supra* note 27.

the technology with the second-lowest cost, the owner of the “best” technology can command a license fee no greater than \$1 per unit.¹¹⁵ Unless the owner of the best technology demands a license fee greater than this amount, its technology will be incorporated in the standard.¹¹⁶

VIII. COLLECTIVE DETERMINATION OF LICENSE FEES

The FTC decision in *Rambus* and the VITA and IEEE Business Review Letters endorse the desirability of determining license fees before lock-in has occurred.¹¹⁷ Moreover, as noted above, although

¹¹⁵ To see this, note that the owner of the second-most-efficient technology faces zero marginal costs from allowing the production of products using its technology. In this example, if the owner of the most-efficient technology attempts to charge more than \$1 per unit, users that relied on its technology would incur costs, including the patent royalty, of more than \$10 per unit. If, for example, the royalty were set at \$1.02 per unit, the costs associated with the use of the most efficient technology, including the royalty, would be \$10.02 per unit. If that were the case, the owner of the second-most-efficient technology could profitably displace the supplier of the most-efficient technology by setting a royalty rate of, say, \$.01 resulting in per unit costs, including the royalty, of \$10.01, which would be lower than that of the most efficient technology. Anticipating this outcome, the supplier of the most efficient technology would not charge a royalty in excess of \$1. Recall that we have assumed that the all technologies are “equally capable,” so that they differ only with respect to their associated manufacturing costs. We consider the effect of relaxing this assumption below.

¹¹⁶ The DOJ and the FTC have noted that ex ante negotiations “might be unreasonable if there were no viable alternatives to the particular patented technology that is incorporated into a standard, the IP holder’s market power was not enhanced by the standard, and all potential licensees refuse to license that particular patented technology except on agreed-upon licensing terms. In such circumstances, the ex ante negotiation among potential licensees does not preserve competition among technologies that existed during the development of the standard but may instead simply eliminate competition among the potential licensees for the patented technology.” ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS, *supra* note 93, at 53.

¹¹⁷ *But see* Addamax Corp. v. Open Software Foundation, Inc. 152 F.3d 48 (1st Cir. 1998). *Addamax* has been seen by some as endorsing the use by standards organizations of ex ante competitions among sponsors to limit patent license fees. See, e.g., Robert A. Skitol, *Concerted Buying Power: Its Potential for Addressing the Patent Holdup Problem in Standard Setting*, 72 ANTITRUST L. J. 727, 736 (2005). In *Addamax*, the Open Software Foundation (“OSF”), a

the pronouncements envisioned the possibility that *individual* users will negotiate license fees before they agree to include a technology in a standard, these FTC and DOJ pronouncements left open the possibility that, under certain circumstances, users might negotiate license fees *collectively*.¹¹⁸ What those circumstances might be were suggested in a speech by FTC Chairman Majoras that is cited in the FTC's *Rambus* Decision.¹¹⁹

In her speech, Chairman Majoras noted that proposals to allow SSO members to collectively discuss rates:

have raised concerns that agreed rates are exercises in collective price-fixing and therefore run afoul of the antitrust laws' *per se* ban on price fixing. Consequently, some SSOs and their participants have hesitated to allow unilateral announcements of royalty rates by, let alone *ex ante*

non-profit joint research and development venture among computer manufacturers, was charged with a number of *per se* violations of the antitrust laws because it and its members had chosen to include a competing computer software security system in the product that it was developing, apparently in part because the system had a lower price than that demanded by Addamax for its own software security system. The court of appeals noted: "Where the venture is producing a new product . . . there is patently a potential for a productive contribution to the economy, and conduct that is strictly ancillary to this [sic] productive efforts (e.g., the joint venture's decision as to the price at which it will purchase inputs) is evaluated under the rule of reason." *Addamax*, 152 F.3d at 52. Thus, the court explicitly ruled only that OSF's behavior was not *per se* illegal. Moreover, OSF was a research and development joint venture, not a standard setting organization. *Id.* at 50. Finally, the court did not find that no antitrust violation had occurred but only upheld the district court's finding that "antitrust violations, *even if they were assumed to have occurred*, were not a material cause of Addamax's failure in the line of business at issue." *Id.* at 49 (emphasis added).

¹¹⁸ FTC Decision, *supra* note 2, at 36.

¹¹⁹ FTC Decision, *supra* note 2, at 36 n.166. The FTC and DOJ Guidelines do not explicitly address the scope of acceptable behavior although they do express concern about "possible anticompetitive effects of standard setting in the context of competitor collaborations." At the same time, they appear to endorse competitor collaborations that would "enable participants to offer goods or services that are cheaper, more valuable to consumers, or brought to market faster than would be possible absent the collaboration." FED. TRADE COMM'N & U.S. DEP'T OF JUSTICE, ANTITRUST GUIDELINES FOR COLLABORATIONS AMONG COMPETITORS 6 (Apr. 2000), available at <http://www.ftc.gov/os/2000/04/ftcdojguidelines.pdf>.

joint royalty discussions with, firms that own the technology being considered for incorporation into the standard¹²⁰

Moreover, Chairman Majoras suggested that not only would a patent holder's "voluntary and unilateral disclosure of its royalty rate" be "highly unlikely to require antitrust scrutiny,"¹²¹ but also that collective discussions of licensing might also be procompetitive:

If joint ex ante discussions succeed in staving off hold up, we can generally expect lower royalty rates to lead to lower marginal costs for the standardized product and lower consumer prices. By mitigating hold up, joint ex ante royalty discussions might also make possible the more timely and efficient development of standards. A reduction in ex ante uncertainty on royalty rates may 'reduce the extent to which litigation is needed to resolve issues relating to patents and standards.' Joint ex ante royalty discussions also could prevent delays in the implementation of the standard resulting from ex post litigation (or threats of it)¹²²

Chairman Majoras further maintained that the risk that collective negotiations over license fees might lead to rates "below the competitive level," thus leading to reduced incentives to innovate, "is unlikely to be a frequent practical concern," primarily because manufacturer members of an SSO have an interest in not forcing rates so low that patent holders choose not to join the organization in the first place.¹²³ She concluded that, in cases in which collective rate-setting is challenged, the FTC would determine "whether an uncoordinated series of bilateral negotiations between patentees and individual would-be licensees would be equally capable of mitigating hold up"¹²⁴

¹²⁰ Majoras Remarks, *supra* note 93, at 6.

¹²¹ *Id.* at 6, 7.

¹²² *Id.* at 8 (footnotes omitted).

¹²³ *Id.* at 8, 9.

¹²⁴ *Id.* at 10. By endorsing collective license fee negotiations, Chairman Majoras's remarks appear to go somewhat beyond the policy incorporated in the Standards Development Organization Advancement Act of 2004, Pub. L. No. 108-237, 118 Stat. 661 (2004). Although that legislation clarifies that the behavior of standard-setting organizations will be judged under the rule of reason, it does not explicitly address the issue of collective license fee negotiations. Indeed, the Act's legislative history notes only that "[i]t further encourages discussion among intellectual property rights owners and other

As we have already discussed, notwithstanding the obvious desirability of taking prospective license fees into account *before* a standard is adopted, many standards bodies and their members are concerned about incurring antitrust liability if they bargain collectively with technology sponsors over fees. In particular, SSOs are concerned that they will be accused of exerting *monopsony* power in their dealings with sponsors, and hence they avoid any discussions of license fees in their deliberations. A possible way to overcome this perceived problem while still preserving the benefits of taking license fees into account before a standard is selected is to employ a procedure proposed by Swanson and Baumol.¹²⁵ Their approach would be:

[T]o adopt the ‘sealed-bid’ or ‘Dutch’ auction model and accord all candidates the opportunity to submit (simultaneously) ‘best and final’ responses to the SSO’s RFP.

We assume that such an auction-like process would involve no collective royalty negotiations with any given putative licensor after its ‘bid’ has been submitted to the SSO (though we would not deem it to violate this assumption if, in appropriate circumstances, bidding were to be reopened on a general basis).¹²⁶

Under this approach, the SSO would solicit license fee “bids” and collectively determine what the standard would be, and thus the license fee that would be paid. Although the license fee would be not be *negotiated* collectively, it would be *determined* by the members of the SSO through their collective choice of which “bid” to accept.¹²⁷

interested standards participants regarding the terms under which relevant intellectual property rights would be made available for use in conjunction with the standard or proposed standard.” 150 CONG. REC. H3657 (June 2, 2004).

¹²⁵ Daniel G. Swanson & William J. Baumol, *Reasonable and Nondiscriminatory (RAND) Royalties, Standards Selection, and Control of Market Power*, 73 ANTITRUST L. J. 1 (2005).

¹²⁶ *Id.* at 17.

¹²⁷ It is not clear whether Chairman Majoras’s approach is more permissive with regard to collective negotiations than that suggested by Swanson and Baumol, especially since they do not suggest what are the “appropriate circumstances” under which bidding could be reopened. One might view an institution that allows bidding to be reopened when prior bids are deemed insufficient by SSO members to be similar to one that permits ongoing

IX. SOME EXTENSIONS OF THE PROTOTYPE

The prototypical rate setting process discussed above was based on a number of simplifications. This Section shows how that analysis might be extended to take account of differences in the technical characteristics of competing technologies. We also show how the auction process can provide appropriate incentives for developing new technologies.

A. *Differences in the Quality of Technologies*

As described earlier, the assumptions set forth in Section VII imply that the upper bound on the license fee that the owner of the patent on the technology having the lowest manufacturing cost could obtain in an auction is its cost advantage over the technology having the second lowest manufacturing cost. The lower bound on the license fee is zero, under the assumption that all R&D costs have already been sunk.¹²⁸ Presumably, the license fee that is negotiated will be somewhere between these two amounts.¹²⁹

The sponsor of a superior technology may be able to obtain a higher license fee than the cost differential may suggest. Indeed, the sponsor may win the competition to be included in the standard, and obtain a positive license fee, even if its associated manufacturing costs are not the lowest among the competing sponsors.¹³⁰ This would be the case if the technical superiority of

negotiations between the SSO on the one hand and individual IP holders on the other.

¹²⁸ In the jargon of economics, the costs of developing the technologies have already been “sunk” by their sponsors when these costs “cannot be eliminated, even by total cessation of production.” See WILLIAM J. BAUMOL, JOHN C. PANZAR, & ROBERT D. WILLIG, *CONTESTABLE MARKETS AND THE THEORY OF INDUSTRY STRUCTURE* 280 (1982).

¹²⁹ Under some circumstances, we can be more precise. For example, if patent holders are fully aware of the magnitude of the cost differentials among the respective technologies, the license fee will equal an amount that is just slightly below the entire manufacturing cost differential. That is because the sponsor with the lowest manufacturing cost technology will bid an amount just below the cost differential, knowing that then the technology with the second-lowest manufacturing cost will be not be adopted even at a license fee of zero.

¹³⁰ FTC Commissioner Azcuenaga’s dissent in *Dell* notes that “It is . . . possible . . . that Dell’s product was technically superior or more efficient,

the technology is more important to users than the differential in manufacturing costs. This condition may occur, for example, when the technology allows the manufactured product to offer higher performance. In such cases, the maximum license fee that the winner can obtain is the value that users place on the technical superiority *minus* the manufacturing cost disadvantage. Conversely, if the technically superior technology also has the lowest manufacturing costs, the maximum license fee is the value of its technical advantage *plus* the manufacturing cost advantage.

If intellectual property holdings and prospective license fees were revealed during the standard-setting process, the members of an SSO presumably would be able to trade-off the benefits of a superior technology against the manufacturing cost savings associated with using other, less capable, technologies.

B. *Differences Among Users*

The hypothetical considered earlier was greatly simplified by the assumptions that sponsors of the patented technologies and users of those technologies do not overlap and that all users place the same value on all of the technological alternatives that are considered for inclusion in a standard. Here, we examine the effect of relaxing these assumptions.

To begin, users may differ because they do not value the various alternatives equally. For example, technology A may offer a manufacturing cost advantage for one user but technology B may offer a manufacturing cost advantage for another user.¹³¹ In such cases, in the absence of side payments, the SSO's technology choice will depend on the rules that are used to make decisions.

Swanson and Baumol suggest that "the operative SSO voting (or other decision-making) process [should] not be unduly susceptible to being skewed or biased by one or more SSO

and, if so, that a standards-setter might prefer the patented design, even though it would involve the payment of royalties to the inventor." *Dell Decision*, *supra* note 31, at 641.

¹³¹ Immediately below, we consider the case in which all users prefer the same technology but the advantage of that technology over the best alternative differs among users.

members,”¹³² but that principle permits a wide range of choices of rules. Indeed, SSOs usually operate under the “consensus principle” which has been interpreted as “the largest possible agreement . . . among all interests concerned with the use of standards.”¹³³

Even where all users prefer that the same technology be included in a standard, they may not value that technology equally. For example, the manufacturing cost advantage of technology A over the next-best alternative, technology B, may be greater for some users than for others. One option in such cases would be for license fees to reflect the cost advantages that are specific to individual users, an outcome that could arise if fees were negotiated individually.¹³⁴

Sponsors could propose different fees for different types of users before a standard is adopted in order to equalize the net advantage to all users of the chosen technology and so that such fees would be viewed as non-discriminatory. Nevertheless, variations in fees could be employed for less benign purposes. For example, a sponsor might attempt to influence the votes of the most influential members of an SSO by offering them especially attractive fees.¹³⁵ Such differences in rates would not only be

¹³² Swanson & Baumol, *supra* note 125, at 17.

¹³³ LAL C. VERMAN, *STANDARDIZATION: A NEW DISCIPLINE* (1973) at 12. The consensus principle does not imply either unanimity or majority rule. Moreover, in reaching a consensus, greater weight is usually attached to the views of those members for which the standard is especially important. An interesting exception to the “standard” approach is that the European Telecommunications Standards Institute (ETSI) allows for “national weighted voting” when consensus cannot be achieved. See generally Stanley M. Besen, *The European Telecommunications Standards Institute: A Preliminary Analysis*, 14 TELECOMMUNICATIONS POLICY 521 (1990).

¹³⁴ If individual negotiations are impractical, however, the SSO may adopt a technology for which the sponsor proposes a single fee for all licensees. In that case, those users deriving the largest manufacturing cost advantage from the chosen technology would retain that advantage. Suppose, for example, that the cost advantage of technology A over technology B is 10 for user 1 and 7 for user 2. If the license fee is set at, say, 7, the advantage would be completely eliminated for user 2 but user 1 would save 3 from the adoption of technology A over technology B.

¹³⁵ This could be accomplished, for example, by offering quantity discounts.

discriminatory but might also distort the choice of the technologies that are included in the standard. In any event, it may be difficult to prevent such behavior, especially where sponsors quote only their maximum fees during the standard-setting process.¹³⁶

C. Users as Sponsors

The interests of users also may diverge when some are technology sponsors but others are not. Users that are technology sponsors will care not only about the effect of the standard on production of the final good but also on the license fees that they garner. As a result, such firms may have incentives to support their own technologies in the standard-setting process even if other technologies are less costly to use or are technologically superior.

D. License Fees and the Incentive to Innovate

In the hypothetical discussed above, R&D costs were sunk and there were no prospective refinements of the technology, so members of the SSO did not have to be concerned about the effects of their behavior on the incentives to innovate. In the more usual case, however, SSOs must be concerned about setting license fees too low because innovators will have little incentive to develop the technologies that are needed for future standards. Here, we show that the use of the above-described auction can create appropriate incentives for R&D.

Consider a simple case in which there are two potential sponsors. Assume that each of the two sponsors has the same probability of developing a technology associated with low manufacturing costs, that each sponsor has the same probability of developing a high manufacturing cost technology, and that the (common) respective probabilities of developing a low manufacturing cost technology may differ from the (common)

¹³⁶ This phenomenon is not limited to formal standard-setting. In de facto standard-setting, sponsors sometimes offer lower fees to large users in order to get a standards "bandwagon" rolling. See STANLEY M. BESEN & LELAND L. JOHNSON, COMPATIBILITY STANDARDS, COMPETITION, AND INNOVATION IN THE BROADCASTING INDUSTRY (The Rand Corp., Report No. R-3453-NSF, Nov. 1986) (citing examples of this phenomenon).

respective probabilities of developing a high manufacturing cost technology.¹³⁷ For this analysis, assume that “high manufacturing cost” means a cost of H dollars per unit of the final good produced, while “low manufacturing cost” means a cost of L dollars per unit of the final good, where $H > L$. If both sponsors develop a high manufacturing cost technology or both develop a low manufacturing cost technology, competition between them after R&D has been completed but before the standard has been adopted will result in a zero license fee in an ex ante auction. This is because neither of the firms’ technologies will offer a manufacturing cost advantage over the other.¹³⁸

Suppose that, from the perspective of either sponsor prior to the point at which its technology has been developed, the probability that it will develop a low manufacturing cost technology is p and that its probability of instead developing a high-manufacturing-cost technology is $1-p$. Assume, moreover, that the probability that one technology sponsor will develop a low manufacturing cost technology is statistically independent of the probability that the other will do so and, consequently, that the probability that one will develop a high manufacturing cost technology is independent of that of the other sponsor. Under these assumptions the probability that the first sponsor will develop a low manufacturing cost technology and the second will develop a high manufacturing cost technology is $p(1-p)$.¹³⁹ If the SSO were to guarantee that a sponsor that succeeds in developing a low manufacturing cost technology when the other develops a high

¹³⁷ Thus, for example, if both sponsors have a one-fourth probability of developing a high manufacturing cost technology they both would have a three-fourth probability of developing a low manufacturing cost technology. This assumes, of course, that the respective low cost technologies that might be developed by the sponsors are sufficiently different from one another for both to be patentable and that the same is true for the respective high cost technologies.

¹³⁸ Note that this assumes that there are no licensing costs.

¹³⁹ Under our assumptions, the probability that the second sponsor would develop a low manufacturing cost technology while the first would develop a high manufacturing cost technology would also be $p(1-p)$, so the probability that *either* of the developers would develop a low manufacturing cost alternative when the other develops a high manufacturing cost technology would be $2p(1-p)$.

manufacturing cost technology would be offered a per-unit license fee equal to the entire manufacturing cost differential, $d = H - L$, the SSO would ensure that sponsors would be willing to invest up to the *expected* reduction in downstream manufacturing costs in developing their respective technologies.¹⁴⁰

However, guaranteeing that the “winning” sponsor will receive the entire surplus may result in expected returns to developers that exceed their expected development costs. This could also cause per-unit costs—including license fees—to be higher than necessary, leading to a reduction in the quantity demanded of the downstream product and a consequent deadweight loss.¹⁴¹

Such considerations may cause downstream manufacturers to push for license fees below d . The extent to which manufacturers would want to exert such downward pressure could be limited, however, by the fact that such pressure may reduce the willingness of both current sponsors and others to engage in R&D in the future. Thus, although the failure of the VITA and IEEE Business Review Letters to provide explicit endorsement to collective royalty negotiations might tend to limit the SSO’s exercise of buyer market power, they might also have an unintended side effect. As we have already noted, SSO members have a *joint* incentive not to depress intellectual property royalties below competitive levels because, if they were to do so, the stream of innovations available to them in the future might be adversely

¹⁴⁰ For example, let Q be the sponsor’s estimate, when deciding whether to develop its technology, of the number of units of the downstream product that will ultimately be sold. Let d and p be as defined earlier. Ignoring discounting, the sponsor’s expected patent royalties would be $p(1-p)Qd$. The first factor, $p(1-p)$, is the probability that the sponsor would obtain a royalty, while the second factor, Qd , is the royalties the sponsor would earn if its technology is adopted and guaranteed a per-unit royalty of d . The product of these two factors represents both the maximum amount that the sponsor would be willing to invest to develop the technology and the expected reduction in manufacturing costs that would arise if the sponsor undertook this investment. Note that *neither* sponsor would receive any royalties if *both* developed either a high manufacturing cost or a low manufacturing cost technology.

¹⁴¹ In a more general case, where the number of developers is not fixed, this can also lead to excessive investments by technology developers.

affected.¹⁴² That is, in order for an SSO to assure that innovators will continue to develop technologies for inclusion in future standards, it must maintain a reputation for appropriately rewarding those innovators whose technologies are included in the standards that it adopts. This limits an SSO's incentive to demand low royalties.¹⁴³

Moreover, SSOs are likely to have stronger reputational motives than individual technology sponsors, since the SSOs are likely to participate in all future standard-setting activities that involve their industry, whereas sponsors may have shorter lives and may not be among the leading alternatives when standards are set in the future. For the same reason, it may be difficult for an SSO to adequately "punish" sponsors when they behave opportunistically. This is because those sponsors will not necessarily be participants in future standards competitions held by the same standards body, and so they might not suffer greatly if the "punishments" take the form of a reduced likelihood that the SSO would accept that sponsor's technologies during its future standard-setting efforts.¹⁴⁴

When users negotiate fees *individually* they will want to pay as low a license fee as possible. That is because the rewards to innovators, and their incentives to develop technologies, are

¹⁴² The intensity of this incentive will depend, among other things, on: SSO participants' expectations regarding their abilities to exploit innovations into the future, the extent to which they anticipate that downward pressure on the royalties paid to their current technology sponsors might lead to these sponsors, and other technology sponsors upon whom they might rely in the future, to reduce their future willingness to invest in R&D, and the extent to which they discount future returns.

¹⁴³ Of course, this means only that innovators must be rewarded for the value of their innovations as compared to that of the best alternative. Some have observed that technology users may have only weak incentives to limit license fees that are imposed uniformly on them, especially if they can pass on all or a large portion of any increase to final consumers. See, e.g., Brief Amicus Curiae of Economics Professors and Scholars at 10–12, In the Matter of Rambus Incorporated Before Federal Trade Commission, Apr. 15, 2004; Lerner & Tirole, *supra* note 91, at 1093.

¹⁴⁴ This may be a less significant concern, however, if a sponsor's reputation for engaging in opportunistic behavior spreads to other SSOs. In that case, the reputational cost to the opportunistic sponsor may indeed be significant.

largely determined by the royalties paid by *other* users. In order words, in negotiating license fees, each individual user has an incentive to attempt to free ride on the actions of other users. By contrast, when fees are negotiated *collectively*, the members of an SSO have an incentive to maintain a reputation for rewarding sponsors appropriately, in order to ensure that a stream of future innovations are available to its industry.¹⁴⁵ By failing explicitly to endorse collective license fee negotiations by SSO members, the DOJ Business Review Letters and, for that matter, the rules established by SSOs that prohibit collective price determination, may inadvertently adversely affect the incentives for innovation by *lowering* the fees received by patent holders.

At the same time, it must be recognized that individualized negotiations have the benefit of being tailored to the circumstances of each licensee.¹⁴⁶ As we have noted above,¹⁴⁷ the value of incorporating a particular technology into a standard may differ among users because different users may prefer that different technologies be included. These differences may be difficult to take into account in collective negotiations. This suggests that collective negotiations should be preferred when the differences among users are not large, so that a single royalty rate and non-royalty license terms may be appropriate for most or all users, and the effect of license fees on the incentives to innovate can be most easily accommodated. Where there are significant differences among users, however, standards bodies might face a difficult tradeoff between the need to tailor license fees to the

¹⁴⁵ This assumes that future innovations will be used only by a single industry. Where there is more than one industry, there will remain an incentive for each industry to attempt to free ride on the activities of other industries.

¹⁴⁶ There can be circumstances in which "efficient discrimination," i.e., differences in royalty rates based on the types of differences among users, that has already been noted, might be desirable. However, we are skeptical that ex ante negotiations with large numbers of potential users will often be feasible. Apart from the obvious transactions costs of such arrangements, they also create the potential for "inefficient discrimination," as well as the possibility that individual licensees may ignore the effect of their behavior on the incentives for innovation, something that is less likely when collective negotiations involving all users take place.

¹⁴⁷ See *supra* Section IX (B).

circumstances of different users, which may require individualized negotiations, and the potentially adverse effect of individualized negotiations on the incentives for innovation.

E. *License Fees and Uncertainty*

In determining whether to undertake an R&D project, a technology sponsor will take account both of the probability that its technology will be chosen for inclusion in the standard as well as the royalty it can expect if its technology is chosen. In our earlier analysis, uncertainty about whether a sponsor's technology would be chosen for inclusion in a standard was accommodated by assuming that a sponsor will undertake R&D if the *expected* return from doing so is advantageous. This expected return depends both on the probability that a sponsor will develop a low manufacturing cost technology at the same time that its rival develops a high manufacturing cost technology, which is the probability that it will "win," and on the anticipated payoff from winning.¹⁴⁸ When the sponsor is risk-averse, however, it will be unwilling to undertake the costs associated with R&D unless its expected returns from doing so are larger than the costs of R&D.¹⁴⁹ In other words, because there is uncertainty about whether a sponsor will "win," it may demand a higher return than if its return from R&D was certain.

A different form of uncertainty involves the market conditions that exist after the standard is set and production of the product begins. One example is that inflation may turn out to be higher than anticipated at the time the bids were made.¹⁵⁰ Other examples are where sponsors' licensing costs turn out to be higher than expected or where sales of the final product are lower than

¹⁴⁸ This expected value is the return the sponsor receives when it "wins," multiplied by the probability that only it will develop the low manufacturing cost technology, i.e., the probability that it will "win." For the definition of expected value, *see, e.g.*, DAVID BESANKO, DAVID DRANOVE, MARK SHANLEY, & SCOTT SCHAEFER, *ECONOMICS OF STRATEGY*, at 488 (3rd ed. 2004).

¹⁴⁹ For a definition of risk aversion *see* BESANKO et al., *supra* note 149.

¹⁵⁰ One way to accommodate this concern would be to set license fees as a percentage of final-product revenues rather than as fixed dollar amounts.

expected. In anticipation of such possibilities, sponsors may demand higher license fees than if such uncertainties did not exist.

Alternatively, sponsors may attempt to renegotiate license fees when these developments occur. However, licensors also may try to renegotiate fees even where market conditions have *not* changed if they no longer face competition from technological alternatives. Consequently, licensees are likely to resist such attempts regardless of the sponsors' underlying reasons.¹⁵¹ Indeed, such ex post renegotiation of license fees raises many of the same hold-up-related difficulties that ex ante fee setting is intended to prevent, although, in some circumstances, it may be unavoidable.

X. CONCLUSION

It is economically efficient for the license fee for a technology that is included in a standard to reflect the advantages of that technology over its next-best alternative. This outcome is likely to be at least roughly achieved if license fees are determined before the decision is made to incorporate one of a number of alternative technologies into an industry standard. Moreover, under fairly reasonable assumptions, the license fees that would result from such an ex ante royalty-determination processes will tend to create appropriate incentives for sponsors to engage in R&D of technologies that might be included in future standards.

Although ex ante license fee setting raises the possibility that users might jointly attempt to exercise buyer power to force license rates below "reasonable" levels, SSOs made up of users are likely to resist the temptation to do so if they recognize that such conduct could lead to the reduction of future innovative activity. That is, so long as SSOs are concerned about preserving their reputations for not taking advantage of developers after R&D has been completed, they are unlikely to "unreasonably" exploit their bargaining power in ex ante negotiations. Moreover, although it is recognized that there is a risk that ex ante negotiations with regard to intellectual

¹⁵¹ Indeed, this is the basis for Williamson's skepticism about the benefits of a Demsetz-style auction for the right to be a monopolist. See Oliver E. Williamson, *Franchise Bidding for Natural Monopolies—in General and with Respect to CATV*, 7 BELL J. OF ECON. 73 (1976).

property licensing fees among SSO members might serve as a “cover” for price fixing by SSO members in the downstream market, the benefits will often exceed this risk.

The FTC’s decision in *Rambus* is fully consistent with this view. In this decision, the FTC found that Rambus had concealed its IP rights, which had either led the JEDEC SSO to choose the Rambus technology rather than its alternatives or prevented JEDEC from securing lower license fees from Rambus. When viewed together with the ensuing DOJ Business Review letters, the FTC’s *Rambus* decision promised significant progress in the standard-setting process. Unfortunately, the D.C. Circuit’s decision to overturn the FTC’s ruling threatens to reverse this progress. Most disturbing is the D.C. Circuit’s holding that JEDEC’s loss of an opportunity to seek favorable licensing terms, which resulted from the failure of Rambus to disclose its patent holdings, did not constitute an antitrust harm.

We fear that the *Rambus* decision will have adverse consequences, not only for the licensees of patented technologies, but also for ultimate consumers who may experience higher prices for the products that they purchase and also slower rates of innovation. Technology owners are more likely to withhold information about their IP holdings from SSOs because they now face significantly reduced risks of antitrust liability by doing so. As a consequence, SSOs will increasingly make key technology choices in ignorance of the IP status of the technologies that they are considering. When an SSO unknowingly standardizes on a technology whose proprietary nature has not been disclosed, it affords the IP owner the opportunity to raise royalties to monopolistic levels once the technology is incorporated into the standard and the standard has become entrenched. This can lead to higher costs of production which would result in higher prices to ultimate consumers. Moreover, such prospects may reduce the attractiveness of the SSO process to licensees, leading to their reduced participation in SSOs and consequent reductions in the social benefits of standardization.

Broadly speaking, SSOs may respond to these developments in one or more of the following ways. First, they may expend

resources in order to determine whether the technologies they are considering are encumbered by IP rights, something that they have been reluctant to do in the past. This may lead to slower adoption of new technologies into standards as SSOs attempt to take account of the increased risks of inadvertently adopting technologies for which patent holdings have not been disclosed.

Second, SSOs may continue to place reliance on their own internal disclosure rules, but increase the specificity of the disclosure obligations of their members. Although SSOs are still likely to face considerable burdens in demonstrating that they would have chosen a different technology if sponsors had disclosed their holdings, and thus are far less likely to prevail in antitrust cases, clearer rules may make it easier for them to prevail in actions for breach of contract.

Finally, SSOs may choose to *not* require disclosures of members' IP holdings, but instead to ask members to commit to charge RAND or FRAND royalties if their technologies are included in the standard. Although this may avoid the issue of disclosure altogether, it may require SSOs to seek greater clarity about the meaning of such commitments. If this approach is adopted, the competitive royalty rates that would emerge from an ex ante auction (as, for instance, described in this article) would provide an appropriate benchmark for such RAND or FRAND royalties.