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How Antitrust Law Can Make FRAND Commitments More Effective

ABSTRACT. Much attention has been paid in recent years to legal issues arising from standard setting, assertion of standard-essential patents, and the requirements imposed by standard-setting organizations that standard-essential patents be licensed on reasonable terms. This Feature argues that a fundamental aspect of the antitrust laws, heretofore overlooked in this context, can play an important role in ensuring that the rules established by standard-setting organizations are effective in preventing owners of standard-essential patents from engaging in patent holdup. It has long been a basic principle of antitrust law that when firms collaborate to engage in conduct that has efficiency benefits, like standard-setting, they violate the antitrust laws if their collaboration also harms competition more than necessary to obtain the efficiency benefits. Both standard-setting organizations and their members can violate Section 1 of the Sherman Act if the organization's rules are ineffective in preventing owners of standard-essential patents from exploiting the monopoly power they gain as a result of the standard.

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INTRODUCTION

Compatibility standards comprise a critical part of the information and communications technology sector. From Wi-Fi and 4G cell phone standards to the ubiquitous JPEG and MPEG file formats, many of the benefits generated by the recent and dramatic advances in information technology would have been difficult or impossible to achieve without compatibility standards.

For the past twenty years, antitrust enforcement related to standard setting has focused largely on the interpretation and implementation of the commitments made by patent holders as part of the standard-setting process to license their Standard-Essential Patents (SEPs) on Fair, Reasonable and Non-Discriminatory (FRAND) terms. The Department of Justice (DOJ) and the Federal Trade Commission (FTC) devoted an entire chapter to this topic in their 2007 report on antitrust enforcement and intellectual property rights.¹ The debate over FRAND commitments has continued undiminished in the ten years since the publication of that report.

With respect to SEPs, the most significant and immediate commercial and antitrust concern centers on the SEP owners' command of substantial market power once the standard in question becomes widely adopted. Put simply: without some checks, SEP owners could opportunistically engage in patent holdup, taking advantage of the fact that the firms and users adopting the standard become individually and collectively locked in to the standard over time. Of course, it is precisely this danger of ex post opportunism that motivates market participants and standard-setting organizations (SSOs) to require participants in the standard-setting process to make FRAND commitments in the first place.

By its nature, standard setting involves collaboration among competitors and thus raises core antitrust issues. In this Feature, we argue that existing antitrust laws have an important role to play in ensuring that SSO rules are effective to prevent ex post opportunism. In Part I, we set forth the pertinent background regarding standard setting and the competitive process. In Part II, we explain why effective FRAND rules are needed to prevent exploitation by SEP holders of market power created by the standard-setting process, and we refute arguments that SEP-holder market power and holdup are not a serious problem. In Part III, we explain the important role that antitrust law can play in preventing

1. U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION 33-56 (Apr. 2007), <http://www.ftc.gov/sites/default/files/documents/reports/antitrust-enforcement-and-intellectual-property-rights-promoting-innovation-and-competition-report.s.department-justice-and-federal-trade-commission/p040101promotinginnovationandcompetitionrpto704.pdf> [<http://perma.cc/4P49-7D2F>].

and remedying anticompetitive violations of FRAND commitments and in ensuring that SSOs adopt effective FRAND rules. We explain in particular a heretofore overlooked reason why SSOs and their members can violate Section 1 of the Sherman Act² if the SSO fails to adopt and enforce rules that are effective to prevent SEP owners from exploiting the ex post monopoly power created by the standard. This Section 1 liability facing SSO participants and SSOs works alongside liability under Section 2 of the Sherman Act for unilateral conduct by SEP owners.³

I. STANDARD SETTING AND THE COMPETITIVE PROCESS

The fundamental economics in the information technology sector, driven by network effects, implies that there is enormous value associated with establishing compatibility standards. Popular standards include the mobile broadband standards used in cell phones, which are established by the 3rd Generation Partnership Project (3GPP), and the Wi-Fi technology for wireless local area networks, which is enabled by the 802.11 standard established by the Institute of Electrical and Electronics Engineers (IEEE).⁴

There are many SSOs, and their rules and procedures differ considerably. In addition to IEEE, leading SSOs include the International Organization for Standardization (ISO), the International Telecommunication Union (ITU), the European Telecommunications Standards Institute (ETSI), the Internet Engineering Task Force (IETF), and the World Wide Web Consortium (W3C).⁵ SSOs generally establish standards by holding a series of committee meetings among industry participants. These meetings culminate in a vote on a technical specification that describes what features or attributes a product must have in order to comply with the standard. Most SSOs are open to all industry participants and seek to operate on a consensus basis, applying certain voting rules. SSOs do not normally engage in patent licensing, nor do they specify how patent

2. 15 U.S.C. § 1 (2012).

3. 15 U.S.C. § 2 (2012).

4. For more information about 3GPP, see *About 3GPP*, 3GPP, <http://www.3gpp.org/about-3gpp> [<http://perma.cc/CH8E-2UU3>]. For more information about the IEEE 802.11 Wi-Fi Standards, see *IEEE 802.11 Wi-Fi Standards*, RADIO-ELECTRONICS.COM, <http://www.radio-electronics.com/info/wireless/wi-fi/ieee-802-11-standards-tutorial.php> [<http://perma.cc/69AN-D92X>].

5. For a discussion of these leading SSOs and others, see NAT'L RES. COUNCIL NAT'L ACADS., *PATENT CHALLENGES FOR STANDARD-SETTING IN THE GLOBAL ECONOMY: LESSONS FROM INFORMATION AND COMMUNICATIONS TECHNOLOGY* 31-34 (Keith Maskus & Stephen A. Merrill eds., 2013), <http://www.nap.edu/catalog/18510/patent-challenges-for-standard-setting-in-the-global-economy-lessons> [<http://perma.cc/8ZCP-3ABV>].

royalties will be divided up among patent holders. They leave that to their members, which in some cases form patent pools to address these issues.⁶

SSOs adopt specific policies relating to intellectual property rights (IPRs).⁷ These IPR policies are generally intended to enable the SEP holders to obtain reasonable royalties for licensing their patents, while prohibiting them from charging excessive royalties after other industry participants have committed to the standard. At that point, firms committed to implementing the standard—which we call “implementers”—would find it very costly to avoid using the patented technology. For this purpose, most SSOs require SEP owners to license their SEPs on FRAND terms.⁸

FRAND policies are especially necessary because negotiations between SEP holders and implementers generally take place only after the implementers have used and infringed the technologies claimed by the SEPs. Standards involving information and communications technology can involve hundreds or even thousands of SEPs, many with uncertain boundaries for infringement. In addition, a time lag exists between patent application and patent issuance. For these and other reasons, it is impractical for implementers to enter into negotiations for patent licenses with all SEP owners prior to the establishment of a standard and to their implementation of it.⁹

The fact that patent negotiations generally do not take place until after implementers have used and infringed the technologies has several critical implications. First, at the time of negotiation, implementers are locked into the standard and the technologies claimed by the SEPs—that is, the cost to switch to an alternative technology or standard at that point—ex post—is much greater than it was ex ante, before the patented technology was first included in the standard. Ex post, the patent holder is no longer competing to have its technology included in the standard, nor is it competing to have implementers of the standard use its technology. Instead, because the patent holder owns an asset that is essential to the standard, implementers have no choice but to use the patented technology.

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6. For a general discussion of standard setting with an emphasis on standard-essential patents, see generally *id.*
 7. See Rudi Bekkers & Andrew Updegrove, *A Study of IPR Policies and Practices of a Representative Group of Standards Setting Organizations Worldwide*, U.S. NAT'L ACADS. SCI., BOARD SCI., TECH. & ECON. POL'Y 15-23 (2012), http://sites.nationalacademies.org/cs/groups/pgasite/documents/webpage/pgasite_072197.pdf [<http://perma.cc/FDR3-78SK>] (providing an overview of the policies of SSOs regarding IPRs); see also Benjamin Chiao et al., *The Rules of Standard-Setting Organizations: An Empirical Analysis*, 38 RAND J. ECON. 905 (2007).
 8. Jay P. Kesan & Carol M. Hayes, *FRAND's Forever: Standards, Patent Transfers, and Licensing Commitments*, 89 IND. L.J. 231, 233-35 (2014).
 9. See William F. Lee & A. Douglas Melamed, *Breaking the Vicious Cycle of Patent Damages*, 101 CORNELL L. REV. 385, 404-09 (2016) (explaining several reasons why comprehensive ex ante licensing is neither feasible as a practical matter nor desirable as a policy matter).

If the standard is commercially successful, implementers are willing to pay a much larger royalty for use of the patented technology than they would have paid *ex ante*, when the SEP holder faced competition from other technologies. In these circumstances, the SEP holder can be said to have obtained monopoly power in the market in which the patented technology is licensed for use in implementing the standard.¹⁰

Second, because of lock-in and the implementer's ongoing infringement, the potential for litigation looms large in licensing negotiations. In effect, the parties are negotiating about how to settle an infringement suit, and that negotiation is heavily influenced by their predictions as to what the court will do if they cannot agree. This situation is not unique to SEPs; it arises frequently when firms are faced with patent infringement claims for products they have independently developed or technologies they have inadvertently infringed. Patent law addresses such instances by specifying that patent holders are entitled to "reasonable royalties," defined as the royalties that the parties would have negotiated prior to the infringement and thus prior to lock-in.¹¹ Those hypothetical *ex ante* royalties reflect the market value of the patent license. Notwithstanding the law's embrace of this principle, however, as a practical matter, patent holders are generally able to recover more than the *ex ante* value of the patent when litigation occurs after the implementers are locked in. Further, negotiations in the shadow of litigation after lock-in tend to result in royalties in excess of the *ex ante* or market value of the patented technology.¹²

Third, the shadow of litigation is particularly problematic in the communications and technology sector, in which products typically include hundreds or

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10. See *Rambus Inc. v. FTC*, 522 F.3d 456, 459 (D.C. Cir. 2008); *Broadcom Corp. v. Qualcomm, Inc.*, 501 F.3d 297, 315 (3d Cir. 2007).
 11. See, e.g., *VirmetX, Inc. v. Cisco Sys.*, 767 F.3d 1308, 1326 (Fed. Cir. 2014); *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1324-25 (Fed. Cir. 2009) (offering one definition of a reasonable royalty as what would result from an "ex ante licensing negotiation"); see also *LaserDynamics, Inc. v. Quanta Comput., Inc.*, 694 F.3d 51, 76 (Fed. Cir. 2012) (defining a reasonable royalty as "the value of the patented technology in the marketplace when the infringement began"). See generally *Apple, Inc. v. Motorola*, 869 F. Supp.2d 901, 913 (N.D. Ill. 2012) (Posner, J., sitting by designation) ("The proper method of computing a FRAND royalty starts with what the cost to the licensee would have been of obtaining, just before the patented invention was declared essential to compliance with the industry standard, a license for the function performed by the patent."), *aff'd in part, rev'd in part, vacated in part*, 757 F.3d 1286 (Fed. Cir. 2014); FED. TRADE COMM'N, *THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION* 194 (2011) ("Courts should cap the royalty at the incremental value of the patented technology over alternatives available at the time the standard was defined."); Josh Lerner & Jean Tirole, *Standard-Essential Patents*, 123 J. POL. ECON. 547 (2015).
 12. See, e.g., *Lee & Melamed*, *supra* note 9, at 409-39 (identifying several reasons why *ex post* compensation, including for SEPs, is as a general matter excessive).

thousands of patented technologies. A court-ordered injunction involving such products would deprive the implementer of not only the value of the technology covered by the patent-in-suit, but also the value of the entire product.¹³ Implementers that are forced to bear the risk of an injunction are thus induced to agree to royalties greater than those that would be appropriate if only the value of the patented technology were at stake. Those royalties systematically provide SEP holders with excessive compensation in comparison with the benchmark of ex ante royalties.

These implications of lock-in and ex post dealings are well-understood: they represent an example of the general concept of lock-in and opportunism developed by Oliver Williamson.¹⁴ The Federal Circuit has also recognized the market distortions caused by the inclusion of patented technologies in public standards and the resulting danger of patent holdup involving SEPs.¹⁵

For these and other reasons, the SEP holder has ex post monopoly power that, if left unchecked, would enable it to obtain royalties far in excess of the royalties that it could earn in a competitive market.¹⁶ To address this common problem and limit ex post opportunism by SEP holders, SSOs typically require participants that own SEPs to make certain FRAND commitments. In particular, by requiring a commitment to license on “fair and reasonable” terms, the FRAND requirement aims to prevent, or at least reduce, the extent of monopoly pricing by SEP holders. And by requiring a commitment to license on “nondiscriminatory” terms, the FRAND requirement can prevent SEP holders from extracting monopoly premiums by selective licensing or, more important, migrating their monopoly power from the FRAND-regulated market to unregulated standard-implementing product markets by licensing to only one or a few implementers or licensing to selected implementers on discriminatorily favorable terms.

13. The courts have limited the circumstances under which patent holders can obtain permanent injunctions against infringers in the United States, but they have not eliminated that possibility. See *eBay Inc. v. MercExchange, LLC*, 547 U.S. 388, 391-94 (2006). Moreover, as explained in note 40 *infra*, courts cannot eliminate the risk of injunctions from foreign tribunals or the risk of an exclusion order from the International Trade Commission barring importation of products that include patented technologies.

14. Williamson was awarded the Nobel Prize for this work. For a recent review, see Steven Tadelis & Oliver E. Williamson, *Transaction Cost Economics*, in *THE HANDBOOK OF ORGANIZATIONAL ECONOMICS* 159 (Robert Gibbons & John Roberts eds., 2012).

15. *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1231-33 (Fed. Cir. 2014).

16. Lee & Melamed, *supra* note 9, at 411-33 (explaining in detail why patent holders in general, including SEP holders, have monopoly power ex post in the communications and technology sector); see also Mark A. Lemley & A. Douglas Melamed, *Missing the Forest for the Trolls*, 113 COLUM. L. REV. 2117, 2143-45 (2013) (discussing the reasons that patent damages tend to be overstated).

II. THE NEED FOR EFFECTIVE FRAND COMMITMENTS

Restrictions on ex post opportunism are needed to prevent a wealth transfer from implementers and their customers to SEP holders as a result of monopoly pricing.¹⁷ But much more is at stake.

A. Underlying Economic Principles

Basic economic principles instruct that ex post monopoly pricing by SEP holders harms consumers by raising the cost of products that comply with the standard. Ex post monopoly pricing also creates welfare-reducing deadweight loss in three respects. First, it increases the cost of, and thus reduces the output of, standard-implementing products. Second, and perhaps more important, supracompetitive pricing by SEP holders increases the cost of follow-on inventions that build on or improve the technologies claimed by the SEPs. This cost acts as a tax on follow-on innovation, reducing such innovations and impairing the very process of invention that the patent laws are intended to promote. Third, the prospect of ex post monopoly pricing by SEP holders exaggerates incentives for firms to obtain patents that might become SEPs and, perhaps more important, to jockey for inclusion of their patented technologies in industry standards. The latter incentive in turn could cause delays and induce expensive rent-seeking conduct in the standard-setting process and distort the standards-development process away from optimal technical solutions in ways that further the interests of rent seekers.

These concerns are not universally shared. Indeed, a heated debate regarding the desirability of efforts to prevent ex post opportunism by SEP holders has persisted for the past twenty years. Those who do not share these concerns argue that the greater risk lies in inhibiting monetization of the inventions claimed by SEPs and thus discouraging innovation by SEP holders and those who expect to become SEP holders.

We believe that those who share our concerns have by far the stronger argument. The risk of ex post opportunism is very real. Implementation typically precedes resolution of patent issues, and for good reason. Deferring implementation until the patent issues are resolved would delay the commercialization and innovation process. Implementers are therefore usually locked in to the allegedly infringing technologies well before the issue of patent royalties is addressed. The

17. The implementers, which pay the royalties to the SEP holders, will in the first instance suffer the wealth transfer. Depending on competition in the markets in which implementers sell their standard-compliant products, some or all of the wealth transfer is likely to be passed on to final consumers.

real question is thus how best to prevent opportunism, not whether it is a genuine danger.

Absent rigorous enforcement of effective FRAND commitments or a suitable alternative, SEP holders could take advantage of lock-in to exploit their substantial ex post market power by charging royalties far above the ex ante value of the patented technology, tying non-SEPs to SEPs, and implementing other means discussed below.¹⁸ Economic theory predicts that SEP holders will exploit their positions, and both anecdotal evidence and litigated cases suggest that they have done so.¹⁹

B. Addressing the Patent Holdup Skeptics

Several arguments have been advanced in support of imposing less stringent or no restraints on SEP holders. These arguments are deeply flawed, both empirically and theoretically.

First, some who oppose rigorous enforcement of effective FRAND commitments rely on studies that purport to show that concerns about ex post opportunism leading to excessive royalties are unfounded.²⁰ However, those studies lack proper controls and therefore do not show what they purport to show—namely, that aggregate royalty costs have not hindered innovation or commercialization. The basic shortcoming of these studies is that they do not offer a sensible but-for world in the absence of opportunism as a comparator by which to assess observed behavior. For example, noting that cell phone technology has advanced rapidly in recent years does not prove a lack of costly opportunism by the owners of SEPs for the thousands of technologies included in cell phones.²¹

18. See *infra* Section III.A. We do not have in mind any specific alternatives to well-defined FRAND obligations; and the antitrust principles on which we rely do not require adopting and enforcing any particular kind of SSO policy, so long as the policies adopted are effective to prevent the kinds of ex post opportunism discussed here. If a creative SSO can develop some policy other than a FRAND commitment that can effectively prevent such opportunism, that policy would likely be a suitable alternative. Because we know of no such alternatives, throughout the remainder of this Feature, we will refer to FRAND commitments as the solution to the problem of ex post opportunism by SEP holders.

19. See, e.g., Lee & Melamed, *supra* note 9, at 409-11, 430-31, 438-39; see also *Microsoft Corp. v. Motorola Inc.*, 795 F.3d 1024 (9th Cir. 2015); *Ericsson*, 773 F.3d 1201; *In re Innovatio IP Ventures, LLC Patent Litig.*, No. 11 C 9308, 2013 WL 5593609 (N.D. Ill. Oct. 3, 2013).

20. See, e.g., Reply Submission on the Public Interest by Commissioners Maureen K. Ohlhausen & Joshua D. Wright, *In re Certain 3G Mobile Handsets and Components Thereof*, Inv. No. 337-TA-613, USITC, 4 (July 2015) [hereinafter Ohlhausen & Wright Reply Submission], http://www.ftc.gov/system/files/documents/public_statements/685811/150720itcreplyohlhausen-wright.pdf [<http://perma.cc/E99R-MT2Q>].

21. See, e.g., Alexander Galetovic, Stephen Haber & Ross Levine, *An Empirical Examination of Patent Holdup*, 11 J. COMPETITION L. & ECON. 549, 552 & n.6, 564-70 (2015).

Nor do the studies even purport to show that individual holders of asserted patents are not excessively compensated, or rebut the hypothesis that the prospect of such excessive compensation has created perverse incentives for over-patenting and other welfare-reducing strategies.

Second, others express concerns that effective efforts to prevent ex post opportunism will result in under-compensation of SEP holders. Their concerns rest on mistaken assumptions. First, patent holders are not required to make FRAND commitments. These commitments are the result of an ex ante market bargain. When patent holders do make such commitments, they are voluntarily choosing to gain volume (by including their technologies in the standard) in exchange for unit price (by agreeing to charge only FRAND royalties). If the standard is successful, that bargain is generally very profitable; if the standard is not successful, the bargain leaves the SEP holder no worse off than if it had not made the commitment.

Further, enforcing sound, rigorously-defined FRAND commitments would enable SEP holders to recover the ex ante value of their technology—that is, the value of the patented technology before implementers were locked in. Ex ante value reflects what the SEP holder would have been paid by implementers of the standard in an ex ante bargain, and is the proper measure of the market value of the SEPs.²² As we explain below, effective prevention of ex post opportunism need not, and should not, enable SSOs to act as a buyers' cartel or require SEP holders to accept less than the market value of their patents as determined without ex post opportunism.

Third, some critics of effective measures to prevent ex post opportunism argue that SEP holders, too, are locked in because of the costs they have already incurred in developing the patented technology. They argue that SEP holders are thus vulnerable to opportunistic behavior by implementers of the standard that seek to take advantage of the SEP holders' sunk costs in order to obtain patent licenses at low royalties.²³ This argument is deeply flawed because it rests on a fundamental misunderstanding of how the development of new technologies takes place in a market economy as well as how markets for the licensing of technology operate.

22. Technology markets, including markets for the licensing of patented technologies, are generally based on such ex ante bargains, and ex ante value is the standard for determining reasonable royalties in patent infringement cases. See Bekkers & Updegrave, *supra* note 7, at 24 n.31; see also Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc., 809 F.3d 1295, 1305 (Fed. Cir. 2015) (“We therefore reaffirm that reasonable royalties for SEPs generally – and not only those subject to a RAND commitment – must not include any value flowing to the patent from the standard’s adoption.”); ResQNet.com, Inc. v. Lansa, Inc., 594 F.3d 860, 868-69 (Fed. Cir. 2010) (presenting a hypothetical negotiation between patentee and infringer when the infringement began).

23. See, e.g., Ohlhausen & Wright Reply Submission, *supra* note 20, at 3 n.2.

Typically, new technologies are licensed only after they have been developed, regardless of whether they are included in an industry standard.²⁴ By the time the owner of the new technology negotiates licenses with users, the owner has already incurred various R&D expenses. This is common in the development of all types of products.²⁵ In effect, technology developers make speculative investments. Technology developers thus bear a risk that their technology will not be sufficiently compensated by an arms' length market bargain to provide an attractive return on investment. But in this respect, the situation facing a technology developer seeking to license its intellectual property is no different from that of anyone else that makes a speculative investment, whether in technology, real estate, corporate securities, or any other industry. Regardless of the magnitude of its investment, the investing party will be able to obtain the market value of its asset whenever it endeavors to sell or license it. Requiring that buyers guarantee an adequate return to those who make speculative investments would be antithetical to the operation of the market system and would badly distort investment incentives.

An implementer that has been promised reasonable access to the essential patented technologies faces a very different problem. Unless that promise of access is rigorously defined and enforced, the implementer is vulnerable to extraction of supracompetitive royalties based, not just on the value of the patented technology, but on the entire value of the implementer's standard-compliant product. At the time of negotiation, the implementer is locked in, not just to its investment in the patented technology, but also to all of the other components in the infringing product. The implementer is therefore vulnerable to a kind of *ex post* opportunism that is very different from the risk knowingly incurred by a technology developer.

In any event, for good reason, antitrust law does not permit a firm introducing a new product or technology to act anticompetitively on the ground that it cannot otherwise obtain sufficient compensation for its sunk R&D costs.²⁶ That

24. The exception occurs when one or more potential users of the technology agree to fund its development, for example, by entering into a research joint venture with the developer or developers of the technology.

25. The principles discussed here apply whether or not the firm developing the new technology is vertically integrated into one or more downstream uses of the technology.

26. *See* *United States v. Apple*, 791 F.3d 290, 298 (2d Cir. 2015) (rejecting the argument that a firm might engage in otherwise illegal conduct if necessary to compete against an incumbent monopoly as “a concept of marketplace vigilantism that is wholly foreign to the antitrust laws”). Indeed, permitting anticompetitive conduct to ensure that a firm receives an adequate return on investment would be the antithesis of antitrust law, which is based on the premise that lawful competition should determine the appropriate rewards to investment. *See, e.g.*, *United States v. Socony-Vacuum Oil Co.*, 310 U.S. 150, 213 (1940); *United States v. Trans-Mo. Freight Assoc.*, 166 U.S. 290, 321-24 (1897).

kind of self-help would be especially inappropriate in the context of SEP licensing, because enabling SEP owners to engage in opportunism would harm all implementers, including those that would readily pay the patent holder the ex ante value of its invention. Allowing SEP owners to engage in such opportunism would inhibit innovation and the adoption of new technologies by implementers, which are often significant innovators themselves.

Fourth, others who oppose effective measures to prevent ex post opportunism argue that so-called “patent hold-out” by implementers – the unwillingness of some implementers to bargain in good faith for patent licenses – is a more serious problem.²⁷ We know of no factual support for this argument. Moreover, if the implementers are infringing valid patents, they are required by the patent statute to pay at least a reasonable royalty and may be liable for treble damages.²⁸ The issue, therefore, is not whether the implementer would prefer not to pay for a license, but rather whether there is a need for special rules in patent infringement cases – unavailable in other settings – to deal with alleged debtors that would rather litigate than settle on the terms offered to them.

In a recent speech, the Assistant Attorney General for Antitrust, Makan Delrahim, made a different argument about what he calls “collective hold-out.”²⁹ Delrahim seems to have in mind implementers acting “together within a standard-setting organization” in order “to impose anticompetitive licensing terms” before the standard is established.³⁰ This concern should provide no basis to permit SSOs to refrain from adopting and enforcing effective FRAND commitments, much less to stop them from doing so.

In the first place, we know of no instance in which the feared “collective hold-out” has happened in the context of modern communications and information industries, and Delrahim cites none. Moreover, SSOs are a form of industry and competitor collaboration, and the creation and promotion of standards is usually procompetitive and efficiency-enhancing. These procompetitive activities and

27. See, e.g., Richard A. Epstein & Kayvan B. Noroozi, *Why Incentives for ‘Patent Holdout’ Threaten To Dismantle FRAND, and Why It Matters*, 32 BERKELEY TECH. L.J. (forthcoming) (manuscript at 15-21), http://ssrn.com/abstract_id=2913105 [<http://perma.cc/22BZ-PTEL>].

28. See 35 U.S.C. § 284 (2012).

29. Makan Delrahim, Assistant Att’y Gen., Antitrust Div., Dep’t of Justice, Remarks at the USC Gould School of Law’s Center for Transnational Law and Business Conference (Nov. 10, 2017), <http://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-usc-gould-school-laws-center> [<http://perma.cc/X46Q-KM6N>].

30. *Id.*

rules of SSOs—including FRAND requirements—cannot therefore be condemned as naked, cartel-like behavior. Instead, they should be assessed for anti-trust purposes under the Rule of Reason.³¹

This does not mean that FRAND requirements can never violate the antitrust laws. FRAND requirements are intended to ameliorate the problem of ex post monopoly power created by the collective action of the SSO. They should do so by, inter alia, constraining monopoly pricing so that ex post royalties will be closer to the competitive ex ante price. As long as FRAND requirements do not entail the use of market power to force patent holders to accept royalties at lower levels, they should not be regarded as an unlawful exercise of collective buyer power. To our knowledge, no SSO has required patent holders to accept less than the ex ante price; and the kind of effective FRAND commitments we advocate, and believe the law requires, would not require that patent holders do so.

Delrahim suggests that any effort by an SSO to enact meaningful FRAND commitments is problematic because “[e]very incremental shift in bargaining leverage toward implementers of new technologies acting in concert can undermine incentives to innovate.”³² But excessive royalties undermine incentives for follow-on innovation and can have adverse economic consequences as well. The patent laws are intended to limit, not maximize, the royalties to which patent holders are entitled.³³ Delrahim’s approach is inconsistent with both sound economic analysis and the policies animating patent law. FRAND commitments that reduce excessive royalties further the policies of both the antitrust laws and the patent laws.

Delrahim also suggests more generally that restrictions on the availability of injunctions for patent holders undermine the legal rights of patent holders. This position was squarely rejected by the Supreme Court in *eBay v. MercExchange*, and for good reason.³⁴ In the first place, the patent statute gives the patent holder no more than “the attributes of personal property,” including whatever rights of

31. See generally U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, ANTITRUST GUIDELINES FOR COLLABORATIONS AMONG COMPETITORS 8 (2007) (“If, however, participants in an efficiency-enhancing integration of economic activity enter into an agreement that is reasonably related to the integration and reasonably necessary to achieve its procompetitive benefits, the Agencies analyze the agreement under the rule of reason, even if it is of a type that might otherwise be considered per se illegal.” (footnote omitted)).

32. Delrahim, *supra* note 29.

33. The patent statute specifies and thus limits the infringement remedies to which a patent holder is entitled. See, e.g., 35 U.S.C. § 284 (2012) (providing for compensatory damages not less than a “reasonable royalty” and enhanced damages up to a specified maximum in certain cases). Numerous cases have held that there are limits on the amounts a patent holder may recover and that courts will not support efforts to extract greater amounts. See, e.g., cases cited *supra* notes 11 and 19.

34. *eBay, Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 391-94 (2006).

exclusion personal property provides.³⁵ Those rights do not include an unqualified right to an injunction. Moreover, the purpose of patent law is to promote innovation, not to maximize the returns to patent holders; and the remedies for patent infringement provided by the patent statute reflect that goal. Allowing patent holders to use the threat of injunctions to engage in patent holdup would *obstruct* innovation by leading to royalties in excess of those in an *ex ante* market bargain.

The proper balance, therefore, is to encourage SSOs to adopt effective policies to prevent *ex post* holdup or other forms of excessive compensation for SEP holders, while prohibiting SSO policies or actions that are likely to force SEP holders to accept compensation at less than the market value of their patents as determined without *ex post* opportunism.

III. THE ROLE FOR ANTITRUST LAW TO ENSURE THAT FRAND COMMITMENTS ARE EFFECTIVE IN PREVENTING EX POST OPPORTUNISM

In this Part, we explain why contract and patent law are not sufficient to ensure that FRAND commitments are effective in preventing *ex post* opportunism. Antitrust law is also needed to constrain anticompetitive conduct by both SEP holders and SSOs.

Contract and patent law certainly play major roles in rendering FRAND commitments effective. Contract law principles can be employed to determine the FRAND rate and ensure royalties are collected. Contract law also can operate to enforce the “nondiscrimination” prong of a FRAND commitment and thereby prevent SEP owners from discriminating against certain implementers.³⁶ Patent law operates, following *eBay*, by limiting the use of injunctions for SEP owners that have made FRAND commitments. Patent law also operates by setting reasonable royalties, in principle, at the level to which the SEP owner and the im-

35. 35 U.S.C. § 261 (2012).

36. See *TCL Commc'n Tech. Holdings, LTD. v. Telefonaktiebolaget LM Ericsson*, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635, at *55 (C.D. Cal. Dec. 21, 2017) (holding that the nondiscrimination prong in ETSI's rules was designed to ensure that standardization benefits all implementers, so Ericsson's discrimination against TCL was a violation of ETSI's rules, even if that discrimination did not rise to the level of a violation of the Sherman Act).

plementer would have agreed in a hypothetical negotiation prior to the establishment of the standard,³⁷ based on the smallest saleable patent-practicing component of the infringing device.³⁸

Experience and economic principles, however, teach that contract and patent law are not sufficient to guard against patent holdup. For a variety of reasons, both court-ordered patent remedies and licenses negotiated in the shadow of litigation tend to overcompensate patent holders, even when they purport to be based on the ex ante value of the patents.³⁹ While the *eBay* case has limited the availability of injunctions in infringement cases involving SEPs, it has not eliminated that possibility or the bargaining leverage that the prospect of an injunction can confer upon SEP holders in royalty negotiations with infringers.⁴⁰

Some scholars have suggested that courts should grant an injunction to a SEP holder if an implementer is found to have refused an offer that was subsequently deemed to have been FRAND-compliant.⁴¹ However, this proposal does not solve the ultimate problem; it would not eliminate the pressure on implementers to accept offers that they regard as noncompliant, for fear that a court

37. See, e.g., *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201 (Fed. Cir. 2014); *In re Innovatio IP Ventures, LLC Patent Litig.*, 2013 WL 5593609, at *4-8 (N.D. Ill. Oct. 3, 2013); *Microsoft Corp. v. Motorola, Inc.*, No. C10-1823JLR, 2013 WL 2111217, at *14-20 (W.D. Wash. Apr. 25, 2013); see also *IP Innovation L.L.C. v. Red Hat, Inc.*, 705 F. Supp. 2d 687, 689 (E.D. Tex. 2010) (“A reasonable royalty contemplates a hypothetical negotiation between the patentee and the infringer at a time before the infringement began.”).

38. See *VirnetX, Inc. v. Cisco Sys., Inc.*, 767 F.3d 1308, 1327 (Fed. Cir. 2014); *LaserDynamics v. Quanta Comput.*, 694 F.3d 51, 67 (Fed. Cir. 2012).

39. These reasons include, among others, use by courts of ex post factors that reflect lock-in and other commercial developments that tend to exaggerate the apparent value of the patent, allocating to the value of the patent value actually attributable to other components of a multi-component product, and reliance on license agreements negotiated after lock-in. See Lemley & Melamed, *supra* note 16, at 2178 (explaining that patent damages and the risk of such awards allow patent holders to obtain royalties and settlements “in excess of ex ante incremental value of the patented technology”); see also Lee & Melamed, *supra* note 9, at 417-33, 438-39 (discussing how the law overcompensates patent holders by “contaminating the hypothetical negotiation with ex post considerations”); Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1994-2010 (2007) (discussing how the threat of injunctions and negotiated royalty rates contribute to overcompensation of patent holders).

40. Moreover, *eBay* applies only within the United States and thus does not prevent SEP owners from obtaining bargaining leverage based on the threat of an injunction in other jurisdictions. Nor does it prevent SEP holders from obtaining exclusion orders from the International Trade Commission barring the importation of infringing products. See 19 U.S.C. § 1337(a)(1)(B)(i), (a)(2), (d) (2012).

41. See, e.g., Damien Geradin & Miguel Rato, *Can Standard Setting Lead to Exploitative Abuse?: A Dissonant View on Patent Hold-up, Royalty Stacking and the Meaning of FRAND*, 3 EUR. COMPETITION J. 101, 118-19 (2007) (arguing that a FRAND commitment should not preclude seeking an injunction when good faith negotiations have failed).

will reach a different conclusion at a later time and expose them to patent holdup. That approach would also enable SEP owners to pressure implementers to accept offers even when the implementers believe that the asserted SEPs are not valid or not infringed. Such pressure predictably induces settlements on terms more onerous to implementers than the ex ante value of the SEPs.⁴² Instead, the proper approach would be to make injunction remedies available only if the implementer refuses to pay the FRAND rate after that rate has been determined.⁴³

A. Anticompetitive Conduct by SEP Holders

Courts have already recognized that, in some situations, antitrust cases can be brought against SEP holders under Section 2 of the Sherman Act.⁴⁴ For example, a SEP holder that makes a FRAND commitment without intending to comply, and thereby induces the SSO to include its technology in the standard, unlawfully obtains its monopoly and thus violates Section 2.⁴⁵ In that situation, the SEP holder could be liable for damages to patent holders on technologies wrongfully excluded from the standard, and to implementers harmed by the SEP holder's subsequent exercise of the unlawfully obtained monopoly power.⁴⁶ However, these kinds of Section 2 cases are unlikely to have a significant impact on the efficacy of measures designed to prevent ex post opportunism. This is

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42. The European Court of Justice has taken a better approach, ruling that a SEP holder that has made a FRAND commitment cannot obtain an injunction against an implementer unless it has first made a royalty offer to that implementer and “the alleged infringer has not diligently responded to that offer, in accordance with recognised commercial practices in the field in good faith . . . [with] no delaying tactics.” See Case C-170/13, *Huawei Techs. Co. v. ZTE Corp.*, 2015 E.C.R. C 302. Even this approach, however, does not eliminate the bargaining leverage created for the SEP holder from the risk that the implementer will be wrongfully found after-the-fact not to have engaged in good faith negotiation.
43. This approach gives the implementer an incentive to accept a reasonable offer rather than litigate because the reasonable ex ante value of the patents would appropriately be discounted to reflect the likelihood that the patents would be found to be invalid or not infringed. This is the normal situation when parties negotiate patent licenses in the shadow of litigation in the absence of lock-in, and in circumstances where the court is expected to award ongoing royalties rather than issue an injunction if the patent is found valid and infringed.
44. 15 U.S.C. § 2 (2012).
45. *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297, 303 (3d Cir. 2007) (holding that the plaintiff had stated a claim for monopolization under Section 2 of the Sherman Act when the defendant intentionally deceived private standards-determining organizations); see also *Conwood Co. v. United States Tobacco Co.*, 290 F.3d 768, 788 (6th Cir. 2002) (determining that misrepresentation and other tortious conduct can meet the anticompetitive conduct element of unlawful monopolization).
46. Cf. *Walker Process Equip., Inc. v. Food Mach. & Chem. Corp.*, 382 U.S. 172 (1965) (holding that the enforcement of a patent procured by fraud may violate Section 2 of the Sherman Act and that damages may be available to the injured party).

because they require the plaintiff to prove both that the FRAND commitment was fraudulent when made and that it caused the inclusion of the patented technology in the standard and, thus, created the SEP holder's monopoly. Both of these prongs are problematic and difficult to prove: a well-counseled firm can avoid creating discoverable materials showing that it never intended to abide by its FRAND commitment, and a plaintiff will have a difficult time proving at the time of trial several years later that a given standard would not have been adopted absent the SEP holder's FRAND commitment.

Plaintiffs may bring other antitrust claims against SEP holders, depending on the particular conduct and circumstances. First, a SEP holder might violate Section 2 if it refuses to license to an implementer in violation of a FRAND commitment, and if that refusal enables the SEP holder to gain or preserve market power in a market in which the implementer does or would otherwise compete.⁴⁷ At first glance, an antitrust claim of that type might seem to face long odds. The Federal Circuit held in *CSU, LLC v. Xerox Corp.* (CSU) that a unilateral refusal to license a lawfully obtained patent does not violate the antitrust laws.⁴⁸ Although that case has been soundly criticized for giving patent holders an exemption from the antitrust laws that is not required by the patent statute and is not available to owners of tangible property,⁴⁹ and the Supreme Court has in recent years repeatedly overturned Federal Circuit law that it found to be too protective of patent holders, the Court has not yet directly departed from or cast doubt on CSU's holding. More important, in *Verizon v. Trinko*,⁵⁰ the Supreme Court expressed great skepticism about unilateral, unconditional refusal-to-deal cases. *Trinko* involved violations of regulatory duties imposed by the Telecommunications Act of 1996 and enforced by the Federal Communications Commission (FCC). The Court held that violation of a non-antitrust requirement is not sufficient for a refusal to deal to be deemed wrongful or anticompetitive conduct for

47. See generally *Aspen Skiing Co. v. Aspen Highlands Skiing Corp.*, 472 U.S. 585 (1985) (holding that a monopolist violated Section 2 of the Sherman Act when it refused to engage in otherwise profitable dealings with another firm in order to gain market power).

48. *In re Indep. Serv. Orgs. Antitrust Litig.* (CSU, LLC v. Xerox Corp.), 203 F.3d 1322, 1327 (Fed. Cir. 2000) ("In the absence of any indication of illegal tying, fraud in the Patent and Trademark Office, or sham litigation, the patent holder may enforce the statutory right to exclude others from making, using, or selling the claimed invention free from liability under the antitrust laws.").

49. See, e.g., A. Douglas Melamed, Ali M. Stoeppelwerth & Barbara Blank, *Refusals to Deal in Patents and Patented Goods*, in 3 ISSUES IN COMPETITION LAW AND POLICY 2061, 2071-73 (Wayne D. Collins, et al. eds., 2008); Howard A. Shelanski, *Unilateral Refusals to Deal in Intellectual and Other Property*, 76 ANTITRUST L.J. 369, 387 (2009).

50. *Verizon Commc'ns Inc. v. Law Offices of Curtis V. Trinko, LLP*, 540 U.S. 398 (2004).

antitrust purposes.⁵¹ Some have understood the decision to mean that termination of a prior course of dealing might be necessary for a successful refusal-to-deal claim.⁵² In the absence of a FRAND commitment, a simple, unilateral refusal to license case would be unlikely to succeed.

There is, however, another line of antitrust cases that would support finding antitrust liability for a refusal to deal that violates a FRAND commitment. These are cases in which a monopolist uses a refusal to deal to extend its regulated monopoly into an unregulated downstream market, in order to exercise market power that it was unable to exercise in the regulated market. The Supreme Court embraced such a theory in *Otter Tail Power Co. v. United States*.⁵³ William Baxter, Assistant Attorney General for Antitrust in the Reagan Administration, famously vowed to litigate “to the eyeball” the government’s case against AT&T, which was based on this theory of regulatory evasion.⁵⁴ The Department of Justice ultimately settled that case when AT&T agreed to be broken into eight separate companies, each of which was subject to significant post-divestiture restrictions. By analogy, a SEP holder’s refusal to license in violation of a FRAND commitment under circumstances that enable or enhance the creation of market power in a related market not subject to a FRAND commitment would seem to violate Section 2. This would be true if the refusal to deal enhanced the SEP holder’s market power as an implementer of the standard or if the SEP holder’s refusal to deal enabled an unaffiliated implementer to gain market power for which it compensated the SEP holder by inflated royalties for a license to the SEPs or otherwise.⁵⁵

Second, a SEP holder’s violation of the nondiscrimination requirement of a FRAND commitment could also violate Section 1 of the Sherman Act. If a SEP

51. *Id.* at 405-06, 415.

52. *See, e.g.,* Jonathan I. Gleklen, *The ISO Litigation Legacy of Eastman Kodak Co. v. Image Technical Services: Twenty Years and Not Much to Show for It*, 27 ANTITRUST 56, 61 (2012). Lower courts have taken up this line of reasoning. *See, e.g.,* *Kinderstart.com LLC v. Google, Inc.*, 2006 WL 3246596, at *10 (N.D. Cal. July 13, 2006) (dismissing a refusal to deal claim against Google by reasoning that, as distinguished from the defendant in *Aspen Skiing Co.*, defendant Google had not had prior dealing with the plaintiff).

53. 410 U.S. 366 (1973).

54. *See* Judi Hasson, *Justice Department to Press AT&T Case*, UPI (Apr. 9, 1981), <http://www.upi.com/Archives/1981/04/09/Justice-Department-to-press-ATT-case/4428355640400> [<http://perma.cc/6DYC-ZW8X>]. Baxter stated: “I intend to litigate it to the eyeball . . . I do not intend to fold up my tent and go away because the Department of Defense has expressed its concern.” *Id.*

55. In the latter case, the SEP holder would in effect both evade regulation of its patent monopoly and sell its market power to the implementer. The arrangement might be deemed to be a conspiracy to monopolize in violation of Section 2 or an unlawful agreement in violation of Section 1.

holder agrees to give certain implementers exclusive licenses or grant them preferential terms, those agreements could violate Section 1 of the Sherman Act if they injure or are likely to injure competition among implementers.⁵⁶ The fact that the exclusive or preferential licenses violated the SEP holder's FRAND commitment would not be material to the violation, but it would probably influence the antitrust decision maker and, depending on the factual context, could undermine the SEP holder's efforts to demonstrate that those licenses served some procompetitive purpose.

Third, a SEP holder's insistence on tying SEPs together with other patents (or goods) in licensing deals could be seen as violating Section 1. By insisting that implementers that want a license to the SEPs also license non-SEP patents, the SEP holder can extract more consideration for the non-SEP patents than it otherwise could. That extra consideration is properly attributable to the SEPs, so the scheme can be seen as a means of obtaining more than a "reasonable" royalty for the SEPs and thus a violation of the FRAND commitment, much like the regulatory evasion in *Otter Tail*. In most instances, there is separate demand for the SEPs and the other patents, so they are likely to be deemed separate products for tying purposes.⁵⁷ Therefore, because the SEP holder has market power in the technology market in which the SEPs are licensed, the arrangement could well be deemed an unlawful tying arrangement.⁵⁸

The SEP holder might respond by pointing to language in *Jefferson Parish* suggesting that the Court's quasi per se rule applicable to tying applies only where the buyer (in this case, the implementer) does not *want* to buy the tied product (in this case, the license to the non-SEP patents) from the seller.⁵⁹ On the basis of that language, the SEP holder might argue that the tying arrangement does not violate the antitrust laws if the implementer wanted to license both the SEPs and the non-SEPs, even if the implementer would have preferred that they not be tied together. However, it is doubtful that the brief passage from *Jefferson Parish*, which was written in a very different context, can be read so

56. See, e.g., *In re Toys "R" Us, Inc.*, 5 Trade Reg. Rptr. (CCH) ¶24,516 (F.T.C., Dkt. 9278, Oct. 13, 1998), *aff'd on other grounds sub nom*, *Toys "R" Us, Inc. v. FTC*, 221 F.3d 928 (7th Cir. 2000) (noting that "it is hornbook law that exclusive dealing contracts that tie up 40% or more of the supply in a relevant antitrust market can create cognizable competitive problems"); *Twin City Sportservice, Inc. v. Charles O. Finley & Co.*, 676 F.2d 1291 (9th Cir. 1982) (holding that exclusive dealing contracts for concession rights at sports arenas violated the rule of reason).

57. See *Jefferson Par. Hosp. Dist. No. 2 v. Hyde*, 466 U.S. 2, 18-22 (1984) (holding that products are deemed to be separate products for tying purposes if there is separate demand for them).

58. See *id.* at 9, 13-14 (holding that the tying of separate products when the seller has market power over at least one of them is unlawful per se.).

59. *Id.* at 12 (explaining that an unlawful tying arrangement involves forcing a buyer to purchase something that the buyer "either did not want at all, or might have preferred to purchase elsewhere on different terms").

broadly. Even if that language might ordinarily preclude a tying claim involving multiple products that the buyer wants to purchase from the seller, it should not do so in the case of a tying arrangement that violates a FRAND commitment. The rationale for the *Jefferson Parish* dicta is a variation of the one-monopoly-profit theory—the idea that, if the buyer wants to purchase both the tying and the tied product from the seller, the seller cannot increase its market power by, in effect, allocating some of the consideration for the tying product to the tied product. This rationale has no application in the FRAND context, where the SEP holder has already agreed to limits on its market power. The tying arrangement simply serves to enable the SEP holder to violate the FRAND commitment and thus to exercise market power not otherwise available to it.⁶⁰

B. Anticompetitive Conduct by SSOs and Their Members

Antitrust enforcement aimed only at SEP holders is not sufficient to prevent or remedy ex post opportunism. First, as described in Part I, that kind of enforcement must be implemented separately for each patent holder, and for many standards, there are hundreds or even thousands of SEP holders. Second, some of the most common kinds of opportunism are arguably beyond the reach of antitrust claims against SEP holders.⁶¹ Moreover, enforcement aimed at SEP holders is not directed at the basic problem: the failure of the SSOs to take adequate steps to prevent the ex post opportunism that the SSOs' conduct enabled.

There is, therefore, another important role for Section 1 of the Sherman Act to help guard against ex post opportunism by SEP holders—one that the courts have not yet had occasion to recognize. This role is soundly based on well-established Supreme Court precedent regarding the application of Section 1 to activities by SSOs and their members.

1. The Basic Legal Principles

The starting point in the analysis is the recognition that, while SSOs provide substantial economic value, they also inherently give rise to antitrust risks. SSOs are large, industry-wide organizations whose members include multiple competitors in various industry segments. Collaboration among competitors needs

60. See Erik Hovenkamp, *Tying, Exclusivity, and Standard-Essential Patents*, 19 COLUM. SCI. & TECH. L. REV. 79, 85-87 (2017).

61. See, e.g., *Rambus Inc. v. FTC*, 522 F.3d 456, 467 (D.C. Cir. 2008) (holding that avoiding a FRAND obligation is not itself injury to competition for purposes of Section 2 of the Sherman Act).

to be conducted with great care, lest it reduce competition beyond what is necessary to achieve benefits of greater value. It is inconceivable, for example, that competitors could ordinarily agree on product specifications without violating Section 1, which prohibits unreasonable restraints of trade or anticompetitive agreements.⁶² Public technology standards established by SSOs are nevertheless generally lawful because they are necessary to facilitate interoperability and interconnection of technology-dependent devices. They can also address problems of coordination among suppliers of complements, which does not ordinarily give rise to antitrust concerns.⁶³ Trickier from an antitrust perspective, they also facilitate coordination among competitors in a way that can enhance competition and promote economic efficiency.⁶⁴

Despite the procompetitive benefits generally associated with standard setting by SSOs, such activities do not fall into a safe harbor insulated from the antitrust laws. To the contrary, the Supreme Court and the lower courts have repeatedly held that both SSOs and their members can violate Section 1 of the Sherman Act. For example, in *Allied Tube & Conduit Corp. v. Indian Head, Inc.*, the Supreme Court held that a group of manufacturers violated Section 1 when they manipulated the standard selection process in order to exclude a competing technology from the standard.⁶⁵ And in *American Society of Mechanical Engineers, Inc. v. Hydrolevel Corp.*, the Court found that a scheme by a member company and an officer of the SSO to cause a competitor's product to be wrongfully deemed noncompliant with the standard violated both Sections 1 and 2 of the Sherman Act.⁶⁶

62. See, e.g., *Nat'l Macaroni Mfrs. Ass'n v. FTC*, 345 F.2d 421 (7th Cir. 1965) (holding that an agreement among members of a trade association restricting the ingredients to be used in macaroni and other products violates the antitrust laws).

63. See, e.g., *Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition*, U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N 33-56 (2007), <http://www.ftc.gov/sites/default/files/documents/reports/antitrust-enforcement-and-intellectual-property-rights-promoting-innovation-and-competition-report.s.department-justice-and-federal-trade-commission/po40101promotinginnovationandcompetitionrpto704.pdf> [<http://perma.cc/E2HL-KQAC>].

64. See, e.g., *id.* at 57-86; see also *Broad. Music, Inc. v. Columbia Broad. Sys., Inc.*, 441 U.S. 1 (1979) (holding that an arrangement for blanket licensing fees set by a licensing agency addressed difficult coordination problems and thus was not per se unlawful).

65. 486 U.S. 492 (1988). The Court explained that industry-wide standard setting is permitted under the antitrust laws "only on the understanding that it will be conducted in a nonpartisan manner offering procompetitive benefits." *Id.* at 506-07.

66. 456 U.S. 556 (1982); see also *Radiant Burner, Inc. v. Peoples Gas Light & Coke Co.*, 364 U.S. 656 (1961) (holding that the association's certification process operated as group boycott that wrongfully excluded the competitor's product).

The key antitrust question, therefore, is: how does the law reconcile the legitimate purpose of collaborative standard setting with its likely creation of market power for SEP holders? The answer is found in the fundamental principle of antitrust law that, when firms – and especially competitors – collaborate, even for a legitimate purpose, their collaboration must be no more restrictive of competition than reasonably necessary to enable achievement of the legitimate purpose.

This principle has its origins in the common law⁶⁷ and in some of the earliest U.S. antitrust cases.⁶⁸ It means not just that the collaboration in question – for present purposes, SSO rules and practices regarding the creation of standards and the licensing of SEPs – must on balance enhance competition or consumer welfare, but also that the collaboration is unlawful if a different set of rules and practices could largely achieve the intended benefits with less harm.⁶⁹ As the Court explained in *Allied Tube*, “[a]n association cannot validate the anticompetitive activities of its members simply by adopting rules that fail to provide . . . safeguards” against conduct by members “with economic interests in restraining competition.”⁷⁰

This principle has repeatedly been expressed in lower court decisions and antitrust enforcement agency guidelines. In *Kreuzer v. American Academy of Periodontology*, which concerned the lawfulness of a professional association’s rules of practice, the court reasoned as follows: “[A] practice intended to benefit the public may have a collateral adverse effect on competition. If it does, then such a practice must be the least restrictive means of achieving the desired goal and the public benefit rendered must outweigh the adverse effect on competition.”⁷¹ And the U.S. enforcement agencies’ Competitor Collaboration Guidelines make clear that when a collaboration among competitors harms competition or creates market power – as the creation by SSOs of monopoly power for SEP holders surely does – that harm must be justified by an offsetting, procompetitive justification.

67. See, e.g., *Horner v. Graves* (1831), 131 Eng. Rep. 735; 7 Bing. 735, 743 (describing a “reasonable restraint of trade” as not “larger than . . . necessary” or “so large as to interfere with the interests of the public”).

68. See, e.g., *United States v. Addyston Pipe & Steel Co.*, 85 F. 271, 282 (6th Cir. 1898) (Taft, J.) (“[N]o . . . restraint of trade can be enforced unless . . . it is merely ancillary to the main purpose of a lawful contract, and necessary to protect the covenantee[’s] . . . enjoyment of the legitimate fruits of the contract, or . . . from the dangers of an unjust use of those fruits by the other party.”).

69. See C. Scott Hemphill, *Less Restrictive Alternatives in Antitrust Law*, 116 COLUM. L. REV. 927, 937 (2016) (explaining that the “less restrictive alternative” principle “goes beyond the net-effects test” and asks whether there is an alternative to the conduct in question “that serves the same beneficial goal with less anticompetitive effect”).

70. 486 U.S. at 509.

71. 735 F.2d 1479, 1496 (D.C. Cir. 1984) (emphasis added).

It is not enough to show that the collaboration created procompetitive efficiencies. To the contrary, if the participants “could achieve similar efficiencies by practical, significantly less restrictive means,” the enforcement agencies regard the competitive harm as not necessary to achieve the procompetitive benefits and thus not justified by them.⁷²

In the standard-setting context, this principle requires that the SSO and its members take effective steps to minimize the harm from the monopolies that their collaboration confers upon SEP holders. Unless the SSO can demonstrate that it would have been unable to promulgate the standard or a suitable alternative without permitting the opportunistic *ex post* exercise of market power by SEP holders, the SSO must either avoid the inclusion of patented technologies in public standards or take effective measures to prevent SEP holders from exercising the monopoly power created by the standard.

2. *Why Antitrust Enforcement Is Necessary*

Some SSO members have an interest in ensuring that the SSO takes steps to minimize the potential harms from the SEP holders’ monopoly power, and this undoubtedly explains in part why most SSOs have adopted FRAND policies or similar requirements. But, as shown in the economic model in the Appendix,⁷³ SSOs cannot in general be counted on to adopt effective FRAND policies. The bases for this conclusion, which is central to our argument for the applicability of Section 1 to SSO FRAND rules, can be summarized as follows.⁷⁴

First, the SSO members *collectively* have an interest in permitting SEP holders to charge supracompetitive royalties that elevate the downstream price of compliant devices to the monopoly level. Doing so will enable the members in aggregate to collect increased revenues from consumers, and thus to generate increased profits that in theory could be shared by all the members. In other words, supracompetitive royalties can enrich industry participants as a group at the expense of final consumers. This fact alone should serve as a clear and strong signal regarding the dangers of counting on SSOs to implement effective FRAND policies: if the SSO members negotiate efficiently, the outcome will be

72. U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, ANTITRUST GUIDELINES FOR COLLABORATIONS AMONG COMPETITORS § 3.36(b) (2000) [hereinafter U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, ANTITRUST GUIDELINES].

73. *See infra* Appendix.

74. The economic model in the Appendix builds upon several papers and models in the literature. *See, e.g.,* Joseph Farrell & Robert P. Merges, *Incentives To Challenge and Defend Patents: Why Litigation Won’t Reliably Fix Patent Office Errors, and Why Administrative Patent Review Might Help*, 19 BERKELEY TECH. L.J. 943 (2004); Joseph Farrell & Carl Shapiro, *How Strong Are Weak Patents?*, 98 AM. ECON. REV. 1347 (2008).

just as bad for consumers as if the members agreed to fix downstream prices.⁷⁵ The fundamental problem is that final consumers are not at the table when the SSO rules are negotiated.

Second, SSO members that own SEPs but earn little or no profits as implementers have a powerful self-interest in being able to exercise the ex post monopoly power associated with their SEPs. Because SSO policies are usually determined by a consensus process, these members will likely be able to block the adoption of fully effective FRAND policies. Moreover, these SSO members often have the greatest interest in SSO patent policies. Since much of their income may be attributable to patent licensing, they can be expected to devote substantial resources to block the adoption of FRAND policies that effectively prevent patent holdup.

Third, even SSO members that earn significant profits as implementers may have mixed incentives if they also own SEPs, which can also lead to weak or ineffective FRAND rules. In the Appendix, we show that, if the requisite share of votes in the SSO are cast by firms whose share of SEP royalties is at least as large as their share of downstream profits, and if these firms can coordinate their voting over the FRAND rules, then an SSO unconstrained by antitrust laws will establish FRAND rules leading to an outcome no better for consumers than would result from an integrated monopolist controlling all SEPs and all downstream sales.⁷⁶

Fourth, even SSO members that are downstream implementers and own few, if any, SEPs may have only a modest interest in promoting effective policies to restrict ex post opportunism. Because *all* implementers will be subject to the opportunism, all of them will face increased licensing costs, and therefore will likely be able to pass on most or all of the increased costs to their customers.⁷⁷ Furthermore, these implementers might not be especially active or effective in the standard-setting process for free-riding or public-good reasons, especially if SEP royalties constitute only a relatively small portion of the costs of their standard-implementing products. Public choice theory predicts that the highly motivated SEP holders are likely to have the greatest influence over patent policies.

75. We are not saying that such efficient multilateral negotiations are common. They typically would require that SEP owners make side payments to downstream implementers so the latter will acquiesce to the supracompetitive SEP royalties. One way for SSO members to make such side payments is through reciprocity across multiple standards. But our robust central point here is that there is an inherent danger in allowing a group of industry members to set rules that ultimately determine the prices that consumers will pay for their products.

76. See *infra* Appendix.

77. Farrell and Merges refer to this as the “pass-through problem,” which weakens the incentives of alleged infringers to challenge patents or resist excessive royalty rates that will apply widely. Farrell & Merges, *supra* note 74, at 952.

Empirical evidence bears out these concerns. As a starting point, we find it striking that SSO FRAND rules are almost always quite vague.⁷⁸ Notably, SSOs in which SEP holders are more prevalent tend to have weaker FRAND rules.⁷⁹ Further, to our knowledge, SSOs have made almost no effort to enforce their FRAND rules and have, instead, left enforcement efforts to others.⁸⁰ This evidence raises serious doubts about the effectiveness of the existing FRAND rules in preventing ex post opportunism.

The problem is exacerbated by the fact that most SSOs put IPR rules in place long ago, when SEP-holder opportunism was much less of a problem. Proponents of new, stricter IPR rules to prevent SEP-holder opportunism thus face the daunting task of persuading an SSO that makes decisions by consensus to change an existing policy over the often-intense opposition of SEP holders. The dispute over the recent changes to the IPR rules at the Institute of Electrical and Electronics Engineers (IEEE) illustrates how difficult and contentious that process can be.⁸¹

Thus, effective prevention of ex post opportunism by SEP holders requires antitrust enforcement to overcome the SSO problems associated with (a) attenuated incentives (implementers that also own SEPs); (b) the public good aspect of stronger FRAND rules (the danger that implementers will free ride on others rather than expend resources to implement strong FRAND rules); and (c) externalities (the harm to consumers that results when implementers pass through higher royalties in the form of higher prices).

78. Based on their study of the IPR policies of twelve major SSOs, Bekkers and Updegrove conclude that “none of the policies in the study set seeks to define the term ‘reasonable’ (and/or the term . . . ‘fair’ if the policy refers to FRAND). Likewise, ‘non-discriminatory’ also is left to the parties involved to agree upon (or to the courts, if they cannot).” Bekkers & Updegrove, *supra* note 7, at 103.

79. See Chiao et al., *supra* note 7. Bekkers and Updegrove provide a detailed report on the IPR policies of twelve major SSOs, including the ITU, ANSI, IETF, ETSI, and IEEE. See Bekkers & Updegrove, *supra* note 7.

80. Bekkers & Updegrove, *supra* note 7, at 20 (“SSOs invariably leave enforcement of obligations assumed under their IPR policies to their members . . .”).

81. We discuss these recent changes and the DOJ business review letter relating to them later in this Section. Both Qualcomm and Interdigital reacted very strongly and negatively to these changes, threatening not to make any new FRAND commitments at the IEEE because of the IEEE’s new IPR policy. See Richard Lloyd, *InterDigital Reveals That, Like Qualcomm, It Is Reworking Relationship with IEEE After Introduction of New Patent Policy*, IAM: BLOG (Mar. 24 2015), <http://www.iam-media.com/Blog/Detail.aspx?g=8c9676dd-6bbd-4d6c-b3e5-9a5dde36581> [<http://perma.cc/QG89-UR3S>].

3. *Application of the Basic Legal Principles*

The antitrust principle is straightforward: industry-wide collaboration through SSOs to establish procompetitive standards is permitted only if it is no more restrictive of competition than reasonably necessary to enable creation of the standards. When standard setting predictably creates technology monopolies that, if unrestrained, will enable anticompetitive ex post opportunism that would otherwise not occur, an SSO that does not take effective measures to prevent or minimize such ex post opportunism engages in conduct that is more restrictive of competition than necessary. In that case, the SSO and, in appropriate cases, its members, may well violate Section 1 of the Sherman Act.

Under this principle, SSO procedures and FRAND rules should be evaluated based on whether they lead to reasonable SEP royalties, using the competitive ex ante licensing standard discussed above, which has been adopted by the courts in patent law. Put differently, FRAND rules should be evaluated based on their ability to prevent SEP holders from obtaining more than the ex ante value of their technology from implementers.

This limitation would not prevent a SEP holder from profiting, perhaps greatly, from participating in the SSO and having its patented technology included in the standard. The SEP holder continues to be rewarded for its technology because the inclusion of its technology in the standard can still greatly increase the volume of licensing opportunities available to the SEP holder.

Whether a particular set of FRAND rules are sufficiently effective in preventing ex post opportunism will depend on the particular circumstances. The procedural unfolding of the case will also depend upon the circumstances. As a general matter, the case would probably be structured as an ordinary Rule of Reason case.⁸²

First, the plaintiff would have to demonstrate harm to competition as a result of the collaboration of the SSO's members, many of which compete with one another. In this case, the harm to competition would stem from the ability of the SEP holder to exercise monopoly power by obtaining royalties in excess of the competitive, ex ante level. The decision to include patented technologies in the standard would be the allegedly unlawful agreement. Notably, the court need not determine what a FRAND royalty is; it would suffice to determine that market power has been created or exercised, and that existing SSO rules and policies were not adequate to prevent the competitive harm. The defendant, which could be the SSO or perhaps one or more SSO members, would win at this point if the plaintiff failed to show harm to competition. It might fail if the standard faces substantial competition and the court concludes that the SEP holder therefore

82. See Hemphill, *supra* note 69, at 938.

does not have market power or if the SSO's rules and policies are found to be effective in preventing ex post opportunism, even if the plaintiff or even the court thinks that other rules and policies would be preferable.

Second, if the plaintiff makes the requisite showing of harm to competition, the defendant(s) would then have to show some procompetitive justification—in this case, the benefits of the standard. These two initial steps should be straightforward.

Third, if as is likely the defendant is able to show a procompetitive justification, the plaintiff would have to show that the SSO could have used available, reasonable alternatives to realize the efficiency benefits with less or none of the competitive harms. The plaintiff might identify reasonable alternatives that would have led to a different standard, based on including unpatented technology in the standard or perhaps involving fewer SEPs or fewer owners of SEPs, which would be less subject to patent holdup. More likely, the plaintiff could suggest alternative SSO rules that would not change the standard, but would reduce the likelihood or extent of ex post opportunism. For example, the plaintiff might suggest more rigorous FRAND-type rules, such as rules that set forth more precise principles on which FRAND royalties are to be determined and the circumstances under which SEP holders might seek injunctions.

Fourth, the burden would then shift to the defendant(s) to show that the benefits of the standard could not have been realized if the SSO had adopted any of the proffered alternatives or that those alternatives were unrealistic.⁸³ The plaintiff would be entitled to judgment if the court concludes that those benefits

83. Those defending ineffective rules might argue that stronger rules would cause patent holders to withdraw from SSO membership and would thus impair the standard-setting activities. See, e.g., Epstein & Noroozi, *supra* note 27, at 28 (noting that four companies announced that they would not comply with the new IEEE policies discussed below). Under ordinary antitrust principles, the burden of proof on this point would be on the SSO advancing that justification, and we would expect the argument to fail in most instances. Among other things, SSOs often have hundreds of members, so the recalcitrance of a handful is unlikely to stop the innovation or standard-setting process. Also, the payoff to SSO membership from inclusion of one's patented technologies in a standard can be enormous, so large scale defections would appear to be very unlikely. Most important, stating an intention not to comply with effective rules is much more likely when part of an effort to change the SSO rules in times of flux, or when other SSO alternatives have less effective rules, than when all SSOs strive for effective rules in order to comply with the antitrust laws. Lastly, a defense along these lines would be problematic as a legal matter because it has long been clear that anticompetitive agreements among competitors may not be justified by arguments that the public interest is better served by dispensing with competition or that the parties are unwilling to engage in desirable conduct unless they are permitted to do so in an anticompetitive way. See generally *Nat'l Soc'y of Prof'l Eng'rs v. United States*, 435 U.S. 679, 695 (1978) (rejecting an argument based on the potential harmfulness of competition); *United States v. Apple*, 791 F.3d 290, 330-33 (2d Cir. 2015) (same).

could have been realized with less competitive harm if the SSO had adopted the standard with different IPR rules or policies.

Our overall sense, based on experience and the empirical literature, is that the extant FRAND rules are generally useful, but tend to be inadequate because they are imprecise and leave unresolved such critical issues as (a) the meaning of a reasonable royalty, even conceptually; (b) the meaning of “non-discriminatory;” (c) to whom licenses must be offered; and (d) under what circumstances may a SEP holder obtain an injunction.⁸⁴ These imprecise FRAND commitments are therefore not sufficient to adequately prevent ex post opportunism. The recent revisions to IEEE’s FRAND policy represent a significant step in the right direction, but even this advance leaves important questions unanswered.⁸⁵

If FRAND rules are inadequate in these ways, litigation involving extant FRAND rules would likely be resolved only at the final, fourth step. The defendant would be able to demonstrate the benefits created by the standard; the plaintiff would be able to demonstrate the creation of market power and that other reasonable and practical rules or policies would ameliorate the problem. The case would thus turn on whether the defendant is able to demonstrate that significant benefits associated with standardization could not have been realized if the SSO had adopted those other rules or policies.

The court would have available a variety of possible remedies if the plaintiff prevails. Implementers that paid supracompetitive royalties or were unlawfully excluded in whole or in part from product markets as a result of the inadequate FRAND policies would be entitled to damages and, in some cases, to treble damages.⁸⁶ If the unlawful SSO conduct is regarded as the collective action of the

84. Many of these problems are not all that hard to fix. *See generally* Mark A. Lemley & Carl Shapiro, *A Simple Approach to Setting Reasonable Royalties for Standard-Essential Patents*, 28 BERKELEY TECH. L.J. 1135 (2013) (offering a potential solution to some of these issues).

85. The new policy states that a reasonable royalty excludes the value, if any, from inclusion of the patented technology in the standard and that its determination should include consideration of the value of the claimed invention in the smallest saleable implementation of the standard that practices the invention, the value contributed to that product by all other SEPs, and existing licenses obtained under comparable circumstances and not under threat of an injunction. It prohibits the SEP holder from seeking an injunction unless the implementer refuses to participate in an appropriate adjudication of the patent holder’s claims or to comply with the outcome of such adjudication. And it requires SEP holders to license their patents to any implementer of a standard-compliant product and prohibits an SEP holder from tying SEP licenses to licenses for other patents. *See* Letter from Renata B. Hesse, Acting Assistant Att’y Gen., U.S. Dep’t of Justice, Antitrust Div., to Michael A. Lindsay, Partner, Dorsey & Whitney LLP 11-14 (Feb. 2, 2015), <http://www.justice.gov/atr/public/busreview/311470.pdf> [<http://perma.cc/NB92-EEXR>].

86. Ordinarily, successful antitrust plaintiffs are entitled to treble damages. 15 U.S.C. § 15(a) (2012). The National Cooperative Research and Production Act of 1993, 15 U.S.C. §§ 4301-4306, provides that, under some common circumstances, the failure of an SSO to adopt and

SSO and its members, which is likely to be the case in most instances, SSO members would be jointly and severally liable for the damages. Forward-looking injunctive relief aimed at restoring competition would need to be fashioned to the requirements of the individual case. For example, a court could order the SSO to adopt a new rule or policy proposed by the plaintiff. If the court is reluctant to take on that governance role, it might give the SSO a period of time – maybe ninety days – to develop a rule, subject to the court’s ultimate approval, which would adequately ameliorate the competitive problem created by the SSO. Alternatively or in addition, the court might order the parties to attempt to negotiate a rule or policy on which they can agree. And, depending on the circumstances, the court might order SEP holders, including at least those that were defendants in the case, to comply with the new SSO rules and policies.

CONCLUSION

As always, antitrust law can and should be flexible and attentive to the specific factual circumstances of each case. The best set of rules governing FRAND commitments for one SSO might not be best for another. Experience in the marketplace and the creativity of SSOs and their members can best determine which measures are most effective and efficient in any given case. Because one size does not fit all when it comes to FRAND rules, antitrust law should welcome competition among SSOs to solve the problem of ex post opportunism by SEP holders. The role of antitrust law is not to prescribe how SSOs should solve this problem, but simply to require that they solve it to the extent reasonably possible. Fundamental antitrust principles require SSOs and their members to implement effective solutions that minimize ex post opportunism based on market power they create, to the extent they can do so without sacrificing the many benefits associated with standard setting.

enforce adequate FRAND rules would subject the SSO itself to only single damages. This limitation does not apply to SSO members that are found to have violated the antitrust laws.

APPENDIX: ECONOMIC MODEL OF THE DETERMINATION OF SSO IP RULES

We study an SSO that is selecting its rules relating to the licensing of intellectual property, which we refer to here as FRAND rules. These rules will determine the royalties that SEP owners will be able to obtain from implementers in the ex post licensing that will take place subject to those FRAND rules. We denote by R the resulting total royalty rate that each implementer will pay for the entire set of SEPs. Stricter FRAND rules will lead to a lower R . We study here how the SSO will set its FRAND rules for a given standard and thus for a given set of SEPs.

In this Appendix, we assume that there are no antitrust limits on the FRAND rules that an SSO and its members can select. Our central point is that the absence of antitrust limits can lead to highly undesirable outcomes, so some such limits are needed.

The total royalties paid by implementers to SEP owners are given by $T(R)$, which we assume is concave, reaching its maximum at R^M . R^M is thus the most preferred royalty rate for an unintegrated monopolist controlling all of the SEPs. The total profits of the implementers are given by $V(R)$, which we assume is decreasing in R , reflecting the typical situation where industry profits decline if costs rise uniformly for all suppliers. Consumer surplus is given by $S(R)$, which we also assume is decreasing in R , as higher royalties lead to higher prices. Total industry profits are given by $W(R) = T(R) + V(R)$ which we assume is concave, reaching its maximum at R^I . Since implementer profits decline with R , it is immediately clear that $R^I < R^M$. If there are no effective FRAND rules in place and SEPs are owned by multiple owners, the royalty rate is at the Cournot Complements level of R^C which exceeds R^M .

Our benchmark for R is the total royalty rate that would result from ex ante licensing. Ex ante, each SEP owner faces competition from other technologies that could be incorporated into the standard instead of its SEPs. We denote this competitive benchmark total royalty rate by R^* . This benchmark is very attractive both from a normative perspective and from an antitrust perspective: It fully respects the intellectual property rights of patent owners, who obtain rewards based on the superiority of their inventions, and it captures the royalty rates resulting from technology competition without opportunism by SEP owners.⁸⁷ This approach is consistent with the approach to reasonable royalties for SEPs

87. See Lemley & Shapiro, *supra* note 39; Carl Shapiro, *Injunctions, Hold-Up, and Patent Royalties*, 12 AM. REV. L. & ECON. 280 (2010).

taken by the Federal Circuit in *Ericsson*.⁸⁸ Our competitive benchmark permits the owners of complementary SEPs to form a patent pool to license their patents collectively and thus overcome the Cournot Complements problem. This ensures that the royalty rate is no larger than the monopoly royalty rate: $R^* \leq R^M$.⁸⁹

Our first result applies in situations where the SSO members can bargain collectively amongst themselves to implement a set of FRAND rules that maximizes their combined profits. This might well require the SSO members to find mechanisms to make side payments. With efficient multilateral bargaining and side payments, the SSO will implement FRAND rules that lead to the total royalty rate of R^I —the rate that would be set by a monopolist controlling all SEPs and all downstream products. This deprives consumers of any benefits from competition at either level (SEPs or downstream products). In situations where each SEP owner faces significant ex ante competition from alternative technologies, this total royalty rate will far exceed the competitive benchmark royalty rate R^* .

We now discuss the interests of the individual SSO members. There are N firms that participate in the SSO, where firm $k = 1, 2, \dots, N$. Each of these firms may own SEPs, or be an implementer, or both. Without loss of generality, denote firm k 's share of the SEP licensing revenue by s_k , and denote firm k 's share of the downstream (implementer) profits by t_k . With this notation, firm k 's overall profits are given by

$$W_k(R) = s_k T(R) + t_k V(R).$$

Denote by R_k the royalty that maximizes firm k 's profits. If $s_k = 0$, then firm k operates only downstream as an implementer, so firm k prefers lower royalties: $R_k = 0$. If $t_k = 0$, then firm k operates only upstream as SEP owner, so firm k seeks to maximize the SEP royalty income: $R_k = R^M$. In between these extremes, the first-order condition for R_k is given by $\frac{T'(R)}{-V'(R)} = \frac{t_k}{s_k}$, so R_k is determined by the ratio $z_k \equiv \frac{t_k}{s_k}$, which measures firm k 's stake in the downstream

88. *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1226, 1233 (Fed. Cir. 2014) (explaining that “[t]he essential requirement is that the ultimate reasonable royalty award must be based on the incremental value that the patented invention adds to the end product,” and thus holding that “the royalty for SEPs should reflect the approximate value of that technological contribution, not the value of its widespread adoption due to standardization”).

89. See Josh Lerner & Jean Tirole, *Efficient Patent Pools*, 94 AM. ECON. REV. 691 (2004); Lerner & Tirole, *supra* note 11; see also U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, ANTITRUST GUIDELINES, *supra* note 72, at 20-31; Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in INNOVATION POLICY AND THE ECONOMY 119 (Adam B. Jaffe et al. eds., 2000).

profits *relative* to its stake in SEP royalties. Totally differentiating this first-order condition with respect to z_k shows that $\frac{dR_k}{dz_k} < 0$ —i.e., that firms with a greater relative stake in the downstream profits prefer lower SEP royalty rates, as one would expect. We say that a firm has a greater relative stake in SEPs than in downstream profits if $z_k < 1$. We can then rank the firms based on their relative stake in downstream profits vs. SEP royalties. Without loss of generality, we label the firms such that $z_1 \leq z_2 \leq \dots \leq z_N$. This implies that $R_1 \geq R_2 \geq \dots \geq R_N$.

Our next result applies in situations where each SSO member is vertically integrated as between SEPs and downstream products and captures the same share of SEP revenues as it does of the downstream profits. (This does not require symmetry: some firms can be large and others small.) In our notation, this corresponds to $s_k = t_k$ for all k . This implies that firm k 's profits are $W_k(R) = s_k W(R)$, so each firm's profits are maximized at $R = R^I$. Therefore, there will be consensus at the SSO to set SSO rules that lead to the royalty level that will support the same prices and outputs that a monopolist controlling all of the SEPs and all of the downstream production would choose. This is the same outcome discussed above.

When the interests of the various SSO members diverge with regards to the FRAND rules, in order to obtain predictions about the resulting FRAND rules, one must model the SSO decision-making process and the status quo outcome that prevails if no new proposal garners sufficient support to be adopted. For example, as noted above, if SEP owners have large incentives to block strong FRAND rules and implementers have weaker incentives to put strong FRAND rules in place, the SEP owners may have more influence in the SSO, for any given set of voting procedures. A full model of SSO decision making is beyond the scope of this Feature. However, even without a full model, we can make some observations about situations in which SSO members' interests diverge, assuming no side payments among the members.

- **SSO Dominated by SEP Owners:** Suppose that “pure SEP owners,” i.e., firms that receive no share of the downstream profits, have enough power in the SSO to implement their preferred FRAND rules. Then the SSO will adopt FRAND rules leading to the monopoly royalty rate, $R = R^M$, if these firms can coordinate to vote as a block. This will be the outcome unless implementers can effectively prevent this outcome by dropping out of the SSO and establishing a rival standard in another forum more favorable to them.
- **SSO Dominated by Firms with Greater Relative Interest in SEPs:** Suppose that firms with a greater relative stake in SEPs than in downstream profits have enough power in the SSO to implement their preferred FRAND rules. Since all of these firms prefer FRAND rules that lead to a

royalty rate of at least R^I , the FRAND rules will lead to a royalty rate at least that high if these firms can coordinate to vote as a block.

- SSO Dominated by Implementers: Suppose that “pure implementers,” i.e., firms that own no SEPs, have enough power in the SSO to implement their preferred FRAND rules. If these firms can coordinate to vote as a block, then the SSO will require SEPs to be licensed on royalty-free terms. This will be the outcome unless SEP owners can effectively prevent this outcome by dropping out of the SSO and establishing a rival standard in another forum more favorable to them.

With flexible side payments and efficient multilateral bargaining, we get the outcome discussed above – namely $R = R^I$.