LICENSING STANDARD ESSENTIAL PATENTS WITH FRAND COMMITMENTS: PREPARING FOR 5G MOBILE TELECOMMUNICATIONS

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ABSTRACT

The 5G mobile telecommunications standard is focusing increased attention on licensing of Standard Essential Patents ("SEPs"). SEP holders and technology implementers commit to negotiate license agreements on terms that are Fair, Reasonable, and Non-discriminatory ("FRAND"). Standard Setting Organizations ("SSOs") establish coordinated FRAND commitments by consensus decision making. SEP holders and implementers create negotiated FRAND commitments through patent license agreements. Courts specify adjudicated FRAND commitments in SEP license disputes. The article argues that SSO coordination, market negotiation, and adjudication precisely define FRAND commitments. The courts have successfully applied common law principles and comparable license agreements to interpret FRAND commitments. The article argues however that administrative or judicial regulation would reduce standardization, impede innovation, and constrain market negotiation of patent license agreements. The article introduces the concept of the "patent run-around" to describe potential effects of "licensing to all" regulations. The article cautions that because of some landmark court decisions, there is a risk that the provisions of patent license agreements could be determined more by judicial regulation than by negotiation in competitive markets. Problematic developments include the imposition of arbitrary aggregate rate

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caps and basing royalties on the estimated incremental value of standardized technology. This article concludes by recommending that courts avoid formulating one-size-fits-all FRAND commitments in 5G mobile telecommunications and other innovative industries. Increased antitrust enforcement and administrative regulation are unnecessary because of the effectiveness of SEP licensing with FRAND commitments.

Keywords: Standard Essential Patents, FRAND, patent licensing, technology standards, standard setting organizations, regulation, antitrust, patent holdout, patent holdup, royalty stacking, patent thickets, complements, royalty base, smallest saleable patent-practicing unit

JEL Codes: K00, K11, K12, L24, O30, O33, O34, O38

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I. INTRODUCTION

Licensing Standard Essential Patents ("SEPs") is gaining in importance with the implementation of the 5G mobile telecommunications standard. The cooperative process of industry standard setting and patent license contract negotiation has worked well to promote invention and innovation in mobile telecommunications. As the industry prepares for 5G, however, the process runs the risk of judicial and administrative regulation. Some landmark court decisions involving mobile telecommunications pose problems for the entire standardization process. Acting under the banner of Fair, Reasonable, and Non-discriminatory ("FRAND") patent licensing, courts are setting standardized provisions for private patent license agreements. Some court decisions suggest that the same set of rules for patent license contracts should apply across industries and around the world. The result would be greater judicial and administrative regulation of markets for technology. Assistant Attorney General Makan Delrahim observes "[i]nnovation and dynamic competition inevitably suffer when licensing negotiations break down due to uncertainty about the meaning of 'FRAND.' Injecting antitrust or competition law remedies into these disputes makes matters worse."[1]

This article examines the meaning and implications of FRAND for invention, innovation, and standardization. It finds that FRAND commitments are clear and well defined and thus do not require further interpretation by regulatory agencies or antitrust authorities. FRAND commitments create economic benefits

1. Assistant Attorney General Makan Delrahim, *Promoting Innovation by Ensuring Market-Based Application of Antitrust to Intellectual Property*, DEP'T OF JUST. (June 6, 2019), https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-organisation-economic-co [https://perma.cc/2HHJ-8F5N].

because they rely on private contract negotiation. This means that FRAND commitments create obligations both for patent holders and for implementers, which are beneficial exactly because they are broad rules rather than specific royalty formulas or contract provisions. Aggregate royalty caps and one-size-fits-all license contract provisions reduce incentives for firms to participate in setting standards. Formulaic royalty rules and legal constraints on patent license contracts diminish the efficiency of contract negotiation. This article argues that courts should be careful to limit the scope of their decisions to the evidence and circumstances of the case at hand. It further argues that government regulation of standards organizations by administrative agencies and antitrust authorities would discourage standardization and technological change in telecommunications and other innovative industries.

There are over 1,109 Standard Setting Organizations ("SSOs"), including Standards Development Organizations ("SDOs").[2] These organizations help industries coordinate invention, innovation, transactions, and production. SSOs develop and communicate highly detailed technology standards that specify the quality and interoperability of products and components. These technology standards improve economic efficiency because companies exchanging standardized products have lower transaction costs. Companies derive economies of scale from standardized products, modular components, and technology platforms. Companies then improve their expertise by specialization in particular areas of invention and innovation. SSOs thus increase the rate of technological change because industry participants create complementary inventions and innovations.

In addition to technology standards, SSOs offer general rules for disclosure of Intellectual Property (IP) and licensing agreements between IP holders and technology implementers. The objective of these general rules is to increase incentives for invention and innovation by promoting market transactions between SEP holders and implementers. SSOs usually require inventors to declare ownership of SEPs covering technologies needed to implement the standard. SSOs also generally require holders of SEPs to commit to FRAND licensing provisions. The dual requirements of declaring SEPs and commitment to FRAND terms help provide information and standardization for patent license negotiations.

The standardization process has three stages. The process begins with industries forming organizations that develop technology standards and achieve broad commitments from industry players

2. *See* Andrew Updegrove, *Standard Setting Organizations and Standards List*, CONSORTIUMINFO.ORG, http://www.consortiuminfo.org/links/#.VViiHflViko [https://perma.cc/5DYJ-53A6] (last visited Oct. 11, 2019).

to guide patent licensing negotiations. Next, patent holders and implementers in those industries negotiate patent license agreements in competitive markets. Finally, if patent disputes take place, courts help determine the extent of patent holder commitments to standards organizations and also establish royalties for patents that read on technology standards. The standardization process works well when standards organizations and courts defer to competitive markets. Negotiation of patent license agreements has successfully maintained incentives for both invention and technology adoption. Standardization generally and through patent license negotiation, has fostered significant innovation in technology-related products, production, and transactions. Indeed patent disputes have been relatively rare and court decisions have tended to promote competitive patent license negotiation.

The three stages of standardization work effectively to provide the precise meaning of FRAND commitments. First, SSOs establish *coordinated FRAND commitments* by industry consensus decision making.[3] FRAND policies originated in 1959 with the American Standards Association ("ASA"), which later became the American National Standards Institute ("ANSI"), the U.S. national standards body.[4] In contrast to the detailed specifications contained in technology standards, SSO FRAND policies take the form of a general statement and do not specify the content of FRAND commitments. As such, these coordinated FRAND commitments are able to offer broad guidelines on licensing negotiation. This is an important advantage inherent to SSO IP policies because it provides flexibility in patent license negotiation for SEP holders and implementers. Coordinated FRAND commitments also provide SEP holders the opportunity to obtain economic returns. Coordinated FRAND commitments thus provide implementers with incentives to apply standardized technology.

Second, patent holders and implementers form patent license contracts that establish *negotiated FRAND commitments*. These work well, as patent license contracts are ubiquitous and patent disputes are relatively rare. Evidence shows that the same holds for SEP license contracts. Patent holders and implementers arrange patent license contracts that support rapid technological change

3. *Overview of the U.S. Standardization*, AM. NAT'L STANDARDS INST. 1, 2 (2007), https://share.ansi.org/Shared%20Documents/News%20and%20Publications/Other%20Documents/US-Stdzn-System-FINAL.pdf [https://perma.cc/JV9J-7LQS] (noting that "voluntary consensus standards serve as the cornerstone of the U.S. standardization system").

4. *See generally* George Willingmyre, *History of the Patent Policy of the American National Standards Institute* (2014); Jorge L. Contreras, *A Brief History of FRAND: Analyzing Current Debates in Standard Setting and Antitrust through a Historical Lens*, 80 ANTITRUST L.J. 39 (2015).

throughout the economy. Negotiation is the most important form of FRAND commitment because the parties to license agreements have the best information about the technology and its implementation. It follows that FRAND should be defined by what a willing licensor and a willing licensee negotiate in the marketplace.

Third, courts and regulatory agencies generate *adjudicated FRAND commitments*. In resolving SEP disputes, courts are called upon to determine patent license royalties. The courts necessarily follow procedures similar to those for determining reasonable royalty damages in patent infringement. The courts should instead augment the traditional procedures of SEP disputes in order to address the special features of FRAND commitments. The courts have relied on common law in interpreting FRAND commitments, also considering comparable SEP license contracts to determine patent license royalties. This approach has consequently resulted in decades of successful standardization and robust technological change.

Taken together, coordinated, negotiated and adjudicated FRAND commitments promote efficient markets for patent license agreements. Unfortunately, problems could arise if courts impose restrictive interpretations of FRAND commitments that extend far beyond particular patent disputes. To illustrate this, I examine some issues that arose in *Huawei v ZTE*, *TCL v Ericsson*, and *Unwired Planet v. Huawei*.[5]

Judicial regulation of FRAND commitments risks shifting patent licensing from a market system to a regulatory system. This shift could constrain patent license negotiations if courts play a greater role in determining royalties and other patent license provisions. The danger is that a few landmark court cases resolving SEP disputes will create a system of judicial regulation. Such a system risks imposing arbitrary FRAND pricing regulations that supplant the competitive market for patent license contracts, stalling innovation and invention. SEP holders and implementers may be forced to form inefficient agreements that conform to narrow court decisions rather than meeting broad guidelines for negotiation. In particular, mechanical applications of the "top down" method and various specific formulas can constrain negotiation.[6] In contrast to simply determining reasonable royalty damages, some court

5. Case C-170/13, Huawei Technologies Co. Ltd v. ZTE Corp., ZTE Deutschland GmbH, ECLI:EU:C:2015:477 (2015); TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635 (C.D. Cal. Dec. 21, 2017); Unwired Planet International Ltd. v. Huawei Technologies Co. Ltd., [2017] EWHC (Pat) 711 (April 5, 2017).

6. *See* Contreras, *supra* note 4, at 42.

decisions have overreached by attempting to determine general formulas for license royalties satisfying FRAND commitments.[7]

These problems would be exacerbated if government agencies and antitrust authorities regulated SSO FRAND commitments and other IP policies. For example, the European Commission ("EC") justifies proposed regulatory policies by an alleged lack of clarity in SSO FRAND commitments and IP policies.[8] Advocates of regulation suggest that government control over SSO decision making and restriction of market negotiation would be beneficial. However, the EC itself acknowledges that "Conflicting interests of stakeholders in certain SDOs may make it difficult for these organisations to provide effective guidance on such complex legal and intellectual property (IP) policy issues."[9]

This article introduces the concept of the "patent run-around" to describe problems that could result from regulation of patent license negotiations. The "patent run-around" occurs when implementers send SEP holders to negotiate with firms at other levels of the value chain as a means of diminishing or avoiding patent license royalties. Regulatory proposals such as "licensing to all" seek to determine the level of the value chain at which patent license negotiations occur.[10] Such regulations potentially cause "patent run-around" and would wreak havoc on the market for patent license agreements. Furthermore, judicial or administrative regulations that force SEP licensing at the Smallest Saleable Patent-Practicing Unit ("SSPPU") arbitrarily constrain the royalty base and

7. On the widespread application of various formulas in FRAND cases by courts, see Gregory K. Leonard & Mario A. Lopez, *Determining RAND Royalty Rates for Standard-Essential Patents*, 29 ANTITRUST L.J. 86, 94 (2014); J. Gregory Sidak, *Apportionment, FRAND Royalites, and Comparable Licenses After Ericsson v. D-Link*, 2016 U. ILL. L. REV. 1809 (2016); Anne Layne-Farrar & Koren W. Wong-Ervin. *Methodologies for Calculating FRAND Damages: An Economic and Comparative Analysis of the Case Law from China, the European Union, India, and the United States*, 8 JINDAL GLOBAL L. REV. 127 (2017); Fei Deng, Gregory K. Leonard & Mario A. Lopez, *Comparative Analysis of Court-Determined FRAND Royalty Rates*, 32 ANTITRUST L.J. 47 (2018).

8. *European Commission Communication on the ICT Standardisation Priorities for the Digital Single Market*, at 14, COM (2016) 176 final (April 19, 2016), http://ec.europa.eu/transparency/regdoc/rep/1/2016/EN/1-2016-176-EN-F1-1.PDF [https://perma.cc/L8XB-9NBN] ("[T]he Commission will … work in collaboration with stakeholders including ESOs, EPO, industry and research, on the identification, by 2017, of possible measures to (i) improve accessibility and reliability of information on patent scope, including measures to increase the transparency and quality of standard essential patent declarations as well as (ii) to clarify core elements of an equitable, effective and enforceable licensing methodology around FRAND principles and (iii) to facilitate the efficient and balanced settlement of disputes.").

9. *European Commission Communication on Setting Out the EU approach to Standard Essential Patents*, at 2, COM (2017) 712 final (Nov. 29, 2017), https://ec.europa.eu/docsroom/documents/26583.

10. *See, e.g.*, *Key Principles*, THE FAIR STANDARDS ALLIANCE, https://fair-standards.org/key-principles/ [https://perma.cc/U9KB-JD29] (last visited Oct. 11, 2019) (advocating "fair, reasonable, and non-discriminatory [licensing] to all").

can have similar damaging effects on patent license negotiations. Finally antitrust policies that constrain SSO FRAND commitments and limit market negotiation would also negatively impact licensing, innovation, and standardization.

With increased regulation by courts or regulatory agencies, the interaction of coordinated, negotiated, and adjudicated FRAND commitments would adversely impact invention and innovation. Although they begin as voluntary consensus rules, coordinated FRAND commitments have the force of law in disputes over SEPs. As courts increasingly regulate FRAND license royalties, they risk substituting government planning for private negotiation. This could reduce incentives for inventors and implementers to participate in standard setting, thus decreasing the economic benefits of standardization. To avoid this problem, courts should view the resolution of patent disputes as distinct from general rules for patent license negotiation. Simply put, courts lack both the information and expertise to regulate markets for patent license contracts. Judicial and government regulation would restrict negotiations surrounding the great majority of license contracts that are not in dispute, decrease the efficiency of competitive markets for patent licenses, impede innovation, and reduce incentives for standardization.

II. STANDARDS ORGANIZATIONS AND COORDINATED FRAND COMMITMENTS

SSOs generally are voluntary membership organizations that operate by consensus decision making to develop and communicate technology standards. SSOs also establish IP policies that utilize FRAND commitments in order to encourage participate in standard setting and promote adoption of technology standards. This section examines the characteristics of SSO FRAND policies and considers coordinated FRAND commitments for a number of important SSOs.

A. SSO FRAND Policies

SSOs are a general category of industry organizations that include not only SDOs that create new complex technology standards, but also other organizations that adopt and distribute technology standards, trade associations, industry consortia, and quasi-governmental standards agencies.[11] The current U.S. standards

11. See *Resources: Standards Developing Organizations (SDOs)*, AM. NAT'L STANDARDS INST., https://www.standardsportal.org/usa_en/resources/sdo.aspx [https://perma.cc/C7ZX-QKHL] (last visited Oct. 11, 2019), for a directory of some SDOs. See *Resources: Trade Associations*, AM. NAT'L STANDARDS INST.,

development and communication system is based on voluntary membership in private organizations.[12] In many other countries, the national standards body is a government organization that manages or controls the development of technology standards.[13] Standardization is not just being implemented at the national level, recently the expansion of international trade and the growth of international standards bodies have created a system of global technology standards.

SSOs establish technology standards governing the quality and interoperability of various products and components. The technology standards established by SSOs have significant economic effects. By working to affect technology adoption decisions by market participants, technology standards influence market outcomes in various ways. First, by standardizing products, technology standards decrease transaction costs.[14] Second, technology standards serve a variety of economic functions by allowing industries to control product quality and performance, adjust product variety, measure consistently, codify knowledge, assure compatibility of products, components and parts, articulate a vision of the industry, assure health and safety, and control environmental quality.[15] Third, SSO technology standards provide industry guidance to government technology standards and regulations.

Besides technology standards, SSOs also have organizational rules that include IP policies. SSO IP policies often require members to declare ownership of SEPs before technologies covered by those patents can be included in the standards. These IP policies also require owners of SEPs to make FRAND commitments covering patent license negotiations. Furthermore, SSO IP policies also require commitments from implementers such as reciprocal copyright licensing and reciprocal patent licensing, under FRAND terms.

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https://www.standardsportal.org/usa_en/resources/trade_associations.aspx [https://perma.cc/JM7C-XHM2] (last visited Oct. 11, 2019), for a directory of some trade associations.

12. *See Frequently Asked Questions*, AM. NAT'L STANDARDS INST., https://www.ansi.org/about_ansi/faqs/faqs [https://perma.cc/GM5V-7Q7T] (last visited Oct. 15, 2019); *see Resources: Trade Associations*, *supra* note 11.

13. *Frequently Asked Questions*, AM. NAT'L STANDARDS INST., https://www.ansi.org/about_ansi/faqs/faqs [https://perma.cc/GM5V-7Q7T] (last visited Oct. 15, 2019); *Resources: Trade Associations*, *supra* note 11.

14. Charles P. Kindleberger, *Standards as Public, Collective, and Private Goods*, 36 KYKLOS 377 (1983).

15. Peter Swann, *The Economics of Standardization: An Update*, GOV.UK (Sept. 2, 2010), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/32444/10-1135-economics-of-standardization-update.pdf [https://perma.cc/LEQ3-RPU4] (last visited Oct. 10, 2019).

Overall, SSO FRAND commitments benefit SEP holders and implementers because they offer broad rules that defer specifics to the actual market negotiations. It relies on the knowledge of what Friedrich Hayek referred to as the "man on the spot".[16] Government regulation and antitrust scrutiny would threaten this relationship, as well as the many benefits of the FRAND system. Hayek foresaw this type of problem with startling clarity: "as planning becomes more and more extensive, it becomes regularly necessary to qualify legal provisions increasingly by reference to what is 'fair' or 'reasonable'; this means that it becomes necessary to leave the decision of the concrete case more and more to the discretion of the judge or authority in question."[17] Hayek recommended that "[t]he state should confine itself to establishing rules applying to general types of situations and should allow the individuals freedom in everything which depends on the circumstances of time and place, because only the individuals concerned in each instance can fully know these circumstances and adapt their actions to them."[18] Hayek cautioned that government central planners cannot obtain the information that individual market participants have about their own situations.[19]

SSOs design FRAND policies to balance the interests of SEP holders and implementers. On the one hand, SEP holders must have economic incentives to develop IP, contribute their IP to the standardization process, and license their IP to implementers. On the other hand, implementers must have incentives to participate in the standardization process, adopt technologies included in the standard, and invest in innovations based on standardized technology. Therefore, coordinated FRAND policies necessarily lack detail because those policies must satisfy the diverse economic interests of SSO members.[20]

SSO FRAND commitments function as general rules because the commitments are established through organizational consensus

16. Friedrich A. Hayek, *The Use of Knowledge in Society*, 35 AM. ECON. REV. 519, 524 (1945).

17. FRIEDRICH A. HAYEK, THE ROAD TO SERFDOM: TEXT AND DOCUMENTS – THE DEFINITIVE EDITION 116 (Bruce Caldwell, 2007).

18. *Id.* at 114.

19. Bruce Caldwell, *Hayek and Socialism*, 35 J. ECON. LITERATURE 1856, 1865 (Dec. 1997).

20. COMMITTEE ON INTEL. PROP. MGMT. IN STANDARD-SETTING PROCESSES, NAT'L RES. COUNCIL OF THE NAT'L ACAD., PATENT CHALLENGES FOR STANDARD-SETTING IN THE GLOBAL ECONOMY: LESSONS FROM INFORMATION AND COMMUNICATIONS TECHNOLOGY 53 (Keith Maskus & Stephen A. Merrill eds., 2013), (ebook) ("The diversity of actual and potential members of SSOs helps to explain why few of them have developed policies that include detailed definitions of FRAND. Rather, most SSOs rely on general FRAND licensing commitments and certain clarifications with regard to the effect of such commitments as the need arises. SSOs have to govern their IPR policies in an environment of conflicting interests.").

achieved through a variety of voting procedures. SSOs often require supermajority voting to approve technology standards.[21] Notably, SSOs also operate cooperatively through specialized committees in which members discuss, propose, and adopt technical specifications.[22] Moreover, SSOs distribute technology standards at little or no cost to their members and non-members, increasing efficiency.

Consider, for example, the SSO that establishes and communicates technology standards for cable connectors. The USB 3.0 Promoter Group develops technology standards for Universal Serial Bus (USB) technology.[23] The group is comprised of Apple, Hewlett-Packard, Intel, Microsoft, Renesas Electronics, ST Microelectronics, and Texas Instruments.[24] The USB Implementers Forum (USB-IF), which works in association with the USB 3.0 Promoter Group, is a "support organization and forum for the advancement and adoption of USB technology as defined in the USB specifications."[25] The USB-IF has over one thousand member companies.

The USB-IF is based on consensus. Every action by the USB-IF requires at least a 2/3 vote of "promoter members".[26] In addition, "promoter members" must be engaged in research and development ("R&D") on USB specifications and their membership requires unanimous approval by existing "promoter members".[27] The organization states that "[m]eetings shall be conducted to allow for active, fair and open participation by all Members attending the meeting. All members shall have the right to express opinions on the subject matter, whether or not these opinions dissent from that of the majority."[28]

The USB-IF has both technology standards and IP rules. The technology standard for cable connectors is the USB 3.2 "SuperSpeed USB", which includes data transfer rates of 10 and 20

21. Daniel F. Spulber, *Standard Setting Organizations and Standard Essential Patents: Voting and Markets*, 129 ECON. J. 1477, 1480 (2018); *see* Laszlo Goerke & Manfred J. Holler, *Voting on Standardisation*, 83 PUB. CHOICE 337 (1995).

22. *See* Aija E. Leiponen, *Competing Through Cooperation: Standard-Setting in Wireless Telecommunications*, 54 MGMT. SCI. 1904 (2008); *see* Talia Bar & Aija Leiponen, *Committee Composition and Networking in Standard Setting: The Case of Wireless Telecommunications*, 23 J. ECON. AND MGMT. STRATEGY 1 (2014).

23. *See USB 3.0 Promoter Group Announces USB 3.2 Update*, BUSINESS WIRE (July 25, 2017), https://www.businesswire.com/news/home/20170725005509/en/USB-3.0-Promoter-Group-Announces-USB-3.2 [https://perma.cc/9HHG-K957] (last visited Oct. 10, 2019).

24. *Id.*

25. *Id.*

26. BYLAWS OF THE USB IMPLEMENTERS FORUM INC. § 13.6 (USB IMPLEMENTERS FORUM INC., amend. 2010), https://www.usb.org/sites/default/files/usbif_bylaws121510.pdf [https://perma.cc/SG5C-HDRH] (last visited Jan. 1, 2019).

27. *Id.* § 12.2.

28. *Id.* § 13.10.

gigabits per second ("Gbps").[29] Technology standards also include power delivery over cables and Type-C cables and connectors ("2-way").[30] The USB-IF offers implementers a non-exclusive worldwide license to SEPs, referred to as "necessary claims".[31] The license is royalty free and "under otherwise reasonable and non-discriminatory terms, provided that such a license grant may be conditioned upon Licensee's grant of a reciprocal license binding Licensee."[32]

SSOs thus develop and adopt technology standards and IP processes through voting rather than business deals. This is an important distinction, as individual members of the SSO choose technology standards with some anticipation of how their own companies will be affected by market outcomes. Industry members consequently engage in production, transactions, contracts, IP licensing, financial investment, mergers, and other business arrangements in light of technology standards adopted by SSOs, to which they are contributors. Elsewhere, I argue that voting by SSO members will generate efficient technology choices.[33] This is because industry groups with relatively greater voting power tend to have relatively less market power and industry groups with relatively greater market power tend to have relatively less voting power. These countervailing effects of the size of industry groups tend to generate efficient technology choices in SSOs.[34]

SSO FRAND policies and other IP policies differ from SSO technology standards. Technology standards require more attention than IP policies, as developing and communicating these technology standards is the primary activity of SSOs. SSO members devote considerable time and effort to discussing and choosing the technological features that will be codified in the standards, and revising and replacing standards in response to inventions and

29. *SuperSpeed USB: USB 3.2 Specification*, USB.ORG, https://www.usb.org/superspeed-usb [https://perma.cc/swa3-zzdx] (last visited Sep. 28, 2019).

30. *See USB Type-C*, USB.ORG, https://www.usb.org/usbc [https://perma.cc/YLJ2-B3H3].

31. Benjamin Bai, *To Be or Not to BE SEPs*, KLUWER PATENT BLOG (Feb. 23, 2015), http://patentblog.kluweriplaw.com/2015/02/23/to-be-or-not-to-be-seps/ [https://perma.cc/72VL-ECHQ].

32. USB 2.0 Adopters' Agreement, https://usb.org/sites/default/files/USB_2_0_Adopters_Agreement_final_021411.pdf [https://perma.cc/V59E-8QZ6] (last visited Jan. 1, 2019); *see also* Bai, *supra* note 31.

33. Spulber, *supra* note 21.

34. For example, all other things equal, many small suppliers may have relatively less bargaining power in the market but may exercise greater voting power in an SSO. A small number of technology providers may have relatively greater bargaining power in the market but may exercise relatively less voting power. See Spulber, *supra* note 21, for further discussion.

innovations.[35] Technology standards can be very long documents with diagrams and formulas that provide extensive scientific, engineering, and other technical specifications, and also impose very detailed performance and interoperability requirements.

In contrast, SSO IP policies contain limited guidelines with few details, often consisting of just a few paragraphs. These policies typically involve general rules requiring disclosure of SEPs so that the interests of IP owners in standardization discussions are public knowledge. Disclosure of SEPs also makes sure that potential implementers are informed. The basic broad FRAND commitments demonstrate that negotiation of SEP licenses is not part of SSO deliberations and not the responsibility of the SSO. Indeed, SEP license negotiations are the responsibility of the parties involved and occur in the marketplace outside the SSO.

The SSO seeks agreement on technology standards. As a result, the organization takes a neutral position regarding the relative economic effects of technology standards on member companies. SSOs also must take a neutral position regarding patent license negotiations, favoring neither SEP holders nor implementers. The SSO seeks neither high nor low royalty rates. The SSO is also neutral with respect to the interests of SEP holders within the standard; FRAND policies do not allocate royalties among SEPs. The SSO additionally is neutral with respect to diverse potential implementers, without allocating royalty costs among implementers.

One major advantage of general IP rules is that they are independent of technology standards. SSOs do not need to revise or replace IP rules based on technological change. SSO IP rules and FRAND commitments continue to apply as technology standards are revised or replaced by new standards. For example, IP rules need not change with the shift from 4G to 5G technology standards in mobile telecommunications. Because they do not depend directly on technology standards, IP rules are durable, flexible, and predictable. The relative stability of IP rules provide greater certainty, eliminating risk that allows for companies to invest in invention, innovation, and adoption.

The FRAND process, that is, coordinated, negotiated and adjudicated FRAND commitments, provides a clear and precise meaning of those commitments. Many commentators, however, have complained that SSO FRAND policies are "vague" or

35. *See* Kristen Osenga, *Ignorance Over Innovation: Why Misunderstanding Standard Setting Organizations Will Hinder Technological Progress*, 56 U. LOUISVILLE L. REV. 159 (2018); Spulber, *supra* note 21, at 1502.

"ambiguous".[36] In particular, SSO FRAND policies do not provide any formal definitions of what are "fair", "reasonable", and "non-discriminatory" licensing terms[37], nor do those policies specify the provisions of patent license agreements or any formulas governing patent license royalties.[38] Additionally, SSO FRAND policies do not impose price ceilings or price floors on patent license royalties, and do not provide for profit sharing among SEP holders or rent sharing between SEP holders and implementers.[39] Other commentators have criticized SSO FRAND commitments as being incomplete contracts.[40]

Because they are general rules, SSO FRAND commitments to "non-discriminatory" contract terms do not prevent negotiation between SEP holders and implementers, but rather rule out exclusive licensing and refusals to deal with potential licensees.[41] These commitments also rule out different licensing terms to licensees that are similarly situated. The commitments, however, are sufficiently general that they do not imply uniformity of royalties and patent license provisions.[42] Royalties for particular patents can change over time because patents have finite lifetimes. Royalties for particular patents also change over time in response to technological change and market forces. Furthermore, royalties can also differ across license contracts that include different provisions. For example, royalties can be decreased to reflect benefits that the licensor obtains from cross licensing. Additionally, royalties can vary when the licensor and licensee provide goods and services to each other as part of the license agreement. For example, licensees can have different characteristics and may differ in terms of their output, technology, industry, or location. FRAND commitments function well in this regard, as they contain no explicit statement that could be interpreted as a "most-favored-nation" or "most-favored-licensee" contract clause.

36. *See* Joseph S. Miller, *Standard Setting, Patents, and Access Lock-In: RAND Licensing and the Theory of the Firm*, 40 IND. L. REV 351 (2007); Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 CAL. L. REV. 1889 (2002); Mario Mariniello, *Fair, Reasonable and Non Discriminatory (FRAND) Terms: A Challenge for Competition Authorities*, 7 J. OF COMP. L. & ECON. 523 (2011); Thomas F. Cotter, *Comparative Law and Economics of Standard-Essential Patents and FRAND Royalties*, 22 TEX. INTELL. PROP. L.J., 311 (2014); Garry Gabison, *Worldwide FRAND Licensing Standard*, 24 B. U. J. SCI. & TECH. L. 100 (2018).

37. *See, e.g.*, Miller, *supra* note 36, at 357; Lemley, *supra* note 36, at 1906.

38. *See* Mariniello, *supra* note 36, at 532.

39. *See id.* at 532, 536.

40. *See* Joanna Tsai & Joshua D. Wright, *Standard Setting, Intellectual Property Rights, and the Role of Antitrust in Regulating Incomplete Contracts*, 80 ANTITRUST L.J. 157, 157-59 (2015).

41. *See* Erik Hovenkamp, *Tying, Exclusivity, and Standard-Essential Patents*, 19 COLUM. SCI. & TECH. L. REV. 79, 117, 119-20 (2017).

42. *See* Gabison, *supra* note 36.

The generality of SSO IP policies is the result of careful design. SSO IP rules reflect economic and legal aspects of invention and innovation. Fortunately, these economic and legal considerations need not vary with technological change. The general requirement that patent holders disclose SEPs applies regardless of what technologies are considered for inclusion in a standard.[43] By transcending specific patented technologies or the content of technology standards, FRAND commitments avoid the administrative and organizational costs of reformulating IP rules and policies as technology standards change.

Patent license negotiations are the major reason for the difference between the specificity of SSO technology standards and the generality of SSO IP policies, as SEP holders and implementers work out the details of licensing agreements on their own. These negotiations generally will take place after technology standards are established. The parties will adjust the provisions of patent license agreements to reflect the details of SSO technology standards and SSO IP rules, including FRAND commitments.

SSO FRAND commitments offer sufficient generality and flexibility to allow efficient negotiation between the parties by avoiding specifying patent license contract provisions.[44] The generality of FRAND commitments opens the way for negotiation rather than enforcing one-size-fits-all terms for patent license agreements. This allows SEP holders and implementers to adjust the royalties, duration, and other provisions of patent license agreements. This flexibility is necessary because royalties and other patent license contract terms can vary depending on the characteristics of the patent holder, implementer, and their business relationship. The incompleteness of FRAND commitments is a feature, not a flaw. It allows SEP holders and implementers to negotiate contingent patent license agreements that respond to changes in market conditions.[45] Also, under FRAND commitments, patent holders and implementers can tailor contract provisions to specific aspects of the transaction. FRAND commitments are incomplete contracts because they are not contingent on particular technologies, allowing SSO's policies to remain in place as technology changes. FRAND commitments are not contingent on the characteristics of the patented

43. COMMITTEE ON INTEL. PROP. MGMT. IN STANDARD-SETTING PROCESSES, NAT'L RES. COUNCIL OF THE NAT'L ACAD., *supra* note 20, at 71-79.

44. Brad Biddle et al., *The Expanding Role and Importance of Standards in the Information and Communications Technology*, 52 JURIMETRICS J. 177, 197 (2012) ("IP Policies normally do not attempt to mandate all of the terms that must be included in a particular RAND or RF-RAND license.").

45. *See id.* at 163 ("Contractual flexibility ex post can be an important source of economic value as it allows transactors to adapt more efficiently over time to changes in market conditions than under a more rigid and complete contract.").

technology, the patent holder, or the implementer. Furthermore, the incompleteness of FRAND commitments reduces antitrust liability for SSO members.[46]

SSOs need to be as neutral as possible to encourage participation. Membership in SSOs and adoption of technology standards is voluntary for all industry participants.[47] Policies that constrain royalties would discourage participation by inventors and other IP owners., and policies that increase royalties would discourage participation by implementers. SSOs compete for membership,[48] and competition among SSOs, including the potential entry of new SSOs, gives the organizations incentives to encourage participation.[49]

Generally, SSO FRAND policies seek to balance the interests of SEP holders and implementers. These policies allow SEP holders to be compensated for use of their IP and encourage implementers to apply standards. For example, ANSI explains its FRAND policy as follows,

The terms and conditions used in the development of "open standards" should balance the interests of those who will implement the standard with the interests and voluntary cooperation of those who own intellectual property rights that are essential to the standard. Such terms and conditions should readily promote, and not unreasonably burden, accessibility to the standard for the communities of interested implementers. To achieve such balance, the payment of reasonable license fees and/or other reasonable and non-discriminatory license terms may be required by the intellectual property rights holders. This balance of licensing rights (rather than waiver thereof) is consistent with an open standard. The word "open" does not imply "free" from monetary compensation or other reasonable and non-discriminatory license terms.[50]

Additionally, SSOs FRAND policies serve marketing and public relations functions. Policies that encourage technology licensing under FRAND terms help create a positive image for technology standards, promoting acceptance and adoption of these standards, and encouraging participation. [51] SSO FRAND policies are also

46. *See id*.

47. *See Resources: Standards Developing Organizations (SDOs)*, *supra* note 11.

48. Benjamin Chiao, Josh Lerner & Jean Tirole, *The Rules of Standard-Setting Organizations: An Empirical Analysis,* 38 RAND J. OF ECON. 905 (Oct. 9, 2007).

49. *See* Daniel F. Spulber, *Innovation Economics: The Interplay Among Technology Standards, Competitive Conduct and Economic Performance*, 9 J. OF COMPETITION LAW AND ECON. 777, 777-825 (2013).

50. *Overview of the U.S. Standardization System*, ANSI, https://www.ansi.org/about_ansi/introduction/introduction?menuid=1 [https://perma.cc/BQ72-BBMD] (last visited Oct. 9, 2019).

51. *See, e.g.*, *About ANSI*, ANSI, https://www.ansi.org/about_ansi/overview/overview?menuid=1 [https://perma.cc/M2LF-RGQ9] (last visited Oct. 9, 2019) (ANSI's

important for maintaining good relations with government agencies, because it encourages public agencies to adopt technology standards and to transact with SSO members. According to ANSI, "[s]tate and local governments and agencies have formally adopted thousands of voluntary standards produced by ANSI, and the process appears to be accelerating."[52]

SSO FRAND policies also allow for transparency by reflecting the tax status of these organizations. In the U.S., SSOs are nonprofit, tax-exempt organizations under section 501(c)(3) of the U.S. Code.[53] SSOs must therefore not establish or distribute technology standards, nor design IP policies or FRAND commitments to benefit individuals. This further demonstrates the fair, reasonable, and non-discriminatory aspects of SSO IP policies. For example, the IEEE interprets the tax exemption requirement as "Section 501(c)(3) organizations must serve the good of the general public by making their work available on a nondiscriminatory basis."[54] Indeed, as the IEEE sees its role as a 501(c)(3) organization as "advancing technology and enabling competition."[55]

Some SSOs do not require FRAND commitments but instead recommend or require royalty-free patent licensing. This suggests that SSOs that do have FRAND policies intend to allow negotiation of royalties between patent holders and implementers. Consider for example the Internet Engineering Task Force (IETF): "a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet."[56] The IETF does not require FRAND commitments.[57] The IETF appears to favor

mission is "To enhance both the global competitiveness of U.S. business and the U.S. quality of life by promoting and facilitating voluntary consensus standards and conformity assessment systems, and safeguarding their integrity.").

52. *Introduction to* ANSI, Am. NAT'L STANDARDS INST., https://www.ansi.org/about_ansi/introduction/introduction?menuid=1 [https://perma.cc/4XWF-VR2H] (last visited Oct. 9, 2019).

53. *See* 26 U.S.C. §501(c)(3) (2018).

54. *IEEE Standards and the Law: What You Need to Know*, IIE STANDARDS ASS'N, https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/stdslaw.pdf [https://perma.cc/9JGG-KK49].

55. *See id.* ("IEEE is a Section 501(c)(3) tax-exempt organization as defined by the United States Tax Code. As such, IEEE is obligated to serve the public good through its educational and scientific endeavors. These endeavors are not directed to benefit any group, industry, or profession, but to benefit the general public. Standards benefit the public in part by advancing technology and enabling competition. Therefore, IEEE standards participants need to follow certain guidelines in order to maintain the Section 501(c)(3) status of IEEE.").

56. *About*, IETF, https://www.ietf.org/about/ [https://perma.cc/53PG-CTZ9] (last visited Oct. 9, 2019).

57. *See* Scott O. Bradner & Jorge Contreras, *At Long Last, A Revised Patent Policy for IETF: What's Behind BCP79bis?*, IETF NEWS (July 14, 2017), https://www.ietf.org/blog/whats-behind-bcp79bis/ [https://perma.cc/93ZF-JA78] ("Unlike

royalty-free licensing but does not require it.[58] Another example includes, The World Wide Web Consortium (W3C), which has a mandatory royalty-free policy for SEPs.[59] The W3C summarizes its patent policy as follows: "The W3C Patent Policy governs the handling of patents in the process of producing Web standards. The goal of this policy is to assure that recommendations produced under this policy can be implemented on a Royalty-Free (RF) basis."[60] The W3C emphasizes that it supports organizational consensus.[61] Some companies with SEPs, however, opposed W3C's royalty-free policies.[62] Royalty free policies such as those of W3C could reduce incentives for decrease innovation in comparison to FRAND commitments.[63]

Many discussions of the FRAND process are based on misinformation about the purpose and characteristics of SSO FRAND policies. In the next section, I explain why SSO FRAND policies are not designed to address many of the functions that have been ascribed to those policies.

B. What SSO FRAND Policies Do Not Do

The preceding section argues that SSOs design FRAND policies to promote market negotiation of patent license agreements. To achieve this, SSO FRAND commitments take a neutral position on the provisions of patent license agreements. Many commenters, however, maintain that FRAND commitments address various problems with negotiation of patent license agreements. There is little, if any, evidence that SSO FRAND commitments target any

many SDOs, the IETF does not require that patent holders make any particular commitment to license their patents on fair, reasonable and non-discriminatory (FRAND) or any other terms.").

58. *See* Jorge L. Contreras, *A Tale of Two Layers: Patents, Standardization, and the Internet*, 93 DENVER U. L. REV. 855, 872-73 (2016) ("While IETF does not require its participants to commit to license their patents on any particular terms, reasonable or otherwise, it does express a preference for RF [royalty free] standards in many contexts.").

59. *See id.*; W3C, W3C PATENT POLICY (2004), https://www.w3.org/Consortium/Patent-Policy-20170801/ [https://perma.cc/5A2D-5WQC].

60. *See* W3C, *supra* note 59.

61. *See Facts About W3C*, W3C, https://www.w3.org/Consortium/facts [https://perma.cc/L9EB-V23M] (last visited Oct. 9, 2019) ("The World Wide Web Consortium achieves its mission by bringing diverse stake-holders together, under a clear and effective consensus-based process to develop high-quality standards based on contributions from the W3C Members, staff, and the community at large.").

62. *See* Contreras, *supra* note 58, at 876-77.

63. James C. De Vellis, *Patenting Industry Standards: Balancing the Rights of Patent Holders with the Need for Industry-Wide Standards*, 31 AIPLA Q. J. 301, 351 (2003) ("In the absence of a reasonable licensing option, an RF-only patent policy will stifle technology, reduce network benefits, and force inferior standards to compete against advanced technology that has a higher likelihood of being more widely available under a RAND policy.").

particular problems in SEP licensing. As this section will explain, FRAND commitments do not address the alleged problems of "patent holdup," "royalty stacking," "patent thickets," or the "Tragedy of the Anti-Commons". This is primarily because there is little evidence of the existence of these problems in patent license negotiations.

1. Market Negotiation and Standardization

SSO FRAND policies do not require or even recommend negotiation of patent license contracts before standards are established. Many academics advocate, however, that licenses should be negotiated before standardization on the grounds that technology providers compete for inclusion in the standard.[64] The argument is that competing technological alternatives available before the standard was established ("*ex ante*") are no longer available after the standard is established ("*ex post*").[65] The U.S. Department of Justice ("DOJ") and the Federal Trade Commission ("FTC") have maintained that when an SSO establishes a standard, SEP holders gain market power that they did not have before the standard was established.[66] In fact, some commentators argue that FRAND royalties should be negotiated even before a patent is declared to be an SEP.[67]

First, compulsory negotiation of patent license contracts before standardization would be inconsistent with SSO IP policies.[68]

64. *See* Daniel G. Swanson & William J. Baumol, *Reasonable and Nondiscriminatory (RAND) Royalties, Standards Selection, and Control of Market Power*, 73 ANTITRUST L.J. 1(2005); *see* Stanley M. Besen, *Why Royalties for Standard Essential Patents Should Not Be Set by the Courts*, 15 CHI.-KENT J. INTELL. PROP. 19, 42-43 (2016); *see* Richard J. Gilbert, *Deal or No Deal - Licensing Negotiations in Standard-Setting Organizations*, 77 ANTITRUST L.J. 855 (2011); *see* Dennis W. Carlton & Alan L. Shampine, *An Economic Interpretation of FRAND*, 9 J. COMPETITION L. AND ECON. 531, 545 (2013) ("A 'reasonable' royalty paid by a firm in the context of FRAND and a SSO is a royalty that does not include any hold-up value: the royalty that would have been negotiated ex ante, before the patented technology at issue had been adopted into the standard and prior to the licensee incurring sunk costs.").

65. *See* Swanson & Baumol, *supra* note 64; *see also* Mariniello, *supra* note 36, at 526.

66. U.S. Dep't of Justice & Fed. Trade Comm'n, Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition 35-36, (2007) https://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/p040101promotinginnovationandcompetitionrpt0704.pdf [https://perma.cc/X35U-2CVY].

67. *See* Besen, *supra* note 64, at 19 ("According to the consensus view, a F/RAND royalty should be the cost of obtaining a license just before the patented invention is declared essential to compliance with an industry standard, which should, in turn, reflect the value of the invention over its best alternative.").

68. *See* Kraig A. Jakobsen, *Revisiting Standard-Setting Organizations' Patent Policies*, 3 NW. J. TECH. & INTELL. PROP. 43 (2004).

According to IP policies, patent holders must typically declare SEPs before the patents can be included in the standard.[69] This often implies that patent license negotiations occur after standards are established, and therefore it is clear that patent license negotiations generally take place in the context of established standards. Without compulsory licensing before standardization, patent holders and implementers still have the option of negotiation during standardization.[70] In any case, standardization and licensing take place in a dynamic setting with revision and replacement of technology standards, where technological change continues to occur, innovators continue to develop products that conform to already established standards, and inventors continue to patent inventions even after standards are established.

Requiring negotiation of patent license contracts before standardization or even before declaration of SEPs would be inconsistent with SSO decision making. License negotiation before setting standards would fundamentally alter the structure and operation of SSOs. Such an approach is not feasible because it would involve SSOs in commercial transactions, which is inconsistent with the purpose of these organizations. Involving SSO members in contract negotiations would mix two very different types of interactions. SSOs apply consensus decision processes such as supra-majority voting in order to choose the best technologies for inclusion in the standard.[71] The separation of consensus choice mechanisms for technology standards from patent license contract negotiations is important because it promotes selection of efficient technology standards.[72] These efficiencies are achieved because patent license contract negotiations that take place after SEP declarations and after standardization.

SSO FRAND policies are not designed to generate *ex ante* royalties, that is, royalties on SEPs before standardization or before declaration of SEPs. Advocates of *ex ante* patent license negotiation provide an inaccurate description of the standard setting process. They portray standard setting process as an arbitrary choice between competing technologies.[73] The *ex ante* patent licensing view further suggests that the combination of the SSO standardization

69. Robin Stitzing et al., *Over-Declaration of Standard Essential Patents and Determinants of Essentiality* (Working Paper, 2018), http://dx.doi.org/10.2139/ssrn.2951617 [https://perma.cc/P4WC-9C9P].

70. *See* DAMIEN GERADIN, STANDARDIZATION AND TECHNOLOGICAL INNOVATION: SOME REFLECTIONS ON EX-ANTE LICENSING, FRAND, AND THE PROPER MEANS TO REWARD INNOVATORS (2006).

71. *See* Spulber, *supra* note 21, at 1487-89.

72. *See id*. at 1500.

73. Mark A. Lemley, *Ten Things to Do About Patent Holdup of Standards (And One Not To)*, 48 B.C. L. REV. 149, 154 (2007).

process and IP policy is simply a matter of allocating economic rents. The ex ante view characterizes standardization as a loss of technology options that would otherwise control the economic rents of patent holders.

The notion that SSO FRAND and other IP policies support *ex ante* patent licensing is fundamentally flawed because it misrepresents standardization. Standardization typically does not involve a choice between a set of fully developed technology alternatives. Rather, standardization involves many different decisions that need not be technology-specific. In practice, standardization opens the door for more, rather than fewer technology providers, because standardization increases *ex post* competition among technology providers. Standardization thus controls economic rents and market power of IP holders more effectively than would occur in an industry without standardization. This means that patent license negotiation after standardization is more efficient than patent license negotiation before standardization.

Standardization does not require ex ante negotiation of patent license agreements because it can involve generic choices of minimum quality and performance standards. These standards are not necessarily technology specific and can be satisfied by competing technologies. For example, the USB standard of transmission speeds is not necessarily technology-specific. Indeed, quality and performance limits may be designed to avoid adverse selection and moral hazard problems that would damage any industry. This reduces the problem of Gresham's law of money applied to products; bad products drive out good products.[74] Minimum quality and performance standards improve demand for the industry's products, and increased demand means greater incentives for entry and competition in the industry. Furthermore, quality and performance standards decrease transaction costs and the costs of quality certification and guaranties. Finally, quality and performance standards increase competition and control economic rents and market power of IP holders. It follows that patent license negotiation after standardization will be more efficient than before standardization.

Standardization also involves establishing interoperability of parts, components, products, elements of networks, and multiple networks.[75] Interoperability standards need not be technology specific either, to the contrary, it promotes entry of many technology providers.[76] Interoperability allows industries to engage in

74. *See* George A. Akerlof, *The Market For 'Lemons': Quality Uncertainty and The Market Mechanism*, 84 QUARTERLY J. ECON. 488 (1970).

75. A. Douglas Melamed & Carl Shapiro, *How Antitrust Law Can Make FRAND Commitments More Effective*, 127 YALE L.J. 2110, 2129 (2017).

76. *Id.*

modularization so that companies can benefit from specialization and division of labor, and modular production facilitates efficient combinations of activities within firms and transactions among firms.[77] Modularization also allows firms and industries to shift from production of complete systems to production of specialized parts and components. These parts and components then can be combined to achieve the desired performance and product variety. So, interoperability increases opportunities for technology providers to enter the industry, and therefore, with interoperability standards, patent license negotiation after standardization is again more efficient than before standardization.

The identification of a time before and after standardization is also misguided. The process of establishing particular standards takes a long time, during which technological change continues unabated. Standardization itself involves updates, revisions, and replacement of standards that reflect continual technological change. For example, telecommunications development by 3GPP involves multiple generations including 5G.[78] 3GPP further emphasizes that although generations describe the type of network, technological change and standardization are measured by a series of "milestones."[79] For 3GPP, these "milestones" take the form of sixteen "releases" from 1999 to 2019.[80] During this twenty-year period, telecommunications technology has evolved rapidly and continually so that it is impossible to define a particular moment before and after standardization.

Because standardization takes time and involves multiple iterations, related R&D takes place before, during, and after standardization. Invention and innovation can often take place in tandem with the standardization process. Technology standards thus reflect information about the state of technology, including declaration of SEPs and companies disclosing information about their R&D programs in technical committees. For example, "3GPP specifications and studies are contribution-driven, by member companies, in Working Groups and at the Technical Specification Group level."[81] Standard setting in turn inspires R&D as companies work on

77. *See* Carliss Y. Baldwin, *Where Do Transactions Come From? Modularity, Transactions, and the Boundaries of Firms*, 17 INDUST. AND CORP. CHANGE 155 (2007).

78. Junseok Kim et al., *3GPP SA2 Architecture and Functions for 5G Mobile Communication System*, 3 ICT EXPRESS 1, 1 (2017), https://reader.elsevier.com/reader/sd/pii/S240595951730019X?token=24C17A5CA3835972BDFE59C7E2DF796DD67A0EB366C4FD17401F774AE36C9E98565198F61EFD9DBC15612EF359ECB2A4 [https://perma.cc/2P2W-ZVF7].

79. *About 3GPP Home*, 3GPP: A GLOBAL INITIATIVE (2019), http://www.3gpp.org/about-3gpp/about-3gpp [https://perma.cc/WYV5-UHZX].

80. *Id.*

81. *Id.*

technologies related to emerging standards. Therefore, technology standards regarding quality, performance, and interoperability are often forward-looking targets for R&D. Thus, the distinction between ex ante and ex post licensing of SEPs is misleading and often vacuous, fabricating an issue where there is none.

2. Government Regulation of Royalties and Other License Contract Provisions

SSO FRAND policies do not suggest government regulation of patent license agreements but rather are intended to foster efficient market transactions. The European Commission ("EC") would appear to endorse this view: "Parties to a SEP licensing agreement, negotiating in good faith, are in the best position to determine the FRAND terms most appropriate to their specific situation."[82] The EC further stresses that "there is no one-size-fit-all solution to what FRAND is: what can be considered fair and reasonable differs from sector to sector and over time."[83]

The EC however, has considered regulatory intervention in the process. The EC seeks "possible measures to (i) improve accessibility and reliability of information on patent scope, including measures to increase the transparency and quality of standard essential patent declarations as well as (ii) to clarify core elements of an equitable, effective and enforceable licensing methodology around FRAND principles and (iii) to facilitate the efficient and balanced settlement of disputes."[84]

The EC further argues for regulatory principles that imply government regulation based on FRAND.[85] The EC sets out four IP valuation principles as a guide to common licensing practices.[86] First, the EC states that the economic value of the technology "should not include any element resulting from the decision to include the technology in the standard."[87] Second, the EC asserts that

82. *European Commission Communication on Setting out the EU approach to Standard Essential Patents,* at 8, COM (2017) 712 final (Nov. 29, 2017), https://ec.europa.eu/docsroom/documents/26583 [https://perma.cc/3SG5-W849].

83. *European Commission Communication on the ICT Standardisation Priorities for the Digital Single Market*, *supra* note 8, at 6.

84. *Id.* at 14.

85. *European Commission Communication on Setting out the EU approach to Standard Essential Patents, supra* note 82, at 6. ("The Commission therefore considers that there is an urgent need to set out key principles that foster a balanced, smooth and predictable framework for SEPs."); *see also* Luke McDonagh & Enrico Bonadio, *Standard Essential Patents and the Internet of Things*, EUROPEAN UNION (2019), http://www.europarl.europa.eu/RegData/etudes/IDAN/2019/608854/IPOL_IDA(2019)608854_EN.pdf [https://perma.cc/7FUE-XLSC].

86. *European Commission Communication on Setting out the EU approach to Standard Essential Patents, supra* note 82, at 6-7.

87. *Id.*

"determining a FRAND value should require taking into account the present value added of the patented technology."[88] Third, the EC believes "FRAND valuation should ensure continued incentives for SEP holders to contribute their best available technology to standards."[89] Finally, the EC states that "to avoid royalty stacking, in defining a FRAND value" various measures can be taken including a "maximum cumulative rate that could be reasonably envisaged or expected."[90] The possibility of price regulation arises from an earlier EC statement that claims it will develop measures "to clarify core elements of an equitable, effective and enforceable licensing methodology around FRAND principles."[91] However, it is not evident whether enforcement refers to the courts or to government regulatory agencies.

SSO FRAND policies do not suggest any involvement of SSOs in the exercise of regulatory control over patent license royalties for SEPs. To the contrary, FRAND policies are intended to avoid regulatory control by the organization, by limiting the involvement of the organization in marketplace negotiations.[92] SSO FRAND commitments do not mention or suggest setting any upper limit on prices,[93] and the concepts of "fair" and "reasonable" royalties and contract terms do not indicate any particular pricing limits. "Nondiscriminatory" royalties and contract terms refer to comparisons of negotiation with "similarly situated" implementers, which does not indicate limits on royalties based on the incremental contributions for SEPs.[94]

SSO FRAND policies differ substantially from many of the characterizations of FRAND commitments in the academic literature. These portrayals of FRAND are based on normative prescriptions rather than objective descriptions. The regulatory approach to FRAND would suggest monitoring and control by SSOs, courts, or antitrust agencies. This would contradict SSOs' consensus approach to standards development and IP policies. Such an approach would also depart from SSOs' reliance on marketplace negotiation between SEP holders and implementers.

Although economic and legal scholarship analyzing FRAND often provides highly specific mathematical formulas for determining FRAND royalties,[95] SSO FRAND rules are general prescriptions

88. *Id.* at 7.
89. *Id.*
90. *Id.*
91. *Id.* at 14.
92. *Id.* at 2.
93. *Id.*
94. *Id.* at 1.
95. J. Gregory Sidak, *The Meaning of FRAND, Part I: Royalties*, 9 J. OF COMPETITION L. & ECON. 931 (2013).

that do not support such precise economic calculations. These formulas would be difficult to apply in practice and would constrain private negotiation. For example, the following studies recommend specific formulas as interpretations of SSO FRAND rules. Swanson and Baumol recommend that SSOs should impose regulations on patent license royalties on the basis of a formula in which the royalty equals the difference between the IP owner's own product price and their input costs.[96] Jorge Contreras recommends that SSOs form "pseudo patent pools" in which patent holders and potential implementers establish aggregate royalty rates.[97] Ganglmair et al. suggest that FRAND commitments should be an option-to-license at a regulated royalty.[98] Several economic studies describe FRAND commitments using the theory of cooperative games, applying the concept of the Shapley value to obtain a royalty formula that distributes total surplus based on the contributions of coalitions of players.[99] These formulas offer specific methods for calculating FRAND royalties. These calculation methods do not provide accurate characterizations of SSO FRAND policies, which are general rules rather than specific formulas.

3. Antitrust Policy

Antitrust considerations further help explain why SSO FRAND policies are general statements that defer to market negotiation of royalties. SSOs focus on choosing and promoting technology standards, and therefore, SSOs cannot be vehicles either for monopolization or price fixing. The generality of SSO IP policies and FRAND commitments help avoid antitrust scrutiny for the organization itself and for its members. To comply with antitrust laws, FRAND commitments cannot serve to generate monopoly power for IP holders nor can they generate monopsony power for implementers. Furthermore, SSO FRAND commitments cannot serve to increase, decrease, or coordinate prices.

SSO FRAND policies are also not meant to impose antitrust restrictions on patent holders or implementers. Indeed, SSO

96. Swanson & Baumol, *supra* note 64.

97. Jorge L. Contreras, *Fixing FRAND: A Pseudo-Pool Approach to Standards-Based Patent Licensing*, 79 ANTITRUST L.J. 47 (2013).

98. Bernhard Ganglmair, Luke M. Froeb & Gregory J. Werden, *Patent Hold-Up and Antitrust: How a Well-Intentioned Rule Could Retard Innovation*, 60 J. INDUS. ECON. 249 (2012).

99. *See* Alice Layne-Farrar, A. Jorge Padilla & Richard Schmalensee, *Pricing Patents for Licensing in Standard-Setting Organizations: Making Sense of FRAND Commitments*, 74 ANTITRUST L.J. 671 (2007); Matthias Dewatripont & Patrick Legros, '*Essential' Patents, FRAND Royalties and Technological Standards,* 4 J. INDUS. ECON. 913, 913-37 (2013); Pierre Dehez & Sophie Poukens, *The Shapley Value as a Guide to FRAND Licensing Agreements*, 10 REV. L. ECON. 265, 265-84 (2014).

FRAND policies emphasize that market negotiations should take place outside of the organization. Such negotiations necessarily take place after standardization. SSO FRAND commitments would be inconsistent with negotiation within the organization if implemented before standards are established. ANSI's antitrust policy agrees, stating that the organization "recognizes that it must not be a vehicle for individuals or organizations to reach unlawful agreements regarding prices, terms of sale, customers, or markets or engage in other aspects of anti-competitive behavior."[100]

Referring to prices and output levels, the IEEE-SA cautions "Do not put IEEE, your company, your colleagues in the standards community, or yourself at risk by discussing these topics."[101] The IEEE-SA's antitrust policy states "'[f[or example, selecting one technology for inclusion in a standard is lawful, but an agreement to prohibit standards participants (or implementers) from implementing a competing standard or rival technology would be unlawful – although as a practical matter, a successful standard may lawfully achieve this result through the workings of the market."[102]

Some argue that SSOs should use FRAND policies to pursue antitrust policy objectives. For example, Cary et al. state, "the obligations imposed by SSOs are intended to protect the same interest: guarding against the anticompetitive appropriation and misuse of the ex post monopoly power that may result from selecting a standard."[103] Others suggest that SSOs should develop more detailed FRAND policies so as to avoid antitrust scrutiny of SSOs.[104] In 2013, the DOJ expressed support for FRAND commitments as a remedy for "hold-up" by SEP holders.[105] The DOJ's statement

100. *ANSI Antitrust Policy*, ANSI (May 22, 2014), https://www.ansi.org/publicstatements/ANSI_Antitrust_Policy?menuid=1 [https://perma.cc/8AB3-E5PW].

101. *Antitrust and Competition Policy, What You Need to Know*, IEEE-SA, https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/antitrust.pdf [https://perma.cc/ZDF6-3BGZ] (last visited Oct. 10, 2019).

102. *Id.*

103. George S. Cary et al., *The Case for Antitrust Law to Police the Patent Holdup Problem in Standard Setting*, 77 ANTITRUST L. J. 913, 916 (2011); *see also* Lemley, *supra* note 36.

104. Dennis W. Carlton & Allan L. Shampine, *Patent Litigation, Standard-Setting Organizations, Antitrust, and FRAND*, 22 TEX. INTELL. PROP. L.J. 223, 233 (2013) ("[W]e expect to see SSOs becoming more active in defining exactly what FRAND means. Failure to do so could subject the SSO to an antitrust suit on the grounds that the SSO provided a forum for the exercise of collective market power through standard-setting.").

105. UNITED STATES DEPARTMENT OF JUSTICE AND UNITED STATES PATENT & TRADEMARK OFFICE POLICY STATEMENT ON REMEDIES FOR STANDARDS-ESSENTIAL PATENTS SUBJECT TO VOLUNTARY FRAND COMMITMENTS (2013) https://www.justice.gov/atr/page/file/1118381/download [https://perma.cc/HJ66-ZFSA] ("[T]he owner of that patented technology may gain market power and potentially take advantage of it by engaging in patent hold-up, which entails asserting the patent to exclude a competitor from a market or obtain a higher price for its use than would have been possible before the standard was set, when alternative technologies could have been chosen.").

supported FRAND commitments as an alternative to "the imposition of one-size-fits-all mandates for royalty-free or below-market licensing."[106] Rejecting the erroneous "hold-up" interpretation and associated restrictions on private negotiation, in 2018, Assistant Attorney General Makan Delrahim withdrew the DOJ from the 2013 joint policy statement.[107]

FRAND commitments also differ what might appear to be similar concepts in antitrust policy. Notably, FRAND policies interpret the terms "reasonable" and "non-discriminatory" differently from U.S. antitrust policy and statutes. Contreras argues that SSO rules requiring "reasonable" royalties appear similar to compulsory patent licensing in antitrust consent decrees, while acknowledging obvious differences.[108] He identifies three consent decrees during World War II that were the first to mandate "reasonable" and "non-discriminatory" royalties: *Standard Oil*, *Aluminum Co. of America (Alcoa)*, and *American Bosch*.[109] Contreras also observes that the Supreme Court used the phrase "uniform reasonable royalties" in the 1945 *United States v. Hartford-Empire Co.* case.[110] He notes that "*Hartford-Empire* had a lasting impact on the remedial decrees issued by courts in antitrust and other cases through the 1970s."[111]

SSO FRAND policies, however, differ substantially from compulsory licensing. Patent holders voluntarily participate in SSOs and voluntarily declare SEPs.[112] FRAND commitments address voluntary negotiation of patent license contracts by market participants without government involvement.[113] SSOs generally are

106. *Id.* at 5-6.

107. *See* Makan Delrahim, Assistant Attorney General, Dep't of Justice, Remarks at the 19th Annual Berkeley-Stanford Advanced Patent Law Institute: "'Telegraph Road': Incentivizing Innovation at the Intersection of Patent and Antitrust Law" (Dec. 7, 2018) ("The Antitrust Division is hereby withdrawing its assent to the 2013 joint 'Policy Statement on Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments.'"), https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-19th-annual-berkeley-stanford [https://perma.cc/ADN5-GRN3].

108. *See* Jorge L. Contreras, *A Brief History of FRAND: Analyzing Current Debates in Standard Setting and Antitrust Through a Historical Lens*, 80 ANTITRUST L.J. 39, 41 (2015) ("[W]hile there are clearly differences between FRAND commitments imposed by judicial decree and those entered voluntarily by parties to facilitate product standardization, their similarities, and the analysis offered over the years by courts, enforcement agencies and private firms, should not be ignored.").

109. The consent decrees involve royalty-free licensing during wartime with relaxation after the war. *See id.*

110. *Id.* (quoting Hartford-Empire Co. v. United States, 324 U.S. 570, 574 (1945)).

111. *Id.* at 55.

112. CONGRESSIONAL RESEARCH SERVICE, R42705, AVAILABILITY OF INJUNCTIVE RELIEF FOR STANDARD-ESSENTIAL PATENT HOLDERS (Jan. 10, 2013); Stitzing et al., *supra* note 69.

113. Jeffrey I.D. Lewis, *What is "Frand" All About? The Licensing of Patents Essential to An Accepted Standard*, CARDOZO LAW INTELL. PROP. L. ALUMNI NEWSLETTER (2014),

private organizations and FRAND policies are designed to foster organizational consensus.[114] The imperatives of wartime that led to compulsory licensing do not apply to FRAND commitments.[115]

FRAND commitments should therefore not be used as a basis for antitrust policy. Antitrust agencies have even brought actions against companies for breach of FRAND commitments.[116] Ginsburg et al observe that antirust actions against SEP holders are a growing trend around the world.[117] *FTC v. Qualcomm* interprets a patent holder's refusals to deal as monopolization: "In sum, Qualcomm's refusal to license has prevented rivals' entry, impeded rivals' ability to sell modem chips externally or at all, promoted rivals' exit, and delayed rivals' entry."[118] Bauer argues that refusals to deal by patent holders represent monopolization activities that violate Section 2 of the Sherman Act.[119] Kobayashi and Wright correctly explain that breach of FRAND commitment generally should not be viewed as a Section 2 violation.[120] They point out that "reliance on state contract and tort law, as well as on provisions of the federal patent laws, would be superior to extending antitrust law to address this problem."[121]

Despite the use of the term "essential," SEPs do not fit into the antitrust essential facilities doctrine. There is no limit on inventors' ability to create new technologies, just as there is no limit on innovators' ability to work around particular inventions. Compulsory licensing not only eliminates rewards for inventors, it diminishes

https://cardozo.yu.edu/what-%E2%80%9Cfrand%E2%80%9D-all-about-licensing-patents-essential-accepted-standard [https://perma.cc/78WN-62MZ].

114. CONGRESSIONAL RESEARCH SERVICE, *supra* note 112, at 3-4.

115. Srividhya Ragavan, Brendan Murphy & Raj Davé, *Frand v. Compulsory Licensing: The Lesser of the Two Evils*, 14 DUKE L. & TECH. REV. 83, 83-85 (2015).

116. *See* Douglas H. Ginsburg & Joshua D. Wright, *Whither Symmetry? Antitrust Analysis of Intellectual Property Rights at the FTC and DOJ*, 9 COMPETITION POL'Y INT'L 41, 44 (2013); Tsai & Wright, *supra* note 40.

117. Douglas H. Ginsburg, Koren W. Wong-Ervin & Joshua D. Wright, *The Troubling Use of Antitrust to Regulate FRAND Licensing*, 10 COMPETITION POL'Y INT'L ANTITRUST CHRON. 2, 2 (Oct. 2015) ("Antitrust enforcers around the globe should be wary of upsetting the carefully balanced FRAND-ecosystem, and should consider the unintended consequences of their proposed solution to the largely theoretical problem of patent holdup.").

118. Federal Trade Commission v. Qualcomm Incorporated, 411 F. Supp. 3d 658, 751 (N.D. Cal. May 21, 2019).

119. Joseph P. Bauer, *Refusals to Deal with Competitors by Owners of Patents and Copyrights: Reflections on the Image Technical and Xerox Decisions*, 55 DEPAUL L. REV. 1211, 1245 (2006) ("Trinko does not undermine the Supreme Court's earlier decisions that refusals to deal may form the predicate of a violation of § 2 of the Sherman Act.").

120. Bruce H. Kobayashi & Joshua D. Wright, *Federalism, Substantive Preemption, and Limits on Antitrust: An Application to Patent Holdup*, 5 J. COMPETITION L. & ECON. 469, 501 (2009) ("[T]heories of patent holdup involving the mere breach of a FRAND commitment made in good faith, and without deception, are fatally flawed insofar as such conduct cannot satisfy the exclusionary conduct requirement of Section 2.").

121. *Id.* at 516.

incentives to develop inventions that would compete with the invention that is made available by compulsory access.[122] There is no need for antitrust action to implement compulsory licensing for SEPs.

Even for traditional essential facilities, the Supreme Court in *Trinko* suggests limits on courts' ability to regulate access to bottleneck facilities.[123] Given the complexities of IP, courts are even less qualified to regulate compulsory access to patented technologies. As Assistant Attorney General Makan Delrahim points out "Antitrust laws should not be used to transform an inventor's one-time decision to offer a license to a competitor into a forever commitment that the inventor will continue licensing that competitor in perpetuity."[124] Delrahim observes that "[t]he Supreme Court clarified as much in *Trinko*, explaining that a refusal to deal is not an antitrust violation if the parties have never done business with each other, because 'there is no duty to aid competitors."[125]

SSO IP policies, in fact, do not seek antitrust enforcement of FRAND commitments. As this article has emphasized, the policies typically seek a neutral position favoring neither patent holders nor technology implementers. Therefore, applying antitrust enforcement to marketplace negotiation of patent license agreements under FRAND commitments jeopardizes both standardization and invention.[126]

Critics of standardization, however, argue that antitrust authorities should enforce FRAND commitments. For example, Chappatte states, "it is critically important to the success of open standardisation as a whole that FRAND commitments are enforced by competition authorities, endorsing clear, justiciable principles that

122. Cole M. Fauver, *Compulsory Patent Licensing in the United States: An Idea Whose Time Has Come*, 8 NW. J. INT'L L. & BUS. 666, 668 (1988).

123. Verizon Commc'ns Inc. v. Law Offices of Curtis v. Trinko, LLP, 540 U.S. 398, 414-15 (2004); *see* Daniel F. Spulber & Christopher S. Yoo, *Mandating Access to Telecom and the Internet: the Hidden Side of Trinko*, 107 COLUM. L. REV. 1822, 1822 (2007).

124. Makan Delrahim, Assistant Attorney General, Antitrust Division, The "New Madison" Approach to Antitrust and Intellectual Property Law, Address at the University of Pennsylvania Law School (Mar. 16, 2018), https://www.justice.gov/opa/speech/file/1044316/download [https://perma.cc/LDW8-48FS]; *see also* Makan Delrahim, Assistant Attorney General, Antitrust Division, Take It to the Limit: Respecting Innovation Incentives in the Application of Antitrust Law, Address before USC Gould School of Law (Nov. 10, 2017), https://www.justice.gov/opa/speech/file/1010746/download [https://perma.cc/8WC6-8C8X].

125. Delrahim, The "New Madison" Approach to Antitrust and Intellectual Property Law, *supra* note 124, at 16.

126. *See* Joshua D. Wright, *SSOS, Frand, and Antitrust: Lessons from the Economics of Incomplete Contracts*, 21 GEO. MASON L. REV. 791, 809 (2014) ("The risk of imposing antitrust remedies in pure contract disputes can have harmful effects in terms of dampening incentives to participate in standard-setting bodies and to commercialize innovation.").

will assist in the interpretation of the FRAND concept."[127] Cary et al. suggest that antitrust authorities should enforce FRAND based on monopolization: "avoiding the FRAND constraint is the conduct giving rise to monopoly power, and should be actionable monopolization."[128] Cary et al. further argue for antitrust enforcement, even if royalties are established through independent negotiation, because standard setting combined with FRAND commitments represents some form of collusion.[129]

C. FRAND Policies of Leading SSOs

This section considers SSO FRAND policies for leading standards organizations including those concerned with Information and Communications Technology ("ICT"). Many SSOs requiring FRAND commitments have remarkably similar policies, and SSO FRAND commitments have remained stable for nearly five decades.

1. The American National Standards Institute

The first SSO FRAND policy is a 1959 landmark policy of the ASA, a predecessor of ANSI.[130] ANSI represents over 270,000 companies and organizations and 30 million professionals, as well as government agencies and international bodies.[131] ANSI's standards and IP policies, including FRAND, are based on organizational consensus.

ANSI is a voluntary private organization that does not establish standards but instead helps coordinate private standards development. ANSI "provides all interested U.S. parties with a neutral venue to come together and work towards common

127. Philippe Chappatte, *FRAND Commitments: The Case for Antitrust Intervention*, 5 EUR. COMPETITION J. 319, 346 (2009).

128. *Id.*; George S. Cary et al., *The Case for Antitrust Law to Police the Patent Holdup Problem in Standard Setting*, 77 ANTITRUST L. J., 913, 943 (2011) (conceding that "[s]uch an argument would seem more availing under the EU's abuse of dominance standard, violation of which does not depend upon how the dominant position was achieved.").

129. *See id.* at 941 ("[I]f participants in the standard-setting process, who agreed collectively to support one technology over all others, mutually agree to license on FRAND terms but then, after the standard is adopted, each independently chooses to increase its royalty significantly, no party to the FRAND 'contract' may have incentive to bring a breach of contract action, while implementers of the standard and users of standard-compliant products ultimately pay the bill. Antitrust should be available in such circumstances as a remedy for the parties harmed by the anticompetitive agreement.").

130. Jorge L. Contreras, *A Brief History of FRAND: Analyzing Current Debates in Standard Setting and Antitrust Through a Historical Lens*, 80 ANTITRUST L.J. 39, 43 (2015).

131. *About ANSI*, *supra* note 51.

agreements."[132] ANSI's process "is guided by the Institute's cardinal principles of consensus, due process and openness and depends heavily upon data gathering and compromises among a diverse range of stakeholders."[133] ANSI emphasizes that U.S. industry members "voluntarily participate in the development of standards and related policies and have the freedom to choose how they will participate and which standards they will use."[134]

The ASA's 1959 policy is based on its 1932 ASA policy in Relation of Patented Designs or Methods to Standards, which states:

> That as a general proposition patented designs or methods should not be incorporated in standards. However, each case should be considered on its merits, and if a patentee be willing to grant such rights as will avoid monopolistic tendencies, favorable consideration to the inclusion of such patented designs in a standards might be given[.][135]

ASA's 1959 patent policy introduces the idea that patents are made available on "reasonable" terms to all potential licensees:

> Standards should not include items whose production is covered by patents unless the patent holder agrees to and does make available to any interested and qualified party a license on reasonable terms or unless other unpatented competing items are included within the standards and the patented item would suffer were it left out.[136]

Building on these earlier policies, ANSI's 2019 FRAND policy states that SEP holders must provide:

> assurance that a license to such essential patent claim(s) will be made available to applicants desiring to utilize the license for the purpose of implementing the standard either: i) under reasonable terms and conditions that are demonstrably free of any unfair discrimination; or ii) without compensation and under reasonable terms and conditions that are demonstrably free of any unfair discrimination.[137]

132. *Standards Activities Overview*, ANSI, https://www.ansi.org/standards_activities/overview/overview?menuid=3 [https://perma.cc/97WD-M3SP] (last visited Jan. 17, 2019).

133. *Id.*

134. *U.S. Standards System: Introduction*, ANSI, https://www.standardsportal.org/usa_en/standards_system/introduction.aspx [https://perma.cc/4K2N-V8JE] (last visited Jan. 17, 2019).

135. George Willingmyre, *History of the Patent Policy of the American National Standards Institute*, GTW ASSOCIATES (June 17, 2014).

136. Contreras, *supra* note 4, at 43.

137. AM NAT'L STANDARDS INST., ANSI ESSENTIAL REQUIREMENTS: DUE PROCESS REQUIREMENTS FOR AMERICAN NATIONAL STANDARDS 11 (2019), https://share.ansi.org/Shared%20Documents/Standards%20Activities/American%20National%20Standards/Procedures,%20Guides,%20and%20Forms/2019_ANSI_Essential_Requirements.pdf [https://perma.cc/7BZV-Z5FK].

The statement refers to "unfair discrimination" whereas European standards organizations have separately emphasized that terms should be "fair" and "non-discriminatory."

2. The International Telecommunications Union, the International Organization for Standardization, and the International Electrotechnical Commission

The three major international standards organizations have a "Common Patent Policy." The International Telecommunications Union ("ITU") develops international technology standards through its affiliated organization the Telecommunication Standardization Sector ("ITU-T"). The ITU-T has a joint patent policy with the ITU Radiocommunication Sector ("ITU-R"), the International Organization for Standardization ("ISO"), and the International Electrotechnical Commission ("IEC").[138]

The ITU was established in 1865 and became an agency of the United Nations.[139] The ITU has since developed standards for the telegraph, the telephone, radio, television, satellites, the Internet, and mobile communications.[140] The ITU membership includes 193 governments, many national, regional and international organizations, and hundreds of companies.[141] According to the ITU-T: "From its inception in 1865, ITU-T has driven a contribution-led, consensus-based approach to standards development in which all countries and companies, no matter how large or small, are afforded equal rights to influence the development of ITU-T Recommendations."[142]

Based in Geneva, the ISO is "an independent, non-governmental international organization with a membership of 164 national standards bodies."[143] The ISO emphasizes consensus: "Through its members, it brings together experts to share knowledge and develop voluntary, consensus-based, market relevant International Standards that support innovation and provide solutions to global

138. *See Common Patent Policy for ITU-T/ITU-R/ISO/IEC*, INT'L. TELECOMM. UNION, https://www.itu.int/en/ITU-T/ipr/Pages/policy.aspx [https://perma.cc/Y7BM-3XY3] (last visited Oct. 2, 2019).

139. *See Overview of ITU's History*, INT'L. TELECOMM. UNION, https://www.itu.int/en/history/Pages/ITUsHistory.aspx [https://perma.cc/KV89-MUCW] (last visited Oct. 2, 2019).

140. *See id*.

141. *See ITU Membership Overview*, INT'L. TELECOMM. UNION, https://www.itu.int/en/membership/Pages/overview.aspx [https://perma.cc/2AAM-LBE7] (last visited Oct. 2, 2019).

142. *See ITU-T in Brief*, INT'L. TELECOMM. UNION, https://www.itu.int/en/ITU-T/about/Pages/default.aspx [https://perma.cc/H496-AH96] (last visited Oct. 2, 2019).

143. *About Us*, ISO, https://www.iso.org/about-us.html [https://perma.cc/M8Y9-23F3] (last visited Oct. 9, 2019).

challenges."[144] According to the organization, the ISO has published 22,808 International Standards.[145]

Also based in Geneva, the IEC is a quasi-governmental organization whose members are national committees.[146] The national committees can include "the entire range of electrotechnical interests in their country, companies and businesses, industry associations, educational bodies, governmental and regulatory bodies."[147] Member countries participate by voting on technology standards.[148] According to the IEC, "[c]lose to 20,000 experts from industry, commerce, government, test and research labs, academia and consumer groups participate in IEC Standardization work."[149]

The "Common Patent Policy," referred to as the "code of practice," requires that companies report their patents and pending applications when participating in standard setting using a Patent Statement and Licensing Declaration form.[150] According to the policy "a patent embodied fully or partly in a Recommendation/Deliverable must be accessible to everybody without undue constraints."[151] To meet this requirement in general is the sole objective of the code of practice. The detailed arrangements arising from patents (licensing, royalties, etc.) are left to the parties concerned, as these arrangements might differ from case to case."[152]

The FRAND commitment in the "Common Patent Policy" requires that, for patents included in the various organizations' Recommendation or Deliverables:

2.1 The patent holder is willing to negotiate licences free of charge with other parties on a non-discriminatory basis on reasonable terms and conditions. Such negotiations are left to the parties concerned and are performed outside ITU-T/ITU-R/ISO/IEC. 2.2 The patent holder is willing to negotiate licences with other parties on a non-discriminatory basis on reasonable terms and

144. *Id.*

145. *Id.*

146. *See About the IEC*, INT'L ELECTRONICAL COMM., https://www.iec.ch/about/?ref=menu [https://perma.cc/N8H3-HVCZ] (last visited Oct. 9, 2019).

147. *Global Reach*, INT'L ELECTRONICAL COMM., https://www.iec.ch/about/globalreach/?ref=menu [https://perma.cc/J2GL-GQ9S] (last visited Oct. 9, 2019).

148. *See About the IEC*, INT'L ELECTRONICAL COMM., https://www.iec.ch/about/?ref=menu [https://perma.cc/D47B-75WP] (last visited Oct. 9, 2019).

149. *Id.*

150. *See Common Patent Policy for ITU-T/ITU-R/ISO/IEC*, ITU, https://www.itu.int/en/ITU-T/ipr/Pages/policy.aspx [https://perma.cc/G96W-BBFW] (last visited Oct. 9, 2019).

151. *Id.*

152. *Id.*

conditions. Such negotiations are left to the parties concerned and are performed outside ITU-T/ITU-R/ISO/IEC.[153]

3. The 3rd Generation Partnership Project

The 3rd Generation Partnership Project (3GPP) is an umbrella group for seven telecommunications SDOs.[154] The seven "organizational partners" are the European Telecommunications Standards Institute (ETSI), the Association of Radio Industries and Businesses (ARIB), the Alliance for Telecommunications Industry Solutions (ATIS), China Communications Standards Association (CCSA), the Telecommunications Standards Development Society, India (TSDSI), the Telecommunications Technology Association (TTA), and the Telecommunication Technology Committee (TTC).[155]

3GPP's organizational partners transform Technical Specifications from 3GPP into technology standards.[156] The organizational partners have FRAND policies that "encourage their respective members to declare their willingness to grant licences on fair, reasonable terms and conditions on a non-discriminatory basis, and consistent with their IPR Policy."[157] The focus of these organizations is on technology standards rather than IP policies. For example, ETSI's mission is "[t]o provide platforms for interested parties to work together to produce standards for ICT systems and services that are used globally."[158] ETSI's strategic objectives are to be "at the heart of digital, an enabler of standards, global, versatile, and inclusive."[159]

ETSI summarizes its IP policy objective as follows: "The objective of the ETSI IPR Policy is to balance the rights and interests of IPR holders and the need for implementers to get access to the technology defined in our standards under FRAND terms and conditions."[160] ETSI's IP policy provides a statement of its policy objectives focusing on technology standards.[161] To achieve these

153. *Id*.

154. *Partners*, 3GPP, https://www.3gpp.org/about-3gpp/partners [https://perma.cc/6A9W-6E2X] (last visited Oct. 10, 2019).

155. *See id*.

156. *Id*.

157. 3GPP ORGANIZATIONAL PARTNERS, 3GPP SCOPE AND OBJECTIVES (2007), Section 3.1, http://www.3gpp.org/ftp/Inbox/2008_web_files/3GPP_Scopeando310807.pdf [https://perma.cc/5M9C-XHUR].

158. *About Us*, ETSI, https://www.etsi.org/about [https://perma.cc/7LVY-B8C5] (last visited Oct. 10, 2019).

159. *Id*.

160. *Intellectual Property Rights*, ETSI, https://www.etsi.org/about/how-we-work/intellectual-property-rights-iprs [https://perma.cc/VA3Z-9N7J] (last visited Oct. 10, 2019).

161. ETSI, ETSI INTELLECTUAL PROPERTY RIGHTS POLICY 39 (Apr. 9, 2019), https://www.etsi.org/images/files/IPR/etsi-ipr-policy.pdf [https://perma.cc/8RDB-F4A5]

objectives, the organization states: "[T]he ETSI IPR Policy seeks a balance between the needs of standardization for public use in the field of telecommunications and the rights of the owners of IPRs."[162] ETSI's IP policy ensures SEPs are available, as follows:

> In order to further this objective the ETSI IPR Policy seeks to reduce the risk to ETSI, Members, and others applying ETSI Standards and Technical Specifications, that investment in the preparation, adoption and application of Standards could be wasted as a result of an Essential IPR for a Standard or Technical being unavailable.[163]

ETSI's FRAND policy also includes compensation for SEP holders:

> IPR holders whether members of ETSI and their Affiliates or third parties, should be adequately and fairly rewarded for the use of their IPRs in the implementation of Standards and Technical. [164]

ETSI requires that an SEP holder "is prepared to grant irrevocable licences on fair, reasonable and non-discriminatory ("FRAND") terms and conditions."[165] At the same time, ETSI allows SEP holders to condition their licenses on reciprocal licensing.[166]

In a "Public Statement," ETSI distances the organization from patent license negotiations: "It is reiterated that specific licensing terms and negotiations are commercial matters between the companies and shall not be addressed within ETSI."[167] ETSI also separates the organization from patent license agreements: "The basic principle of the ETSI IPR regime remains FRAND with no specific preference for any licensing model." [168]

4. The Institute of Electrical and Electronics Engineers

The Institute of Electrical and Electronics Engineers ("IEEE") is "[t]he world's largest technical professional organization for the advancement of technology."[169] Its affiliated standards association

(last visited Oct. 10, 2019) ("It is ETSI's objective to create STANDARDS and TECHNICAL SPECIFICATIONS that are based on solutions which best meet the technical objectives of the European telecommunications sector, as defined by the General Assembly.").

162. *Id.* at 39.

163. *Id*.

164. *Id*.

165. *Id.*

166. *Id.* ("The above undertaking may be made subject to the condition that those who seek licences agree to reciprocate.").

167. *Intellectual Property Rights (IPRs)*, ETSI, https://www.etsi.org/intellectual-property-rights [https://perma.cc/CN6E-Z2QD] (last visited Oct. 7, 2019).

168. *Id*.

169. *About IEEE*, IEEE, https://www.ieee.org/about/index.html [https://perma.cc/TWH3-BPS6] (last visited Oct. 7, 2019).

("IEEE-SA") states, "[w]e are a leading consensus building organization that nurtures, develops & advances global technologies."[170] The IEEE IP policy gives SEP holders the option of not enforcing patent claims.[171] The FRAND commitment also states that an SEP holder:

> Will make available a license for Essential Patent Claims to an unrestricted number of Applicants on a worldwide basis without compensation or under Reasonable Rates, with other reasonable terms and conditions that are demonstrably free of any unfair discrimination to make, have made, use, sell, offer to sell, or import any Compliant Implementation that practices the Essential Patent Claims for use in conforming with the IEEE Standard.[172]

The IEEE revised its FRAND policies in response to policy statements by the DOJ's Antitrust Division.[173]

In contrast to many SSOs, the IEEE addressed injunctions as part of its FRAND policy.[174] The IEEE policy stated "Existing licenses covering use of the Essential Patent Claim, where such licenses were not obtained under the explicit or implicit threat of a Prohibitive Order, and where the circumstances and resulting licenses are otherwise sufficiently comparable to the circumstances of the contemplated license."[175] The IEEE stated that the FRAND commitment "signifies that reasonable terms and conditions, including without compensation or under Reasonable Rates, are sufficient compensation for a license to use those Essential Patent Claims and precludes seeking, or seeking to enforce, a Prohibitive Order except as provided in this policy."[176]

170. *Information About Standards & Committee,* IEEE INTELLIGENT TRANSP. SYS. SOC'Y, https://www.ieee-itss.org/standards [https://perma.cc/8ZYK-THR5] (last visited Oct. 7, 2019).

171. IEEE-SA Standards Board Bylaws, at 17 (2019) (the licensing assurance can be a "general disclaimer to the effect that the Submitter without conditions will not enforce any present or future Essential Patent Claims against any person or entity making, having made, using, selling, offering to sell, or importing any Compliant Implementation that practices the Essential Patent Claims for use in conforming with the IEEE Standard.").

172. *Id.*

173. *See* J. Gregory Sidak, *The Antitrust Division's Devaluation of Standard-Essential Patents*, 104 GEO. L.J. ONLINE 48 (2016); Alden Abbott, *IEEE Patent Policy Change Would Undermine Property Rights and Innovation*, TRUTH ON THE MARKET (Feb. 4, 2015), https://truthonthemarket.com/2015/02/04/ieee-patent-policy-change-would-undermine-property-rights-and-innovation/ [https://perma.cc/PAT8-9NPB]; Luke Froeb & Mikhael Shor, *Innovators, Implementers, and Two-sided Hold-up*, THEANTITRUSTSOURCE (Aug. 2015), https://www.mikeshor.com/research/antitrust/antitrustsource.pdf [https://perma.cc/F5GH-FP8X].

174. David Long, *IEEE's Controversial Proposed Intellectual Property Rights ("IPR") Policy Amendments*, ESSENTIAL PATENT LLC (Feb. 3, 2015), https://www.essentialpatentblog.com/2015/02/ieee/ [https://perma.cc/2KXF-55F8].

175. IEEE-SA Standards Board Bylaws, *supra* note 171, at 16.

176. *Id.* at 17.

5. European Committee for Standardization and the European Committee for Electrotechnical Standardization

The European Committee for Standardization ("CEN") and the European Committee for Electrotechnical Standardization ("CENELEC") are associations for European Union national standardization organizations.[177] CEN and CENELEC have a joint IP policy.[178] The CEN/CENELEC FRAND commitment is very limited: "Provided the patent holder(s) is prepared to grant licences on "FRAND" condition on those essential patent that are included in the draft deliverable, the latter can be processed for final approval."[179] The joint policy makes it clear that these organizations do not seek to interfere with patent license agreements: "However, it is important to underline that the technical bodies may not take position regarding the scope, validity or specific licensing terms of any claimed essential patents."[180]

177. *Who We Are*, CEN, https://www.cen.eu/about/Pages/default.aspx [https://perma.cc/W2MB-ZHA8] (last visited Oct. 10, 2019); *CENELEC Community*, CENELEC, https://www.cenelec.eu/aboutcenelec/whoweare/ceneleccommunity/index.html [https://perma.cc/2VD4-4EGD] (last visited Oct. 10, 2019).

178. *Patents and Standards*, CENELEC, https://www.cencenelec.eu/ipr/Patents/Pages/default.aspx [https://perma.cc/BJ6J-DHK3] (last visited Oct. 10, 2019).

179. CEN-CENELEC, *CEN-CENELEC Guidelines for Implementation of the Common Policy on Patents* 8 (2nd Ed. 2019).

180. *Id.*

6. The Organization for the Advancement of Structured Information Standards

The Organization for the Advancement of Structured Information Standards ("OASIS") "is a nonprofit consortium that drives the development, convergence and adoption of open standards for the global information society."[181] Founded in 1993, OASIS has "more than 5,000 participants representing over 600 organizations and individual members in more than 65 countries."[182]

OASIS provides its technical committees with four options: RAND commitments, royalty free licensing on RAND terms, royalty free on limited terms, and a non-assertion covenant.[183] The OASIS FRAND commitment requires that SEP holders:

[W]ill grant to any OASIS Party or third party: a nonexclusive, worldwide, non-sublicensable, perpetual patent license (or an equivalent non-assertion covenant) under its Essential Claims covered by its Contribution Obligations or Participation Obligations on fair, reasonable, and non-discriminatory terms to make, have made, use, market, import, offer to sell, and sell, and to otherwise directly or indirectly distribute (a) Licensed Products that implement such OASIS Standards Final Deliverable, and (b) Licensed Products that implement any Final Maintenance Deliverable with respect to that OASIS Standards Final Deliverable.[184]

III. PATENT LICENSE CONTRACTS AND NEGOTIATED FRAND COMMITMENTS

This section argues that the most important determinants of FRAND commitments are private contractual negotiations between SEP holders and implementers. Because patent license negotiations are voluntary, they offer the best indications of what is "fair" and "reasonable". Voluntary negotiations also provide the best indications of "non-discriminatory" contract terms because negotiations are likely to provide similar contract provisions in similar situations and also adjust contract provisions to the specific needs to implementers. Negotiation between patent holders and implementers thus realizes the broad general rules expressed by SSO FRAND policies. These patent license agreements are significant because they provide courts with market benchmarks. Courts can therefore

181. *About Us*, OASIS, https://www.oasis-open.org/org [https://perma.cc/T74K-DAZC] (last visited Oct. 10, 2019).

182. *Id.*

183. *Intellectual Property Rights (IPR) Policy*, OASIS, https://www.oasis-open.org/policies-guidelines/ipr [https://perma.cc/JD2T-EQNE] (last visited Oct. 10, 2019).

184. *Id.*

use comparable patent license agreements as indicators of FRAND royalties and other contract terms.

A. FRAND and Negotiation of Patent License Contracts

Patent license agreements are the best indicators of FRAND commitments in both *generic* and *specific* ways. First, SEP license agreements are routine and commonplace and such contracts have existed for more than half a century.[185] The population of patent license contracts provides a picture of common practice across many types of contracts over time. The many SEP license agreements illustrate contractual norms and standard contractual provisions including royalties. Such standard practice satisfies the generic legal definition of what is "reasonable". Black's Law Dictionary defines "reasonable" as "fair, proper, or moderate under the circumstances."[186] Common practice in contracting also recalls the legal standard in tort of a "reasonable person" as "a person who exercises the degree of attention, knowledge, intelligence, and judgment that society requires of its members for the protection of their own and of others' interests."[187]

Second, standard practice in SEP license agreements characterizes the meaning of FRAND in a specific sense because licensors have made FRAND commitments before entering into those contracts. Indeed, the parties are fully informed about the content of IP policies of the relevant SSOs and the implementer is well informed about the patent holder's SEP declarations and FRAND commitments. By forming SEP contracts in light of the FRAND commitments, the provisions of those contracts including royalties implicitly define what is meant by "fair", "reasonable", and "nondiscriminatory".

SEP license agreements in the market reflect the judgments, experience, capabilities, knowledge, and business relationships of a large number of SEP holders and implementers. These agreements are "fair" and "reasonable" because they take place in a competitive market environment: the SEP holder and the implementer have jointly chosen the provisions of the agreement. The parties also voluntarily choose what bargaining procedures they will use to arrive at the provisions of the patent license agreement. Royalties and other provisions of a patent license agreement provide the best indicators of what is "fair" and "reasonable".

SEP license agreements define negotiated FRAND commitments because they are made by willing SEP holders and willing

185. *See id.*
186. *Reasonable*, BLACK'S LAW DICTIONARY (11th ed. 2019).
187. *Reasonable Person*, BLACK'S LAW DICTIONARY (11th ed. 2019).

implementers. Patent license agreements in general, whether or not they are FRAND, reflect a meeting of the minds of the licensor and the licensee. In contrast to patent disputes involving infringement, there is no need for a court to imagine a hypothetical negotiation or to construct a contract. There is no need for third parties to infer the expectations of the parties, their business plans, or their costs and benefits.

Negotiation of patent license agreements accurately reflects the information that the parties have at the time. Negotiation of SEP licenses depends on the subjective perspectives of the parties making agreement. The parties may also negotiate contingent contracts that adjust to events that occur after the contract is negotiated, subject to the transaction costs of contingent contracting.[188] SSOs do not provide details or specific guidance for FRAND commitments because SEP holders and implementers are best informed about their commercial interests and the potential benefits of their patent license agreements.

SEP license agreements characterize FRAND commitments because the parties are fully informed about the relevant technology standards. These technology standards are extensive, detailed, and publicly available. The parties may have participated in the technical committees and decision making of the SSO. The parties also are fully informed about the patents because SSOs require public declaration of SEPs and detailed Letters of Assurance (LOAs) that specify the asserted patent claims. Technology standards often reference SEPs, which provides additional information to potential licensees. The parties involved in SEP license negotiations will tend to be informed because they are likely to be companies that are knowledgeable in the industry. Patent license agreements typically involve specialized patent attorneys. Companies involved in SEP license negotiations are likely to be well informed because they may have recurring business transactions and long-term business relationships.

Patent license agreements, including SEP license agreements, are intrinsically "fair" and "reasonable" because they are contracts. As with other types of contract, patent license agreements involve offer, acceptance, and consideration. Patent license agreements protect the reasonable expectations of the parties, although there are varying interpretations of what are reasonable expectations.[189] These agreements generally are formal written contracts and the

188. *See* Gaston Llanes, *Ex-ante Agreements and FRAND Commitments in a Repeated Game of Standard-Setting Organizations*, 54 REV. OF INDUS. ORG.159, 159-74 (forthcoming 2019).

189. *See* Catherine Mitchell, *Leading a Life of its Own? The Roles of Reasonable Expectation in Contract Law*, 23 OXFORD J. OF L. 639, 639-65 (2003).

terms tend to be tailored for the specific licensor and licensee rather than containing highly standardized provisions. Patent license agreements have all other properties of contractual agreements and benefit from the framework and protections of contract law.

In a patent license negotiation, as in any other contract negotiation, self-interest implies that the parties seek to maximize their joint benefits. This means that, apart from negotiation over how to divide the gains from trade, both parties have incentives to maximize the total gains from trade. Economic analysis consistently predicts that parties to a negotiation seek agreements that are Pareto Optimal, that is, there is no agreement that would improve the benefits of one party without reducing the benefits of the other party.[190] Ronald Coase emphasizes the efficiency of bilateral bargaining when transaction costs are low.[191] This suggests that the provisions of patent license agreements, including royalties, will be those that maximize the joint benefits of the parties.

A patent license agreement is a form of what I termed an "Intellectual Contract".[192] Patent license agreements take into account the special characteristics of intangible assets,[193] and because a patent license agreement is a contract, negotiations take place within the context of contract law. This means that all of the protections and mechanisms of contract law are in the background, including defenses against mistake and misrepresentation. Patent license agreements are commercial contracts with formal written provisions, and typically, the provisions are not standardized but vary with the type of technology and the characteristics of the parties involved.[194]

The combination of SSO IP policies, market negotiation of patent licenses, and legal enforcement of IP rights has been generally successful. An important indication of this success is that patent disputes are relatively rare.[195] Ron Katznelson finds that patent lawsuits were less than one third of one percent of U.S. patents in

190. *See* John F. Nash Jr., *The Bargaining Problem* 18(2) ECONOMETRICA 155, 155-62 (1950); John F. Nash Jr., *Two-Person Cooperative Games*, 21(1) ECONOMETRICA 128, 128-40 (1953); Ken Binmore, Ariel Rubinstein & Asher Wolinsky, *The Nash Bargaining Solution in Economic Modelling*, 17 RAND J. OF ECON. 176, 176-88 (1986).

191. *See* Ronald H. Coase, *The Problem of Social Cos*t, 56.4 J.L. ECON. 2 (2013).

192. Daniel F. Spulber, *Intellectual Contract and Intellectual Law*, 23 J. TECH. L. & POL. 1, 3 (2018).

193. *Id.* at 6.

194. Daniel F. Spulber, *Finding Reasonable Royalty Damages: A Contract Approach to Patent Infringement*, 2 UNIV. ILLINOIS L. REV. 615, 628 (2019).

195. Jean O. Lanjouw & Mark Schankerman, *Characteristics of Patent Litigation: A Window on Competition*, 32 RAND J. ECON. 129, 129-51 (2001); Jean O. Lanjouw & Mark Schankerman, *Protecting Intellectual Property Rights: Are Small Firms Handicapped?*, 47 J.L. & ECON. 45, 45-74 (2004).

force during the period 1923-2013.[196] The litigation rate for SEPs is also very low: patent lawsuits were about one half of one percent of U.S. SEPs at ETSI, which has the highest concentration of SEPs.[197] This suggests that the litigation rate would be considerably lower when comparing the number of patent lawsuits to the number of patent license agreements.

The large number of SEPs declared to SSOs provides an important indication of the importance of negotiated FRAND commitments. Pohlmann and Blind find about 200,000 declared SEPs.[198] Stitzing et al. examine a subsample of the 79,257 declared SEPs for ETSI standards.[199] Pohlmann considers declared granted and active SEPs for cellular telecommunications standards: 25,064 for Long Term Evolution (LTE), 19,069 for Universal Mobile Telecommunications Service (UMTS), and 6,293 for Global System for Mobile Communications (GSM).[200] Pohlmann also finds declared granted and active SEPs for related standards: 2,780 for video coding technologies such as Advanced Video Coding (AVC), 1,704 for broadcasting standards such as Digital Video Broadcasting (DVB), and 1,537 for wireless technology standards such as WiFi.[201] Bekkers et al. consider a dozen SSOs and find about 4,910 SEP disclosures.[202]

Declaration of SEPs may exceed the number of patents that are necessary to implement the standard.[203] This occurs because companies may have incentives to over-declare SEPs.[204] SSOs require declaration of SEPs for patents to be included in standards. Even with over-declaration, however, SEP holders remain bound by

196. Ron D. Katznelson, *A Century of Patent Litigation in Perspective*, at 14 (Nov. 17, 2014).

197. Tim Pohlmann & Knut Blind, *Landscaping Study on Standard Essential Patents (SEPs)*, (Iplytics Germany, Working Paper, 2016), https://www.iplytics.com/wp-content/uploads/2017/04/Pohlmann_IPlytics_2017_EU-report_landscaping-SEPs.pdf [https://perma.cc/24RQ-3TPH].

198. *Id.* at 24.

199. *See* Stitzing et al., *supra* note 69.

200. *See* Tim Pohlmann, *Patents and Standards in the Auto Industry*, 83 INTELL. ASSET MGMT. 22, 24 (Mar. 31, 2017).

201. *Id.*

202. Rudi Bekkers et al., *Disclosure Rules and Declared Essential Patents*, (Nat'l Bureau of Econ. Research, Working Paper No. 23627, 2017), https://www.nber.org/papers/w23627 [https://perma.cc/V5DS-DYCT] (examining the three international SDOs (IEC, ISO and ITU), the regional umbrella organizations (CEN/CENELEC, ANSI, and the Broadband Forum), the groupings IEEE, ETSI and IETF, and smaller SSOs (ATIS , OMA, and TIA)).

203. *See* Stitzing et al., *supra* note 69.

204. *Id.* at 4; *see also* Rudi Bekkers & Andrew Updegrove, *A Study of IPR Policies and Practices of a Representative Group of Standard Setting Organizations Worldwide*, NAT'L ACAD. SCI. (Sept. 17, 2012); Mathias Dewatripont & Patrick Legros, *'Essential' Patents, FRAND Royalties and Technological Standards*, 61 J. INDUS. ECON. 913 (2013).

FRAND commitments so that SEP licenses reflect FRAND commitments.

The implementation of technology standards provides additional evidence of the success of SSO FRAND commitments, private license negotiation, and legal enforcement of IP rights. For example, Biddle et al. point to 251 standards in a laptop computer and find that about three quarters of the 197 standards they evaluated were covered by FRAND.[205] The many products that conform to standards established by SSOs, such as smartphones and other electronic devices, further indicates that there are many underlying SEP license agreements. There is widespread conformity to technology standards by suppliers of parts, components, and software, suggesting the existence of many SEP licensing agreements. For example, it is projected that in several years, there will be almost 5 billion devices with one or more USB-C ports.[206] AT&T licenses SEPs for MPEG-4 standards subject to FRAND commitments. These SEPs are licensed to 25 companies that offer "mobile handsets, game consoles, digital cameras, set-top boxes, broadcast equipment, video teleconferencing equipment and software."[207]

There are a number of indications that the number of SEP license agreements is significant.[208] The 200,000 declared SEPs suggest that there are many license agreements. Companies have been licensing SEPs for over half a century, as noted previously. The

205. Brad Biddle, Andrew White & Sean Woods, *How Many Standards in a Laptop? (And Other Empirical Questions)* (2010), https://osf.io/preprints/lawarxiv/cye5n/download ("Our data suggests that historically RAND has been effective in the computing sector, if measured by implementation of associated standards: we see that 75% of the standards we examined were developed under RAND terms.").

206. Noman Akhtar, *USB Type-C Footprint Expands Across Market Segments*, INFORMA (Dec. 13, 2017), https://technology.ihs.com/598651/usb-type-c-footprint-expands-across-market-segments [https://perma.cc/W6NC-4PNE].

207. *MPEG-4 Patent Licensing Program*, AT&T (Mar. 4, 2011), https://about.att.com/innovation/ip/patents/mpeg-4 [https://perma.cc/S9T5-9N8C] ("AT&T's program licenses hardware and software capable of encoding and decoding content in compliance with the MPEG-4 Part 2 and MPEG-4 Part 1 O/H.264 standards. This typically involves mobile handsets, game consoles, digital cameras, set-top boxes, broadcast equipment, video teleconferencing equipment and software. This highly successful program, to date, has over 25 licensees worldwide.").

208. It is difficult to obtain exact numbers of patent licenses. The USPTO Patent Assignment Dataset has over 6 million patent-asset conveyances during 1970-2014 that represent over 10 million recording-property pairs. Most of these assignments are from employee-inventors to their employers. The dataset also includes patent license agreements, as well as transfers between firms, mergers, security interests, mortgages, and liens. *See* Stuart J. H. Graham, Alac C. Marco & Amanda F. Myers, *Patent Transactions in the Marketplace: Lessons from the USPTO Patent Assignment Dataset*, 27 J. ECON. MGMT. STRATEGY 343, 344 (2018); *AUTM 2017 Licensing Activity Survey*, ASS'N. UNIV. TECH. MANAGERS (2017), https://autm.net/AUTM/media/SurveyReports-PDF/AUTM_2017_US_Licensing_Survey_no_appendix.pdf [https://perma.cc/4CRH-F8JM] (In 2017, universities provided 2037 exclusive patent licenses, 1,566 options, and 4,195 non-exclusive patent licenses).

many companies that are members of SSOs further suggest that there are a significant number of potential licensees.

Comparison of negotiated licenses with licensing by patent pools provides a useful indication of the extent of SEP license agreements. This is because the number of negotiated SEP licenses is many times greater than license agreements offered by patent pools. It is estimated that there are nine times as many SEPs licensed through negotiation as those licensed through patent pools.[209] Patent pools have entered into many SEP license agreements with implementers. For example, MPEG LA's MPEG-2 Patent Portfolio License "has helped produce the most widely employed standard in consumer electronics history."[210] The MPEG-2 license lists 891 licensees and affiliates although not all may produce licensed products.[211]

B. FRAND and "Patent Holdout"

"Patent holdout" refers to implementers' refusal to negotiate patent license agreements.[212] Patent holdout by implementers resembles run-of-the-mill patent infringement combined with refusal of patent license offers.[213] Implementers may refuse to negotiate because they expect that the patent holders will not assert their patents because of the uncertainty and costs of litigation.[214] Implementers who refuse negotiation may choose to engage in holdout because they expect to successfully challenge the validity and infringement of the SEPs,[215] or because they seek to challenge the essentiality of patents for compliance with the standards. Patent holdout thus involves much more than delays and other tactics in negotiation of license agreements. Indeed, there is ample empirical evidence of patent holdouts.[216]

209. Pohlmann & Blind, *supra* note 197, at 36 ("91% of the worldwide declared SEPs are licensed individually rather than through a patent pool.").

210. *MPEG-2 Patent Portfolio License Program*, MPEG LA (2009), http://www.mpegla.com/main/programs/M2/Pages/Intro.aspx [https://perma.cc/LW9V-RRBT].

211. *Licensees of The MPEG-2 Patent Portfolio*, MPEG LA (2009), http://www.mpegla.com/main/programs/M2/Pages/Licensees.aspx [https://perma.cc/NAA3-4W4C] (last visited Oct. 10, 2019).

212. Colleen V. Chien, *Holding Up and Holding Out*, 21 MICH. TELECOMM. & TECH. L. REV. 1, 21 (2014).

213. *See id.*

214. *See id.*

215. *See id.* at 40 ("The rejection of reasonable offers may in some cases also deserve financial sanction, using tools like Federal Rule of Civil Procedure No. 68.").

216. Bowman Heiden & Nicolas Petit, *Patent "Trespass" and the Royalty Gap: Exploring the Nature and Impact of Patent Holdout*, 34 SANTA CLARA HIGH TECH. L. J. 179, 242-43 (2018) ("MNCs operating in developed markets were said to primarily deploy extensive delaying tactics with the main goal of reducing their royalty payments, while

Infringement by implementers constitutes an externality that harms patent holders. Patent licensing, in turn, addresses the externality by compensating the patent holder for the infringement and providing incentives for efficient application of technology. Ronald Coase demonstrated that negotiation efficiently handles externalities in the absence of transaction costs.[217] Richard Epstein observes that "[h]oldouts and externalities work in inverse relationship to each other. The best that we can do in a positive transactions cost world is to minimize their sum."[218] Controlling both patent holdout and infringement are necessary for a well-functioning system of IP rights and efficient markets for inventions and innovations.

Patent law addresses the risk of patent holdout by infringers through disclosure requirements for obtaining patents. Patent law further addresses holdout through injunctions and damage remedies for infringement including reasonable royalties and lost profits. Legal costs provide additional incentives for technology adopters to avoid holdout by negotiating patent license agreements. Also, business relationships between patent holders and technology adopters provide incentives for adopters to avoid holdout through patent license negotiation.

SSO IP policies including FRAND commitments help address patent holdout by implementers. SSOs require SEP holders to disclose their patents for inclusion in the standard. Patent holders' disclosure of SEPs to SSOs gives adequate notice to implementers that the SEPs are part of the standard.[219] The disclosure of SEPs to SSOs supplements the disclosure provisions of the patent system itself.[220] The FRAND declarations of SEP holders also provide notice to implementers that the SEPs are available for licensing. Implementers have lower incentives for holdout because they cannot claim to be surprised about the existence of SEPs or their

large firms in emerging markets (LFE) and small to medium-sized enterprises (SMEs), especially the "long tail" of microvendors, seek to avoid payment altogether.").

217. *See* Elizabeth Hoffman & Matthew L. Spitzer, *The Coase Theorem: Some Experimental Tests*, 25 J. L. & ECON. 73 (1982).

218. Richard A. Epstein, *Holdouts, Externalities, and the Single Owner: One More Salute to Ronald Coase*, 36 J. L. & ECON. 553, 557 (1993).

219. Richard A. Epstein et al., *The FTC, IP, and SSOS: Government Hold-Up Replacing Private Coordination*, 8 J. COMPETITION L. & ECON. 1, 25 (2012).

220. *Id.* at 24-25 ("It is noteworthy that in each of the high-profile cases so often held up as examples of 'holdout' — such as RIM, eBay, and Microsoft v. i4i51 —the patents in those cases were judged by the courts to have satisfied every one of these disclosure requirements despite extremely well-funded litigation teams making every conceivable invalidity argument. Throughout Patent Office reexaminations, federal court trials, and federal court appeals, including to the Supreme Court in some of these cases, these patents were determined to give adequate notice.").

availability for licensing. FRAND commitments by SEP holders create legal incentives for implementers to respond to patent license offers.

FRAND commitments do not necessarily rule out the use of injunctions. In *Apple v. Motorola*, Judge Richard Posner found that an injunction may be appropriate if an SEP holder with a FRAND commitment can show irrevocable harm or the inadequacy of monetary damages.[221] Judge Selna's decision in *TCL v. Ericsson* took the form of an injunction that spelled out a FRAND license.[222]

The Court of Justice of the European Union ("CJEU") in *Huawei v. ZTE* addressed the patent holdout problem in the context of FRAND commitments.[223] The CJEU set forth conditions under Article 102 of the Treaty on the Functioning of the European Union (TFEU) such that an SEP holder would not abuse its dominant position by seeking an injunction for infringement or recall of infringing products. The CJEU emphasized various aspects of good faith negotiation of patent license agreements. The CJEU placed obligations on both the SEP holder and the alleged infringer:

> [P]rior to bringing that action, the proprietor has, first, alerted the alleged infringer of the infringement complained about by designating that patent and specifying the way in which it has been infringed, and, secondly, after the alleged infringer has expressed its willingness to conclude a licensing agreement on FRAND terms, presented to that infringer a specific, written offer for a licence on such terms, specifying, in particular, the royalty and the way in which it is to be calculated.[224]

Furthermore, the CJEU ruled that the alleged infringer should not engage in holdout,

> [W]here the alleged infringer continues to use the patent in question, the alleged infringer has not diligently responded to that offer, in accordance with recognised commercial practices in the field and in good faith, this being a matter which must be established on the basis of objective factors and which implies, in particular, that there are no delaying tactics.[225]

Since *Huawei v. ZTE*, the European national courts have provided additional clarity regarding the obligations of the alleged

221. Apple Inc. v. Motorola, Inc., 757 F.3d 1286, 1331 (Fed. Cir. 2014).

222. TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635, at *8 (C.D. Cal. Dec. 21, 2017)

223. Case C-170/13, Huawei Technologies Co. Ltd v. ZTE Corp., ZTE Deutschland GmbH, ECLI:EU:C:2015:477 (2015).

224. *Id.* ¶ 71.

225. *Id.*

infringer to avoid holdup in negotiating SEP licenses.[226] Various types of holdout actions by the alleged infringer allow the SEP holder to request an injunction at different stages of the negotiation if the implementer does not negotiate in good faith.[227]

The non-discriminatory element of FRAND commitments also addresses patent holdout. SEP holders must offer comparable license terms to similarly situated implementers. Implementers cannot holdout to obtain better SEP license terms when similarly situated implementers have agreed to license contracts for those SEPs. Implementers that holdout are more likely to face legal penalties for infringement when similarly situated implementers have licensed SEPs.

Some commentators argue that policy makers should rule out injunctions on the basis of FRAND commitments.[228] The *eBay* decision places limitations on injunctions by patent holders.[229] The IEEE FRAND policy discussed earlier, explicitly limits injunctions. Most SSO IP policies, however, do not limit injunctions. By supporting market negotiation of patent license agreements, FRAND commitments protect the IP rights of inventors.

Regulations or court decisions that limit injunctions are counterproductive, and increase the risk of holdout by implementers.[230] Antitrust policy that penalizes SEP holders from seeking injunctive relief for infringement would encourage holdout by implementers.[231] Injunctions are necessary for the patent holder to enforce IP rights against an infringer that refuses to license and to stop the harm from continuing infringement. Injunctions also shift some responsibility for determining royalties from the courts to negotiation. The possibility of injunctions helps encourage infringers to

226. *Negotiating Licenses for Essential Patents in Europe, Increased Clarity Provided on the Principles Established by the Court of Justice of the European Union in Huawei v ZTE,* 4IPCOUNCIL, https://caselaw.4ipcouncil.com/guidance-national-courts [https://perma.cc/P66L-ZV49] (last visited Oct. 10, 2019).

227. *Id.*

228. *See, e.g.*, Cotter, *supra* note 36, at 314 ("My principal normative conclusion is that courts generally should allow SEP owners to obtain damages only, and not injunctions, for the SEP's unauthorized use; and that, in principle, it would be preferable to use contract and patent law to achieve this result, as opposed to antitrust.").

229. Christopher B. Seaman, *Permanent Injunctions in Patent Litigation After eBay: An Empirical Study,* 101 IOWA L. REV. 1949, 2002 (2015) ("[D]istrict courts have applied eBay in a manner that awards permanent injunctions to operating companies who compete with the infringer in the vast majority of cases, while simultaneously denying them to most PAEs [Patent Assertion Entities] and non-competitors."); *see also* Ryan T. Holte & Christopher B. Seaman, *Patent Injunctions on Appeal: An Empirical Study of the Federal Circuit's Application of eBay*, 92 WASH. L. REV. 145 (2017).

230. Peter Camesasca et al., *Injunctions for Standard-Essential Patents: Justice is not Blind.*, 9.2 J. COMP. L. & ECON., 285, 306 (2013) ("It is an option in the context of a procedure to resolve disputes with respect to royalties, which plays an important role in addressing opportunistic behavior by potential licensees.").

231. *See* Spulber, *supra* note 21.

engage in negotiation rather than pursuing delaying tactics. Furthermore, injunctions allow SEP holders to obtain reasonable royalty damages for infringement that has already occurred and to limit future infringement. Injunctions place less emphasis on intellectual liability and more emphasis on IP and intellectual contract.[232]

The risk of holdout may increase as technological standardization shifts to new industries. Implementers of technology standards may lack experience with patent license negotiations. Complex innovations can require implementers to contract with many SEP holders. Technological developments described as the Fourth Industrial Revolution (4IR) require greater connectivity.[233] This includes such areas as the Internet of Things (IoT), artificial intelligence (AI), cloud computing, connected vehicles, and autonomous vehicles.

C. FRAND, the Royalty Base, and the "Patent Run-Around"

SSO FRAND commitments that attempt to control the royalty base increase transaction costs and discourage negotiation of patent license agreements. SSO IP policies and regulations that attempt to specify where licensing should occur in the value chain interfere with market negotiation. This has the effect of reducing incentives to invent and decreasing standardization. Antitrust and regulatory policies that control the royalty base can cause patent disputes, decrease incentives to form patent license agreements, and reduce the economic benefits of standardization.[234]

This section, thi argues that efforts to control the royalty base could induce implementers to give SEP holders what I refer to as the "patent run-around". The patent run-around occurs when product manufacturers send patent holders to negotiate with component makers, and in turn, component makers send patent holders to negotiate with product manufacturers, with neither group of implementers agreeing to patent license offers. The result is that both groups of implementers engage in holdout and patent holders are not compensated. For example, product manufacturers send SEP holders to negotiate with Tier 1 and Tier 2 suppliers who then send SEP holders to negotiate with product manufacturers, with neither group accepting SEP license offers.

232. *Id*.

233. Klaus Schwab, *The Fourth Industrial Revolution: What It Means and How to Respond, Foreign Affairs*, FOREIGN AFF. (Dec. 12, 2015), https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial-revolution [https://perma.cc/77QS-UULW].

234. *See* Wright, *supra* note 126, at 805-06.

The choice of the royalty base has major effects on negotiation of patent license agreements. For example, controls on the royalty base can determine which implementers license particular SEPs, and can also affect the royalties received by SEP holders. SSO FRAND commitments that seek to determine the royalty base lose their neutrality toward patent license negotiation. This helps explain why SSO FRAND commitments generally do not dictate the royalty base for patent license agreements.

The revised IEEE IP policy unfortunately seeks to limit the royalty base as part the FRAND commitment. The IEEE IP policy requires that SEP holders should consider the following:

> The value that the functionality of the claimed invention or inventive feature within the Essential Patent Claim contributes to the value of the relevant functionality of the smallest saleable Compliant Implementation that practices the Essential Patent Claim.
>
> The value that the Essential Patent Claim contributes to the smallest saleable Compliant Implementation that practices that claim, in light of the value contributed by all Essential Patent Claims for the same IEEE Standard practiced in that Compliant Implementation.[235]

The IEEE policy constrains the royalty base using the contributions to value of the smallest component that practices the SEP claim. Estimating such contributions to value poses additional problems for SEP holders and implementers.

FRAND commitments that control the royalty base affect the location of patent licensing in the value chain. Rules favoring smallest component implementation thus determine which implementers must contract with SEP holders. The transaction costs may be higher for implementers chosen by the smallest component implementers than for other implementers. This will diminish the economic efficiency in the market for patent license contracts, making SEP holders, implementers, and consumers worse off. The result of this inefficiency will be less standardization, thus eliminating the very benefits that SSO FRAND commitments seek to achieve.

In the absence of transaction costs, royalties could be passed through to the final consumer regardless of where patent licensing occurs in the value chain.[236] However, when there are transaction costs the location of patent licensing can have a significant impact

235. *IEEE-SA Standards Board Bylaws*, INST. OF ELECTRICAL & ELECTRONICS ENGINEERS 1, 16 (Mar. 2019), https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/sb_bylaws.pdf [https://perma.cc/BR7E-RNZ2].

236. Anne Layne-Farrar, Gerard Llobet & Jorge Padilla, *Patent Licensing in Vertically Disaggregated Industries: The Royalty Allocation Neutrality Principle*, 95 COMM. & STRATEGIES 61 (2014).

on economic efficiency. Rules that restrict the royalty base to smaller components necessarily push licensing up the value chain.[237] SEP holders would need to license to many suppliers rather than licensing to makers of major components and final products, which could raise the number of contracts to be negotiated, further increasing transaction costs. Restrictions on the royalty base can make it necessary to license individual patents thus giving up transaction efficiencies obtained by licensing patent portfolios.

In a frictionless world, the choice of the royalty base is arbitrary because parties negotiating patent license contracts can make the necessary adjustments in royalty rates to achieve a desired outcome. In a perfectly competitive setting without transaction costs, the location of patent licensing may not affect royalties on SEPs. However, because markets for IP are subject to considerable transaction costs, the parties negotiating patent licenses cannot make the necessary adjustments in royalty rates without incurring additional expenses.

Restricting the royalty base to the smallest implementation has legal consequences as well. By licensing patents to firms higher up the value chain, patent owners may encounter the limitations of patent exhaustion. Patent exhaustion prevents patent owners from obtaining additional benefits that inventions confer on firms lower down the value chain.[238] The Supreme Court in *Impression Products* found "[i]n sum, patent exhaustion is uniform and automatic. Once a patentee decides to sell—whether on its own or through a licensee—that sale exhausts its patent rights, regardless of any post-sale restrictions the patentee purports to impose, either directly or through a license."[239]

Ironically, SSO FRAND commitments that specify the smallest implementation diminish the advantages of centralized coordination through SSOs. To push patent licensing arbitrarily up the value chain means that input suppliers must coordinate with manufacturers because input suppliers pass on the costs of patent license agreements. Implementers incur additional costs of coordinating, which goes against the very purpose of standardization.

Consider for example the SSPPU rule. In *Cornell University*, the court limited reasonable royalty damages based on

237. *See* Jonathan D. Putnam & Tim Williams, *The Smallest Salable Patent-Practicing Unit (SSPPU): Theory and Evidence* (Sept. 6, 2016).

238. 35 U.S.C. § 154(a) (2018) ("A United States patent entitles the patent holder to "exclude others from making, using, offering for sale, or selling [its] invention throughout the United States or importing the invention into the United States."); Quanta Computer Inc. v. LG Electronics Inc., 553 U.S. 617, 625 (2008) ("The longstanding doctrine of patent exhaustion limits the patent rights that survive the initial authorized sale of a patented item.").

239. Impression Products, Inc. v. Lexmark Int'l, Inc., 137 S. Ct. 1523, 1535 (2017).

components.[240] The decision observed that the inventor "Dr. Torng did not develop an entire computing system. Rather, he invented a method for instruction issuance within a computer processor."[241] The decision pointed out that the patent read on a component of the processor, which was itself a component of a central processing unit module, which in turn was part of a larger computing system. The *Cornell University* based the analysis of the economic value contributed by the invention on the location of the invention within a larger system, even though many other factors could conceivably affect the economic value of the invention. The court identified the processor as the SSPPU. The court in *Cornell University* acknowledged that sales of servers rather than processors were Hewlett-Packard's main business.[242] However, the court identified some "a la carte" sales of processors as the basis of the SSPPU rule.

David Kappos and Paul Michel point out that imposing the SSPPU rule "would undermine the basis of the FRAND bargain, and could seriously reduce incentives to innovators."[243] Fortunately, SSO FRAND commitments typically do not suggest that SEP holders follow the SSPPU rule.[244] For example, in telecommunications, patent licensing by final product manufacturers rather than component suppliers is the industry norm.[245]

The royalty base should be at the level of the final product if patented technologies create value at that level of the value chain.[246] The SSPPU rule constrains negotiation of patent license

240. *See* Cornell Univ. v. Hewlett-Packard Co., 609 F. Supp. 2d 279, 289 (N.D.N.Y. 2009) ("[T]his record contains no reasonable basis for finding that Cornell is entitled to the entire market value of Hewlett–Packard's CPU bricks or servers or workstations as a reasonable royalty base.").

241. *Id.* at 283.

242. *Id.* ("Although the accused processors were the smallest salable units incorporating Dr. Torng's invention, Hewlett–Packard's primary business did not include a la carte processor sales.").

243. David Kappos & Paul R. Michel, *The Smallest Salable Patent-Practicing Unit: Observations on its Origins, Development, and Future*, 32 BERKELEY TECH. L.J. 1434, 1448 (2018) ("There is also no support for the contention that SSPPU is a requirement of fair, reasonable and nondiscriminatory ("FRAND") terms and conditions under which holders of standard-essential patents ("SEPs") often agree to grant licenses. No case has imposed such a requirement.").

244. *Id.* at 1449.

245. Erik Stasik, *Royalty Rates and Licensing Strategies for Essential Patents on LTE (4G) Telecommunications Standards*, LICENSING EXECS. SOC'Y (Sept. 2010), https://www.lesi.org/news-results/2011/05/02/royalty-rates-and-licensing-strategies-for-essential-patents-on-lte-(4g)-telecommunication-standards [https://perma.cc/HYP3-PPSM]; Keith Mallinson, *Busting Smartphone Patent Licensing Myths, Center for the Protection of Intellectual Property*, GEORGE MASON UNIV. CTR. FOR THE PROTECTION OF INTELL. PROP. (Sept. 2015), http://sls.gmu.edu/cpip/wp-content/uploads/sites/31/2015/10/Mallinson-Busting-Smartphone-Patent-Licensing-Myths.pdf [https://perma.cc/9G5E-LWKS]; Putnam & Williams, *supra* note 237.

246. *See* J. Gregory Sidak, *The Proper Royalty Base for Patent Damages*, 10 J. OF COMPETITION L. & ECON. 989, 1037 (2014) ("The royalty base for calculating patent

agreements and increases transaction costs.[247] With complex innovations, SEPs may apply to the combination of inventions that form the final product. The relevant functionalities can be at the level of the final product. Implementation of the standard also may be at the level of the final product. The SSPPU rule thus tends to diminish royalties for SEPs because the returns to functionalities are achieved closer to the final product.[248] SSPPU policies would diminish the economic benefits of modularity that have decreased vertical integration and increased competition in many industries.

SSO FRAND commitments requiring non-discriminatory access to implementers do not specify a particular level of the value chain. Multiple purpose technologies can be used by many industries. By pushing patent licensing up the value chain, the smallest component approach tends to standardize royalties across industries. Efficient markets, however, do not imply equality of prices across industries. Efficient markets typically require price differences across markets to achieve allocative and dynamic efficiencies. Epstein, Kieff and Spulber observe:

[I]t is a serious mistake to suppose that there is any such unique number that counts as the incremental value of a patent. Generally, different buyers will derive different benefits from implementing any particular technology. These differences will depend on the buyer's complementary assets, other technologies, final products, organizational structure, technological knowledge, and many other factors.[249]

Industries are likely to derive very different economic benefits from a particular technology.

Some argue that SSO FRAND commitments require SEP holders to "licensing to all," which would mean licensing to all levels of the value chain.[250] Bertram Huber, however, points out "[t]here is

damages generally should be no smaller than the value of the downstream product if the patented technology interacts with other components of that downstream product to create value."). *cf.* Ravi Mohan, *Analysis of the Entire Market Value Rule in Complex Technology Litigation: Arduous Royalty Base Determinations, Unjust Damage Rewards, and Empirical Approaches to Measuring Consumer Demand*, 27 SANTA CLARA COMPUTER & HIGH TECH. L.J. 639 (2010).

247. *See* Nicolas Petit, *The Smallest Salable Patent-Practicing Unit (SSPPU) Experiment, General Purpose Technologies and the Coase Theorem*, GENERAL PURPOSE TECHNOLOGIES AND THE COASE THEOREM 1, 8 (2016) ("SSPPU pricing is a nest of transaction costs. The SSPPU rule may thus limit the ability of technology developers and implementers to reach socially efficient bargains.").

248. *See id.* at 1 ("SSPPU wants to prevent upstream technology developers to claim all or a share of the value added to the end product sold by original equipment manufacturers on downstream markets.").

249. *See* Epstein et al., *supra* note 219, at 37.

250. *See, e.g.*, Karl Heinz Rosenbrock, *Life-long Honorary Director-General of ETSI, Why the ETSI IPR Policy Requires Licensing to All* (2017), https://www.fair-

no question that end-product manufacturers are best positioned to comprehensively license all of the essential IPRs practiced in the fully-compliant mobile devices and infrastructure equipment that they sell to consumers or network operators."[251] "Licensing to all" policies are inconsistent with SSO FRAND commitments because they tend to favor implementers,[252] and conflict with the legal doctrine of patent exhaustion, which prevents patent holders from licensing simultaneously at multiple levels of the value chain.[253]

"Licensing to all" requirements could also cause the problem of "patent run-around." Implementers would avoid FRAND obligations by directing SEP holders to firms at different levels of the value chain. Implementers would appear to respond to SEP license offers but would avoid accepting offers by sending SEP holders to other implementers. In communications, this problem was solved by licensing to implementers producing mobile devices and network equipment. For example, mobile telecommunications standards such as 4G or 5G assure interoperability of parts, components, software, mobile phones, and networks. Some patented technologies apply to multiple components or to combinations of components. As a result, it may not be possible to compensate the SEP owner fully based on a particular component. Therefore, FRAND licensing is achieved by negotiation between those SEP owners and makers of mobile devices and network equipment.

Public policy makers should avoid controlling the royalty base and requirements that SEP holders license to all. This is particularly important as new industries such as automobiles adopt general purpose technologies in ICT. Patents are not new to the automobile industry. George B. Selden famously applied for an automobile patent in 1879, and the complexity of automobiles and

standards.org/wp-content/uploads/2017/08/Why-the-ETSI-IPR-Policy-Requires-Licensing-to-All_Karl-Heinz-Rosenbrock_2017.pdf [https://perma.cc/84KK-HECY].

251. Bertram Huber, *Why the ETSI IPR Policy Does Not and Has Never Required Compulsory 'License to All': A Rebuttal to Karl Heinz Rosenbrock* (2017), http://dx.doi.org/10.2139/ssrn.3038447 [https://perma.cc/LJ73-2Q4Z].

252. *See* Luke McDonagh & Enrico Bonadio, STANDARD ESSENTIAL PATENTS AND THE INTERNET OF THINGS, EUROPEAN PARLIAMENT 27 (2019) http://www.europarl.europa.eu/RegData/etudes/IDAN/2019/608854/IPOL_IDA(2019)608854_EN.pdf [https://perma.cc/32ZR-X9QQ] ("'Use-based licensing' means that the fee or value of an SEP licence would vary depending on the end-use for which it is utilised, i.e. depending on whether it is used in a high-cost, high-value product such as an e-car, or whether it is used in a lower-cost, lower-value item such as an IoT consumer item, such as a web-connected coffee machine or home heating device. By contrast, 'licensing to all' refers to a situation where any party would be entitled to an SEP licence, regardless of the value of the product the SEP technology will be used for. Both approaches have their advantages and disadvantages, with the first generally viewed as more favourable to the SEP-owner, and the second more advantageous to the implementer/licensee.").

253. *See* Huber, *supra* note 251, at 9.

the effects of patents were recognized many decades ago.[254] Now, the development of the connected car and autonomous vehicles will require licensing mobile communications technologies. Automobile manufacturers are developing digital platforms and ecosystems to support the connected car and autonomous vehicles.[255] This implies that regulation and antitrust policy should not mandate SSO FRAND commitments that would prevent SEP licensing at the level of the automobile.

D. FRAND and "Patent Holdup"

Despite the popularity of the "patent holdup" concept, SSOs could not have intended for FRAND policies to address this theoretical problem. The "patent holdup" concept was introduced in 2007.[256] SSO FRAND policies began nearly half a century before the "patent holdup" concept, and most policies predate the concept by many years. So it follows that SSO FRAND policies could not possibly be responding to the "patent holdup" concept, nor meant to address any phenomenon of the type described by "patent holdup."

"Patent holdup" refers to two related public policy concerns: technology usage and technology standardization. First, "patent holdup" describes the possibility that an implementer is already using the patented technology before receiving a license offer from the patent holder.[257] Therefore, an implementer using the technology could face switching costs if they were to implement a substitute technology, and could be "locked in" to the patented technology by the presence of these switching costs.[258] Then, the patent holder could potentially behave "opportunistically" by demanding

254. *See, e.g.*, C. A. Welsh, *Patents and Competition in the Automobile Industry*, 13 L. AND CONTEMP. PROBLEMS 260, 274 (1948) ("[I]t is apparent that the web of automotive technology is so far-flung and is already in the public domain to such an extent that there is only a remote possibility that any individual or group could command enough of the patent strands in the network to control the industry today.").

255. *See Volkswagen Develops the Largest Digital Ecosystem in the Automotive Industry*, VOLKSWAGEN, https://www.volkswagenag.com/en/news/stories/2018/08/volkswagen-develops-the-largest-digital-ecosystem-in-the-automot.html [https://perma.cc/64VW-WTXA] (last visited Oct. 10, 2019) ("The development of a Group-wide platform and digital services for the 'Volkswagen We' ecosystem is being accelerated."); *see also* Dean Afzal, *Automotive: The Age Of The Mobility Ecosystem*, DIGITALIST MAG. (2017), https://www.digitalistmag.com/customer-experience/2017/09/19/automotive-age-of-mobility-ecosystem-05348304 [https://perma.cc/BP5S-XJ5D] ("In the post-ownership future, consumers, dealers, and manufacturers alike are learning how to exist in a mobility ecosystem.").

256. *See* Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEXAS L. REV. 1991 (2007); *see also* Joseph Farrell et al., *Standard Setting, Patents, and Hold-up*, 74 ANTITRUST L.J. 603 (2007).

257. Farrell et al., *supra* note 256.

258. *See* Thomas F. Cotter, *Patent Holdup, Patent Remedies, and Antitrust Responses*, 34 J. CORP. L. 1151 (2009).

"excessive" royalties for a patent license.[259] The implementer would then pay greater royalties to avoid incurring switching costs.

Second, "patent holdup" refers to license negotiation after standardization, and may be termed "SEP holdup" to distinguish from the basic switching cost story. Here, the argument is that substitute technologies in existence before standardization are no longer available. Implementers are said to be "locked in" to the industry technology standard and at the mercy of SEP holders because competing technologies are not part of the standard.[260] Then, it is alleged that SEP holders behave opportunistically by taking advantage of all implementers in royalty negotiations. According to this view, SEP holders do not just demand royalties that reflect the benefits of the patented technology, but take advantage of the collective benefits of conforming to the standard. Here, the notion that implementers face switching costs is replaced by the collective costs to the industry of establishing the standard. The collective costs of adopting a new standard will be prohibitive to the point that the entire industry is stuck with the standards.

Some have argued that SSO intend FRAND policies to address the alleged problem of SEP holdup.[261] The courts have interpreted SSO FRAND policies as targeting "patent holdup".[262] FRAND decisions that consider "patent holdup" include In re Innovatio, Microsoft v. Motorola, and Unwired Planet v. Huawei.[263] In the period from 2007 to 2018, Gregory Sidak found approximately 140 U.S.

259. *See id*.

260. *See* Melamed & Shapiro, *supra* note 75, at 2110 ("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.").

261. *See, e.g.*, COMMITTEE ON INTEL. PROP. MGMT. IN STANDARD-SETTING PROCESSES, NAT'L RES. COUNCIL OF THE NAT'L ACAD., *supra* note 20, at 54; Tsai &Wright, *supra* note 40, at 158; Melamed & Shapiro, *supra* note 75.

262. *See* J. Gregory Sidak, *Is Patent Holdup a Hoax?*, 3 THE CRITERION J. ON INNOVATION 401, 477 (2018).

263. In re Innovatio IP Ventures, LLC, No. 11 C 2303, 2013 WL 5593609, at *8 (N.D. Ill. Sep. 27, 2013) ("[O]ne of the primary purposes of the RAND commitment is to avoid patent hold-up, which occurs when the holder of a standard-essential patent demands excess royalties after standard implementers are already locked into using the standard."); *see* Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024, 1031 (9th Cir. 2015) ("The tactic of withholding a license unless and until a manufacturer agrees to pay an unduly high royalty rate for an SEP is referred to as 'hold-up.'"); *see* Unwired Planet International Ltd. v. Huawei Technologies Co. Ltd., [2017] EWHC 711, ¶¶ 162-63 (Pat) (April 5, 2017). ("An appropriate way to determine a FRAND royalty is to determine a benchmark rate which is governed by the value of the patentee's portfolio. That will be fair, reasonable and generally non-discriminatory. The rate does not vary depending on the size of the licensee. It will eliminate hold-up and hold-out. Small new entrants are entitled to pay a royalty based on the same benchmark as established large entities.").

legal cases concerning SEPs in which "patent holdup" is mentioned.[264]

Overall, there is no need for SSO FRAND commitments to address "patent holdup" or SEP holdup. SSOs require disclosure of SEPs so there is little chance an implementer will be "surprised" by SEPs.[265] SSOs identify SEPs so that prospective implementers adopting the standard are informed about the relevant patents, and SSOs require SEP holders to make FRAND commitments that also provide information to prospective implementers. SEP holders thus cannot take advantage of companies that unknowingly started using the patented technology. SEP holders also have economic incentives to make patent license offers to prospective implementers to obtain license revenues and reasonable royalty damages in the event of infringement.

The rarity of patent disputes compared to the number of active patents implies that "patent holdup" is unlikely. There is no evidence that patent disputes lead to excessive royalties for infringement. In fact, it is the opposite, reasonable royalty damages are based on harm to the patent holder from infringement. Reasonable royalty damages in patent disputes are not intended to capture the implementer's benefit from infringement and are not increased by the implementer's switching costs. Reasonable royalty damages are only increased when the infringement is found to be willful infringement, which is relatively rare.

SSOs do not intend for their FRAND policies to address patent holdup in practice. SSO IP policies do not mention patent holdup or SEP holdup nor do these policies provide any description of the phenomenon. Widespread patent licensing provides considerable evidence that negotiation works, thus contradicting the predictions of patent holdup and SEP holdup.[266] The adoption of technology standards by implementers and the growth of industries supplying products conforming to technology standards provide considerable evidence that the market for patent license contracts functions efficiently.

I have explained at length elsewhere why "patent holdup" is a "fallacy."[267] Advocates of patent holdup do not provide any evidence that "patent holdup" or SEP holdup has ever occurred in

264. *See* Sidak, *supra* note 262, at 476.

265. *See* Carl Shapiro, *Injunctions, Hold-Up, and Patent Royalties*, 12 AM. L. AND ECON. REV. 280, 291 (2010) (discussing patent hold-up and surprise).

266. *See* J. Gregory Sidak, *Holdup, Royalty Stacking, and the Presumption of Injunctive Relief for Patent Infringement: A Reply to Lemley and Shapiro*, 92 MINN. L. REV. 714 (2008); *see* 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 (2007).

267. *See* Spulber, *supra* note 21.

negotiation of SEP license agreements.[268] There is little evidence that switching costs complicate patent license negotiation in general, and this alleged cause of "patent holdup" has very little to do with technology standards and is not specific to SEPs. There is also no evidence that technology standards imply that industries are necessarily "collectively locked in" to particular inventions resulting in a SEP holdup. There is no evidence that inclusion of patents in a standard creates undue market power for SEP holders or generates excessive patent license royalties, and finally, there is no evidence that SEP holders somehow take advantage of implementers or capture all the benefits of standardization.

The SEP holdup concept is fundamentally flawed because a technology standard is not the same as a barrier to entry into the marketplace. Technology standards established by SSOs are not proprietary but instead are available without costs. Any company can choose to conform to a standard. Thus, a number 2 pencil is a technology standard, yet many companies can produce number 2 pencils. The number 2 pencil standard does not create a barrier to entry and does not generate monopoly rents. To the contrary, the number 2 pencil facilitates competition among pencil manufacturers in the particular category.

The SEP holdup problem is based on a literal reading of "essentiality." This can be misleading because declared essential patents may not be necessary for companies to conform to the standard. The technology standard offers technical specifications for product performance and interoperability across products. Indeed, a technology standard established by an SSO typically is a class of technologies rather than a particular technology.[269] In principle, performance and interoperability can be achieved with alternative technologies that do not require particular patents. There is also evidence of over-disclosure of SEPs.[270] This suggests that many SEPs are unnecessary and there may be SEPs that offer substitutable technologies.

268. Sidak, *supra* note 262, at 489 (referring to the patent holdup concept as a "hoax," explaining that "[f]rom its birth, the patent-holdup conjecture has been commissioned legal advocacy masquerading as economic science.").

269. NATIONAL RESEARCH COUNCIL 2013, PATENT CHALLENGES FOR STANDARD-SETTING IN THE GLOBAL ECONOMY: LESSONS FROM INFORMATION AND COMMUNICATIONS TECHNOLOGY (Washington, DC: The National Academies Press, 2013) https://doi.org/10.17226/18510 [https://perma.cc/8RAH-FD5B]. Products can include many technology standards, see Brad Biddle, Andrew White & Sean Woods, *How Many Standards in a Laptop? (And Other Empirical Questions)*, 1-7 (2010), https://osf.io/preprints/lawarxiv/cye5n/download.

270. *See* Stitzing et al., *supra* note 69 (discussing declaration of SEPs); Brad Biddle, *Five Reasons Why Patent Disclosure in Standards-Setting Organizations Doesn't Work (And What to Do Instead)*, (2015); *see* Josh Lerner et al., *Patent Disclosures and Standard-Setting*, 1-37 (Nat'l Bureau of Econ. Research, Working Paper No. 22768, 2016).

A technology standard often differs from the underlying technologies, because the standard often is a goal for which technologies do not exist. After the standard is established companies can develop technologies to achieve the goal, and further improvements in the technology will lead to revision and replacement of the standard. These in turn generate further opportunities for the entry of new technologies.

There are a number of safeguards that limit SEP royalties. SSOs are consensus organizations and need not choose standards that are tied to costly propriety technologies. Even if SEP holders were to extract monopoly rents, for purposes of argument, the total costs of adopting technology can be lowered even without competing technologies. Technology adopting costs include not only royalties but the costs of implementing the technology. Kenneth Arrow pointed out that "drastic innovations" can lower the total of royalties and operating costs below those of alternatives even if an inventor obtains monopoly royalties.[271] Competition from alternatives is not needed for "drastic" inventions. This is not the case for inventions that are not "drastic ," for which competitive alternatives are needed to control monopoly rents. In the case of incremental inventions, however, SSOs may not need such inventions in the standard, or they can include incremental inventions when competitive alternatives are available that are consistent with the standard.

FRAND commitments do not need to address SEP holdup because technology standards increase competition. New technology standards promote the industry and increase market demand for new products that offer enhanced performance. Quality and performance standards reduce Gresham's Law effects whereby low-quality products drive out high-quality products. New technology standards also increase demand for components that interoperate effectively. These increases in demand provide incentives for expansion of existing firms and entry of new firms. By increasing competition in these ways, standardization tends to mitigate monopoly rents.

The sharing of benefits of standardization is achieved by the combination of consensus standardization within SSOs and SEP license negotiation in the marketplace. The notion that patent holders extract monopoly rents from implementers is misleading. Both inventors and implementers contribute to economic value and both

271. *See* KENNETH J. ARROW, ECONOMIC WELFARE AND THE ALLOCATION OF RESOURCES FOR INVENTION IN THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS 609-626 (Universities-National Bureau Committee for Economic Research, Committee on Economic Growth of the Social Science Research Council eds. 1962).

obtain gains from trade in patent license agreements. The extensive participation of industry members in standardization suggests that the benefits of participation are widespread among industry participants. For example, SEP holders' benefits are reflected in their extensive participation in SSOs and their contribution of technologies to the standard. At the same time, implementers also benefit by participating in SSOs, by implementing the standards, and by licensing SEPs. Implementers would not approve the design of standards and inclusion of various SEPs in the standard if the result would be opportunism by SEP holders.

Industry members often cooperate repeatedly to achieve the many benefits of quality and interoperability. Repeated cooperation limits opportunism by either SEP holders or implementers, and requires that SSO members share in the benefits of standardization. The sharing of benefits of standardization among SEP holders and implementers is evidenced by the revision of standards and the introduction of new technology standards. Technological change and the evolving standards demonstrate that inventors have incentives to create and develop new technologies and innovators have incentives to develop new products, production processes and transaction methods.

E. FRAND and the "Complements Problem"

Performance and interoperability are central to technology standards. Combining multiple technologies both within and among innovative products drives the need for interoperability. Multiple patented inventions provide complementary components in innovative products and production processes. The combination of complementary components often results in complex systems that generate benefits greater than can be achieved by separate groups of components.[272]

SSOs do not intend for FRAND policies to address the "complements problem." The "complements problem" refers to the challenge of allocating the joint benefits of complementary inventions to the owners of those inventions.[273] This problem is best solved by decentralized bilateral bargaining among patent holders and

272. *See* Herbert A. Simon, *The Architecture of Complexity*, 106 PROC. AMER. PHILOS. SOC. 467, 468 (1962) ("Roughly, by a complex system I mean one made up of a large number of parts that interact in a nonsimple way. In such systems, the whole is more than the sum of the parts, not in an ultimate, metaphysical sense, but in the important pragmatic sense that, given the properties of the parts and the laws of their interaction, it is not a trivial matter to infer the properties of the whole.").

273. *See* Damien Geradin et al., *The Complements Problem Within Standard Setting; Assessing the Evidence on Royalty Stacking*, 14 B.U. J. SCI. & TECH. L. 144, 145 (2008).

implementers.[274] SSOs rely on bargaining in the marketplace to address the allocation of the benefits of invention and innovation. I have demonstrated elsewhere that bilateral negotiation of patent license agreements guarantees that total royalties and royalties per unit of output are lower than those of a patent pool.[275]

There are a number of public policy concerns associated with the "complements problem" including "royalty stacking," "patent thickets," and the "Tragedy of the Anti-Commons".[276] These closely-related theoretical concepts suggest that with complementary patented inventions, total royalties will be "excessive" due to lack of coordination among licensors.[277] These policy concerns are all based on an application of the classic complementary monopolies model of Antoine Cournot.[278]

Cournot's theoretical analysis shows that monopolists supplying complementary inputs to competitive downstream producers will choose prices whose total is greater than what a monopolist would charge for a bundle of those inputs.[279] This inefficiency is known as the "Cournot Effect". The "Cournot Effect" is a type of "free-rider problem," where each input monopolist chooses its price without taking into account the effect of its price on the demand for all of the complementary inputs.[280] Because inputs are complements, an increase in the price of one input lowers demand for all of the inputs. The theoretical "Cournot Effect" is the result of assuming that complementary monopolists offer take-it-or-leave-it prices to producers.[281]

Patent policy concerns based on the "complements problem" are misguided. In the patent context, patent holders negotiate patent license agreements with implementers. In contrast to take-it-or-leave-it price offers, negotiation eliminates the distortions associated with the "Cournot Effect". Negotiation results in lower total

274. *See* Daniel F. Spulber, *Licensing Standard Essential Patents: Bargaining and Incentives to Invent* 1-44 (Northwestern University, Working Paper, 2019).

275. *See id.*

276. *See* Damien Geradin et al., *Royalty Stacking in High Tech Industries: Separating Myth from Reality* (CEMFI Working Paper No. 0701, 2007).

277. *See id.*

278. Antoine A. Cournot, *Recherches sur les Principes Mathématique de la Théorie des Richesse*, (English ed., N. T. Bacon, trans., Researches into the Mathematical Principles of the Theory of Wealth, New York: Macmillan (1838)).

279. *Id.*

280. *Id.*

281. Daniel F. Spulber, *Complementary Monopolies and Bargaining*, 60 J. OF L. & ECON. 29, 65, 74 (2017) ("Predictions based on the Cournot effect need not hold when complementary monopolists engage in general competitive interactions with supply schedules and price negotiation.").

royalties in comparison with a monopoly patent pool that offers licenses for the bundle of complementary inventions.[282]

SSO FRAND policies predate by many decades any patent policy concerns related to the "complements problem". As with the "patent holdup" problem, SSO FRAND policies do not address these supposed problems either. SSO FRAND policies do not mention any phenomena resembling these theoretical concepts, and there is little evidence that these closely-related problems have ever been observed.[283] The significant pace of technological change and widespread diffusion of advances in ICT provide substantial evidence that these problems do not occur.

IV. THE COURTS AND ADJUDICATED FRAND COMMITMENTS

This section considers how the law of unintended consequences could reshape FRAND commitments. To resolve SEP disputes, courts must interpret both coordinated SSO FRAND commitments and negotiated FRAND commitments. The common law forms the basis for many adjudicated FRAND commitments. In addition, comparable license agreements negotiated in the marketplace provide guidance for the courts in resolving SEP disputes. This section argues that the courts should not extend regulatory control beyond coordinated SSO FRAND commitments and negotiated FRAND commitments. The courts should avoid using aggregate price caps and incremental contributions of patented technologies to develop one-size-fits-all regulation. Otherwise, courts risk applying judicial regulation that would diminish the benefits of standardization and decrease the efficiency of the market for IP.

282. *See* Spulber, *supra* note 274; *see also* Daniel F. Spulber, *Patent Licensing and Bargaining with Innovative Complements and Substitutes*, 70 RES. ECON. 693 (2016).

283. Damien Geradin et al., *The Complements Problem Within Standard Setting; Assessing the Evidence on Royalty Stacking*, 14 B.U. J. OF SCI & TECH. LAW 144, 149 (2008) ("We find little evidence of systematic problems of royalty stacking within standard setting that are not already adequately dealt with through existing mechanisms, including cross licensing, patent pools, and repeat play reputation.").

A. *Adjudicated FRAND Commitments and the Common Law*

Courts have approached SEP litigation between SEP holders and implementers by applying common law principles. At their heart, SEP disputes are patent disputes, taking place between patent holders and implementers. SEP disputes can involve breach of contract and infringement. As with any patent dispute, courts must determine whether the patents at issue are valid and infringed. As for remedies, Courts must calculate reasonable royalty damages to compensate the patent holder for infringement, and evaluate whether an injunction is warranted. For example, the *Unwired Planet v. Huawei* decision pointed out the similarity between determining FRAND royalties and reasonable royalty damages:

After all, arriving at a FRAND royalty rate is not different conceptually from assessing what a reasonable royalty would be in a patent damages enquiry albeit the particular factors applicable in setting a FRAND royalty for a licence to be FRAND and their application may differ from assessing damages.[284]

As with patent disputes generally, courts in SEP disputes apply a mix of property and liability approaches to determine FRAND royalties. As I have emphasized elsewhere, a contractual approach may be more useful for finding reasonable royalty damages for patent infringement.[285] A contractual approach is certainly useful for determining FRAND royalties because the court is concerned with negotiation of patent license agreements.[286]

SSO IP policies and FRAND commitments, however, generate critical differences between SEP disputes and other types of patent disputes. SSO IP policies and market negotiations provide the context for SEP disputes and impose obligations on the parties involved in patent license agreements. Here again, the common law provides guidance for the resolution of SEP disputes. Courts have found SSO FRAND commitments to be contracts between SEP holders and SSOs,[287] with implementers as intended third-party beneficiaries of these contracts.[288] The third party beneficiary approach uses the SEP holder's FRAND commitment as the basis for

284. Unwired Planet International Ltd. v. Huawei Technologies Co. Ltd., [2017] EWHC 711 (Pat) (April 5, 2017).

285. Daniel F. Spulber, *Finding Reasonable Royalty Damages: A Contract Approach to Patent Infringement*, 2019 U. ILL. L. REV. 615 (2019).

286. Spulber, *supra* note 21.

287. *See* Microsoft v. Motorola, 854 F.Supp.2d 993, 996 (2012) (finding that "(1) Motorola entered into binding contractual commitments with the IEEE and the ITU, committing to license its declared-essential patents on RAND terms and conditions; and (2) that Microsoft is a third-party beneficiary of Motorola's commitments to the IEEE and the ITU.").

288. *Id*.

resolving the patent dispute.[289] This approach focuses on the patent holder's contractual obligation to the SSO and by extension their obligation to the implementer as third party beneficiary.

The SEP holder's third-party obligation allows the implementer to be a *plaintiff* in an SEP dispute by claiming that the patent license offer is not FRAND. This is a reversal of roles in comparison to a regular patent dispute in which the patent holder is the plaintiff making a claim of infringement or breach of contract against the implementer. For example, in *TCL v. Ericsson*, the implementer, TCL, brought suit for a breach of contract against the SEP holder, Ericsson.[290]

SEP holders' FRAND obligations to implementers require courts to consider the objectives of the SSO and its members. Eisenberg argues that a third-party beneficiary can enforce the initial contract if doing so would carry out the performance objectives of the parties to the initial agreement.[291] Eisenberg also argues that a third-party beneficiary could enforce the contract based on public policy or moral concerns if it does not conflict with the performance objectives of the parties.[292]

SEP holders' declaration of their patents to SSOs for inclusion in the standard also distinguishes SEP disputes from other types of patent disputes. Declaration of SEPs means that implementers are aware of the existence of the patented technologies. Implementers cannot claim that they inadvertently infringed on the patented technology. This contrasts with many standard patent disputes where implementers may be unaware that they are infringing on the patented technology.

SEP disputes also differ from other types of patent disputes because FRAND commitments are not the same as liability rules for patent infringement. There is an overlap between the damages terminology and the FRAND terminology when both indicate market-determined royalties. The requirement that SEP royalties should be "reasonable" differs, however, from "reasonable royalty damages" in patent infringement cases.[293] The concept of "reasonable royalty damages" means that damages should be sufficient to compensate patent holders for the damages they suffered from

289. J. Gregory Sidak, *A FRAND Contract's Intended Third-Party Beneficiary*, 1 CRITERION J. ON INNOVATION 1001 (2016).

290. TCL Communication Technology Holdings Ltd. v. Telefonaktenbologet LM Ericsson, et al., No. SACV 14-00341 JVS (ANx), 2016 WL 4150033 (C.D. Cal. July 25, 2016).

291. Melvin Aron Eisenberg, *Third-Party Beneficiaries*, 92 COLUM. L. REV. 1358, 1385 (1992).

292. *Id*.

293. See Spulber, *supra* note 21, for a discussion of property, tort and contract aspects of patent infringement.

infringement.[294] SSO FRAND policies, however, are directed at encouraging licensing agreements between SEP holders and implementers. Reasonable royalties in SSO FRAND policies correspond to a negotiated agreement for technology transfer that reflects SEP holders' willingness to accept and implementers' willingness to pay.

Furthermore, courts in SEP disputes have various tasks that do not arise in regular patent disputes. Courts must determine whether the SEP holder and the implementer met FRAND obligations by negotiating in good faith with the implementer or by concluding a FRAND contract. Contreras and Eixenberger recommend that the Federal Circuit Bar Association, the American Intellectual Property Law Association, the American Bar Association and others develop model jury instructions that apply specifically to SEPs.[295] They argue that these jury instructions should determine obligations associated with FRAND commitments.[296]

B. Adjudicated FRAND Commitments and Comparable Licenses

As this article has emphasized, SSOs design IP policies and coordinated FRAND commitments to encourage negotiation of patent license agreements in the marketplace. So, the best way for courts to interpret SSO IP policies is to consider standard practice in the marketplace. The many SEP license agreements provide the best indication of what FRAND patent license terms are in practice. This suggests that courts should base adjudicated FRAND commitments on negotiated FRAND commitments as indicated by comparable SEP license agreements.

If comparable SEP license agreements are not available, it is sometimes feasible to use the market value of SEPs as an indication of the market value of SEP license agreements. Elsewhere, I introduce the "market value method" as a way of calculating reasonable royalty damages.[297] This method provides a way to infer royalties on SEP license agreements. The market value of a patent is equal

294. *Id.*

295. Jorge L. Contreras & Michael Eixenberger, *Model Jury Instructions for Reasonable Royalty Patent Damages*, 57 JURIMETRICS J. 1, 16-17 (2017) ("The FCBA instructions address one important aspect of valuing standards-essential patents (SEPs). However, there are many more issues relating to SEPs that are coming before juries with increasing frequency. These issues include the aggregate royalty that should be charged for the patents covering a particular standard, guidelines for determining whether a patent is essential to a standard, what forms of licensing qualify as nondiscriminatory, and what other obligations may accompany a RAND commitment. These issues, which extend well beyond the area of patent damages, merit a set of jury instructions of their own. We would thus invite the FCBA, AIPLA, ABA or any other interested body to begin the hard work of developing such instructions.").

296. *Id.*

297. Spulber, *supra* note 285.

to the present value of the stream of returns from implementing the technology through own use by the patent holder and licensing to other users.[298] The present value of the stream of returns for each use is obtained by dividing the market value of the patent by the total number of users, including the patent holder.[299] This provides an indication of the present value of the stream of royalty payments for each technology license.[300] The annual payments can be obtained from the present value of the stream of royalty payments by taking into account the discount rate and the remaining life of the patent.[301]

Court decisions support using comparable patent license agreements to define FRAND commitments.[302] The court in *TCL v. Ericsson* explained the use of comparable licenses: "Actual licenses to the patented technology at issue are probative as to what constitutes a fair and reasonable royalty for those patent rights because such actual licenses reflect the economic value of the patented technology in the market place."[303] The court in *TCL v. Ericsson* furthers stated that "by looking at an array of licenses, concerns about FRAND compliance of any particular license, asymmetric information, and litigation pressures are substantially diminished."[304] The court in *Unwired Planet v. Huawei* also supported using patent license agreements to define FRAND:

> There was no real dispute of principle about how to work out what is and is not FRAND. The question is what would be fair, reasonable and non-discriminatory. Asking what a willing licensor and a willing licensee in the relevant circumstances acting without holding out or holding up would agree upon is likely to help decide that question. The evidence of the parties themselves will be relevant, including evidence of how negotiations work in practice in the industry. To the extent they are available other licences may be deployed as comparables.[305]

Courts have long applied comparable license agreements to determine reasonable royalty damages for infringement and breach of contract. The court in *Unwired Planet v. Huawei* pointed out the

298. *Id.* at 656-67.

299. *Id.* at 659-60.

300. *Id.*

301. *Id.* at 662.

302. Leonard & Lopez, *supra* note 7, at 94; J. Gregory Sidak, *Apportionment, FRAND Royalites, and Comparable Licenses after Ericsson v. D-Link*, 2016 U. ILL. L. REV. 1809 (2016).

303. 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).

304. *Id.*

305. Unwired Planet International Ltd. v. Huawei Technologies Co. Ltd., [2017] EWHC (Pat) 711, ¶ 170.

similarity between using comparable licenses to decide what is FRAND in SEP disputes and using comparable licenses in patent disputes generally.[306] The court recognized that some adjustment of royalties and other contract terms may be necessary,

As always judgments will have to be made about how closely comparable any given licence is to the relevant circumstances in issue. The relevance of comparables is that they are evidence of what real parties in real negotiations have agreed upon.[307]

In evaluating comparable licenses, the *Unwired Planet v. Huawei* decision distinguishes between arbitration and market negotiation: "A licence agreement settled in an arbitration is more like terms set by a court than it is like a licence produced by negotiation and agreement."[308]

Comparable licenses provide information about how the parties understand FRAND commitments.[309] Comparable license agreements may differ in terms of the number of patents involved, the provisions of the license agreements, the identities of the parties, cross-licensing arrangements, pass-through rights, and bundling of patent license with other goods and services. To use royalties from comparable license agreements, it is necessary to adjust for aspects of those agreements that may raise or lower royalties. For example, the court in TCL v. Ericsson determined the value of a license as the licensor one-way royalty rate multiplied by licensee revenues.[310]

Patent license agreements that involve cross-licensing do not have a one-way royalty rate because both parties are providing patented technologies in addition to payments if there are any. It is possible, however, to infer one-way royalty rates from cross-licensing agreements. For example, the court in TCL v. Ericsson adjusted royalties in cross-licensing agreements to obtain a one-way rate, which it referred to as "unpacking the license".[311] The court in TCL v. Ericsson calculated the "net balancing payment" as the difference between the licensor's one-way rate multiplied by the licensee's revenues and the licensee's one-way rate multiplied by the licensor's revenues.[312] The balancing payment made to the licensor thus is

306. *Id.*

307. *Id.*

308. *Id.*

309. *See* Sidak, *supra* note 289, at 1815 ("From an economic perspective, comparable licenses most accurately reveal the parties' common understanding of FRAND terms and conditions for the use of the licensed SEP portfolio.").

310. TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635, at *62 (C.D. Cal. Dec. 21, 2017).

311. *Id.* at *54 ("[U]npacking requires the Court to account for cross-licenses, lump sum payments, pass-through rights, and other issues.").

312. *Id.*

the difference between the value of the licensor's license and the value of the licensee's cross license to the licensor.

When calculating the balancing payment, a problem arises if the one-way licensing rate for the cross-licensed patent is unknown. To address this problem, courts must estimate the missing one-way rate. In TCL v. Ericsson, the court defined a "Portfolio Strength Ratio" ("PSR") as the ratio of the one-way royalties of the licensor and the licensee.[313] By estimating the PSR of the licensor and the licensee using other information, it is possible to infer the unknown one-way rate. In *TCL v. Ericsson*, the court calculated the PSR using the ratio of the numbers of patents in the two companies' portfolios.[314] The court rejected another measure, which uses the ratio of the numbers of ideas the companies contributed to the SSO standardization process through working groups,[315] pointing out: "[t]he two major flaws with contribution counting are the absence of any evidence that it corresponds to actual intellectual property rights, and its inability to account for transferred or expired patents."[316]

Comparable licenses should be SEPs so as to reflect the contribution of the patent to the technology standard. The court in *TCL v. Ericsson* recognized that technology standards and the value of patents are related, without necessarily attributing the value of the patent to standardization.[317] In particular, the court suggested distinguishing payments to reflect patented technologies that apply to the 2G, 3G, and 4G standards.[318] Taking into account the contribution of patented technologies to the technology standards, is necessary for SEP royalties to be "fair and reasonable."

In addition to providing benchmarks for royalties to be "fair and reasonable", comparable licenses shed light on the "non-discriminatory" aspect of FRAND commitments. The court in *TCL v. Ericsson* conducted an analysis of firms that were comparable to TCL for purposes of evaluating non-discriminatory license provisions.[319] The firms found to be "similarly situated" to TCL were: Apple, Samsung, LG, HTC, Huawei, and ZTE.[320] According to the court, the factors used in determining "similarly situated" firms were "geographic scope of the firm, the licenses required by the

313. *Id.* at *63.

314. *Id.*

315. TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635, at *41 (C.D. Cal. Dec. 21, 2017).

316. *Id.*

317. *Id.* at *28.

318. *Id.* at *36 ("A lump sum payment creates a challenge for unpacking a license that covers multiple standards (e.g., 2G, 3G, 4G) because the effective royalty rate for each standard needs to be unpacked separately, even though the licensee paid a single lump sum net balancing payment that covers multiple standards.").

319. *Id.* at *30.

320. *Id.* at *30-33.

firm, and a reasonable sales volume."[321] The court rejected factors such as "the firm's overall financial success or risk, brand recognition, the operating system of their devices, or the existence of retail stores."[322] The court concluded that "there is no single rate that is necessarily FRAND, and different rates offered to different licensees may well be FRAND given the economics of the specific license."[323]

Courts in some SEP disputes have examined patent license negotiations to better understand comparable licenses and negotiated FRAND commitments. The court in *Unwired Planet v. Huawei* recognized that offers and counteroffers need not satisfy FRAND commitments but rather are steps toward a license contract that is FRAND.[324] Similarly, the court in *TCL v. Ericsson* noted how FRAND commitments work in practice to allow for substantial flexibility in structuring licenses. After the parties engaged in more than six years of negotiations, including over a dozen offers and many concessions, but failed in negotiations, TCL and Ericsson still agreed to engage in a binding court adjudication of terms for a license.[325] The court specifically referred to the flexibility in calculating FRAND royalties, stating: "it is very likely that a licensee may choose to pay a larger lump sum in exchange for lower rates, a lower cap, a lower floor, or a lower percentage or dollar-per-unit running royalties."[326]

C. Adjudicated FRAND Commitments versus Regulation

SSO IP policies, common law principles, and the use of comparable license agreements provide a consistent basis for adjudication of SEP disputes. This is important because adjudicated FRAND commitments, in turn, affect the design of future SSO IP policies, the terms of future SEP license negotiations, and the outcome of future SEP disputes. By applying common law principles and using comparable licenses, the courts benefit from many decades of

321. *Id.* at *31-33.

322. *Id.* at *31.

323. *Id.* at *55.

324. Unwired Planet International Ltd. v. Huawei Technologies Co. Ltd., [2017] EWHC (Pat) 711, ¶159 (April 5, 2017) ("Therefore it makes much more sense to interpret the ETSI FRAND obligation as applicable primarily to the finally agreed terms rather than to the offers. In other words, it is an obligation to enter into FRAND licenses. The same logic also applies to implementers: an obligation on implementers to make FRAND *offers* as opposed to enter into FRAND licenses would have them paying rates higher than the FRAND rate.").

325. TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635, at *3 (C.D. Cal. Dec. 21, 2017).

326. *Id.* at *36.

industry participation in SSOs and patent licensing negotiations in the marketplace.

Adjudication of SEP disputes guided by common law principles and comparable licenses complements SSO FRAND commitments and market negotiation of SEP licenses. Adjudication based on common law and comparable licenses provides general rules for the resolution of SEP disputes that does not restrict SSO IP policies and or interfere with consensus decision making by SSOs. Such adjudication also does not interfere with efficient market negotiation of SEP licenses.

SSO FRAND policies do not suggest that courts should engage in regulation of the provisions of patent license agreements. The court in *TCL v. Ericsson* states, "[t]he lack of consensus within ETSI about further defining the FRAND obligation has left the resolution of FRAND-related disputes to the national courts."[327] Resolution of FRAND-related disputes by the courts however does not require one-size-fits-all regulatory formulas for patent license royalties.

There is variation in the judicial resolution of SEP disputes. Layne-Farrar and Wong-Ervin survey various U.S. and international SEP cases and find a variety of methodologies for calculating FRAND royalties.[328] They find a "dichotomy between breach of contract FRAND cases filed by licensees (namely, *Microsoft v. Motorola*), and patent infringement cases filed by SEP holders (e.g. *Ericsson v. D-Link*)."[329] Contreras reviews U.S. FRAND litigation in the period 1995–2012 from *Rockwell v. Motorola* to *Samsung v. Ericsson*.[330] He observes that "[d]espite the appeal of FRAND commitments, a consistent, practical and readily enforceable definition of FRAND has proven difficult to achieve."[331]

Contreras argues that to achieve consistent outcomes patent holders and implementers should engage in multilateral royalty negotiations through SDOs.[332] Contreras recommends that SDOs form "pseudo-pools" to specify aggregate royalties with guidelines provided by antitrust authorities and other regulatory agencies.[333] He suggests that such regulatory guidelines would provide

327. *Id.* at *7.

328. Layne-Farrar & Wong-Ervin, *supra* note 7.

329. *Id.* at 159.

330. Jorge L. Contreras, *Fixing FRAND: A Pseudo-Pool Approach to Standards-Based Patent Licensing*, 79 ANTITRUST L.J. 47, 95-97 (2013).

331. *Id.* at 51.

332. *Id.* at 93.

333. *Id.* ("Enforcement agencies such as the DOJ and FTC in the United and the European Commission in the European Union could issue guidelines relating to SDO practices and indicate that antitrust enforcement would unlikely with respect to the implementation of the pseudo-pool approach.").

permission for the formation of patent pools by SDOs. The formation of "pseudo-pools" for determining aggregate royalties, however, would tend to prevent market negotiation of SEP license agreements. This approach would lose efficiencies from market negotiation of licenses. By deterring bilateral negotiation, "pseudo-pools" would reduce incentives for firms to participate in the standardization process. Regulatory guidelines for "pseudo-pools" likely would become enforceable regulations of standards organizations. "Pseudo-pools" also would change adjudication of FRAND commitments. The courts would be able to enforce commitments make to the "pseudo-pool" by SEP holders as contractual obligations.

Differences in the outcomes of SEP disputes need not indicate problems with FRAND commitments. Differences in methodologies for calculating FRAND royalties may reflect the different circumstances of individual cases. Market conditions, technologies, and technology standards affect the provisions of patent license agreements. In addition, the characteristics of patent holders and implementers also affect the outcome of patent license negotiations. In interpreting SSO FRAND commitments, courts should not apply inflexible formulas that do not reflect the circumstances of the patent case.

Courts should avoid regulatory approaches to enforcing FRAND commitments. Based on FRAND commitments, for example, the court in *FTC v. Qualcomm* established a permanent injunction that involved judicial regulation.[334] The court required Qualcomm to license SEPs to modem chip suppliers on FRAND terms and "to submit, as necessary, to arbitral or judicial dispute resolution to determine such terms."[335] This approach seeks to supplant standards organizations and market negotiation of patent license agreements with regulatory control. Market participants have better information than regulators about technology and market conditions. Also, standards organizations and market participants are better than regulators at balancing the interests of patent holders and implementers.

By pursuing "regulatory decrees" in SEP disputes, the courts become regulators in the market for patent licenses. Posner defines a "regulatory decree" as a court decision that establishes "a continuing supervisory relationship between the court in which the decree was entered and the defendant; more realistically, perhaps, between the Judgments Section of the Antitrust Division and the

334. Federal Trade Comm'n v. Qualcomm Inc., 411 F. Supp. 3d 658 (N.D. Cal. 2019).
335. *Id.* at 818.

defendant."[336] Posner gives the example of the 1912 *Terminal Railroad Association* decree, noting that the decree "ordered the defendant association to furnish its terminal services to all seekers on reasonable and nondiscriminatory terms."[337] According to Posner, *Terminal Railroad Association* "has been followed in a large number of decrees that require defendants to grant patent licenses on nondiscriminatory and reasonable-royalty terms."[338] The courts are not suited to be regulatory agencies in the market for IP. The courts should focus on resolving particular patent disputes, allowing standards organizations and market negotiation of licenses to determine the provisions of patent license agreements.

Also, courts should avoid regulatory approaches that would extend the application of their decisions to industry participants not involved in particular SEP disputes. Legal jurisdiction is an important issue in the courts' interpretations of SSO FRAND policies. For example, the *Unwired Planet v. Huawei* decision found that "A UK portfolio licence is not FRAND. The FRAND licence between Unwired Planet and Huawei is a worldwide licence."[339] In *Unwired Planet v. Huawei*, the court stated:

Article 12 of the ETSI IPR Policy provides that it is governed by French law and the IPR declaration forms also refer to French law. They provide that the construction, validity and performance of the undertaking is [sic] governed by French law.[340]

Because SSOs are subject to the laws of particular countries or groups of countries, courts may feel compelled to take into account those laws. This extends the SEP dispute beyond the countries in which the dispute takes place.

D. Adjudicated FRAND Commitments and Aggregate Royalty Caps

A critical problem in determining FRAND royalties in SEP disputes is that complex innovations often depend on large numbers of patented technologies. In various SEP disputes, courts have applied aggregate royalty caps as a means of calculating FRAND royalties for particular patent licenses, see particularly *In Re Innovatio, Unwired Planet v. Huawei*, and *TCL v. Ericsson*. Calculating FRAND

336. Richard Posner, *A Statistical Study of Antitrust Enforcement*, 13 J. L. & ECON. 365, 386 (1970) ("In effect, the decree created a little Interstate Commerce Act for the terminal association, with the court cast in the role of the ICC.").

337. *Id.* (discussing United States v. Terminal Railroad Ass'n of St. Louis, 224 U.S. 383, 411 (1912))

338. *Id.*

339. Unwired Planet International Ltd. v. Huawei Technologies Co. Ltd., [2017] EWHC (Pat) 711, ¶ 807(10).

340. *Id.* ¶ 100.

royalties on the basis of aggregate royalty caps is known as the "top-down method".[341] The "top-down method" calculates aggregate FRAND royalties for SEPs that apply to a given technology standard and then apportions the aggregate royalty cap among multiple patented technologies.[342]

Judge James Holderman in *In re Innovatio* applied the "top-down method" to obtain a FRAND royalty. The court used an estimate of 3,000 "potential" SEPs for a Wi-Fi chip[343] and attributed the profit of the Wi-Fi chip to patented technologies.[344] This made the aggregate royalty cap equal to the profit on the relevant component. Judge Holderman recognized the significant problems that arise in estimating total royalties for the very large numbers of patents that apply to a particular technology standard.[345]

Judge James Selna in *TCL v. Ericsson* applied the "top-down method" to find FRAND royalties.[346] The court cautioned that the "top-down method" need not be FRAND and lacked the advantages of comparable licenses: "[a] top down method, however, cannot address discrimination as the Court interprets the term, and is not necessarily a substitute for a market-based approach that considers comparable licenses."[347] The Court noted that Ericsson shifted from advocating a top-down approach to favoring calculation of royalties based on comparable licenses.[348]

Justice Colin Birss in *Unwired Planet v. Huawei* also applied the "top-down method" to determine FRAND royalties.[349] The decision used the "top-down method" as a cross-check for comparable licenses.[350] Justice Birss observed that using public statements by

341. Leonard & Lopez, *supra* note 7, at 89 ("A FRAND royalty for a particular set of SEPs is an apportionment of the aggregate royalty burden.").

342. *Id.*

343. *Id.* at 83.

344. *Id.* at 85.

345. In re Innovatio IP Ventures, LLC, No. 11 C 2303, 2013 WL 5593609, at *6 (N.D. Ill. Sept. 27, 2013) ("As a practical matter, therefore, this analysis will necessarily be imprecise, as the court cannot undertake a full technical evaluation of the hundreds or thousands of patents that sometimes comprise a standard. Nonetheless, the concern of royalty stacking requires that the court, to the extent possible, evaluate a proposed RAND rate in the light of the total royalties an implementer would have to pay to practice the standard.").

346. Jorge Contreras, *TCL v. Ericsson: The First Major U.S. Top-Down FRAND Royalty Decision*, PATENTLY-O (Dec. 27, 2017), https://patentlyo.com/patent/2017/12/contreras-ericsson-decision.html [https://perma.cc/EKU9-MDWZ].

347. TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635, at *9 (C.D. Cal. Dec. 21, 2017).

348. *Id.* at *19.

349. *See* Damien Neven & Pierre Régibeau, *Unwired Planet Vs Huawei: A Welcome Clarification of the Concept of FRAND and of the Role of Competition Law Towards SEP Licencing*, 8 J. EUR. COMPETITION L. & PRAC. 463 (2017).

350. Unwired Planet International Ltd. v. Huawei Technologies Co. Ltd., [2017] EWHC (Pat) 711, ¶ 269 (April 5, 2017) ("One could use comparable licenses to try and

companies that are patent holders to determine total royalties is highly problematic because such statements are likely to be "self-serving" and much less reliable than comparable licenses.[351]

There is no generally accepted method of calculating aggregate royalty rates for SEPs that apply to a technology standard nor is there a generally accepted method of apportioning royalties across SEPs.[352] Courts have applied a variety of arbitrary allocation systems that are not founded on economic reasoning.[353] For example, courts have used proportions of the total number of patents to allocate royalties across SEPs.[354] The problem with simply counting patents is that technological contributions and economic value are likely to vary across SEPs.

Apportionment of total royalties can generate inaccurate estimates of the market for patent license agreements. Aggregate royalty caps would require courts to estimate contributions that SEPs make to the value of a product that implements the relevant standards. This adds substantial difficulty to the court's problem, particularly when complex products involve hundreds or even thousands of patents. In contrast, the use of a few comparable patent license agreements provides a more accurate and efficient approach to estimating of the value of a patent license agreement. Fortunately, the use of comparable patent license agreements is widely accepted.[355]

Court-established aggregate royalty caps for SEPs introduce additional errors when they combine new technology standards with the revisions of technology standards. Keith Mallinson

derive a figure for the total royalty burden T but to achieve that requires one to have done all the same work which is needed to apply comparables directly anyway, so back calculating T will not add anything.").

351. *Id.* ¶ 270 ("The claims are obviously self-serving. The statements about aggregate royalties in particular are statements about other people's money on the footing that the person making the statement says at the same time that the cake is quite small but they are entitled to a large piece of it. . . Furthermore, putting weight in these statements do not take into account what implementers and SEP holders have actually been content to agree in the intervening years. Compared to public statements, comparable licenses are concrete data points, albeit their interpretation can be uncertain and the factors derived from them even more so.").

352. Jason Bartlett & Jorge L. Contreras, *Rationalizing FRAND Royalties: Can Interpleader save the Internet of Things?*, 36 REV. LITIG. 285, 308, 310 (2017) ("Individual patents and groups of patents have been valued using methods such as citation count, cost recovery, real option value, substitute costs, footprint methodology, discounted cash flow, and comparable license analysis.").

353. *See* Thomas F. Cotter, *Patent Damages Heuristics*, 25 TEX. INTELL. PROP. LJ 159, 204 (2017) (Cotter refers to various court approaches to FRAND as "heuristics").

354. *Id.*

355. Keith Mallinson, *Unreasonably-Low Royalties in Top-Down FRAND-Rate Determinations for TCL v. Ericsson*, Apr. 30, 2018, at 2 ("Comparable licenses are widely accepted pricing benchmarks in patent cases around the globe, including those involving SEPs.").

observes that in *TCL v. Ericsson*, "[t]he Court has misinterpreted statements by Ericsson and others, believing they were indications of multimode rates (i.e. among 2G to 4G) instead of single-mode rates (e.g. for 4G only)."[356] The court imposed a royalty cap for SEPs relevant to the 4G standard in mobile telecommunications, even though handsets and other devices typically included 2G and 3G SEPs.[357] The result was a royalty cap that was too low because it did not include the earlier generations of mobile technology.[358]

Royalty caps cause additional inefficiencies because courts must allocate total royalties among patent holders. Apportionment requires evaluation of the contribution of many patented technologies to complex innovations. This imposes burdens on the courts compared to the more direct route of evaluating the relevant SEPs themselves. The court in *TCL v. Ericsson* apportioned the aggregate royalty cap among patent holders based on the relative number of patents of the SEP holder in the patent dispute and those of other SEP holders.[359]

Counting and evaluating the full set of SEPs can be problematic because SEPs refer to patents declared to be essential. Many SEPs are not necessary for production of the standardized products, and determining the essentiality of SEPs is difficult for SSOs and beyond the courts' capabilities. The court cannot rely on general rules to estimate the proportions of declared-essential patents that are necessary for the standard. Such rules may be useful for understanding declaration of SEPs but have limited value in determining the value of particular SEPs.

Another problem with aggregate royalty caps is that this approach can lead to control over royalty rates by courts acting as regulatory agencies. Bartlett and Contreras advocate for a regulatory approach in which district courts would determine and then allocate total royalties for SEPs.[360] Such a regulatory approach would extend the courts' mission far beyond resolution of specific patent disputes.

Evaluating aggregate royalties can be useful for understanding the technology marketplace, but courts should be careful not to

356. *Id.*

357. *Id.*

358. *Id.*

359. TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635, at *3-25 (C.D. Cal. Dec. 21, 2017).

360. Bartlett & Contreras, *supra* note 352, at 310 ("Though it has not yet been employed in the context of standards-essential patents, federal statutory interpleader offers an attractive procedural mechanism for gathering all holders of FRAND encumbered SEPs that are essential to a particular technology standard into a single action, and then determining (a) the aggregate royalty payable with respect to the SEPs covering that standard, and (b) the allocation of that aggregate royalty among individual SEP holders.").

use aggregate royalties as a mechanism for regulating the market for patent licenses. By using the "top-down method", courts indirectly regulate the technology market because patent holders and implementers may interpret aggregate royalty caps as imposing arbitrary constraints on total SEP royalties. This will restrict negotiation of patent license agreements not involved in the patent dispute.

Court-imposed regulation of patent royalties is subject to the typical failures of price regulation. Price ceilings such as rent controls can lead to housing shortages by increasing the amount demanded and decreasing the amount supplied in comparison to an unrestricted market equilibrium. Price floors such as agricultural price supports or regulated utility rates can lead to oversupply by decreasing the amount demanded and increasing the amount supplied in comparison to an unrestricted market equilibrium, Regulatory price floors sometimes involve government intervention to purchase the product in oversupply.

Arbitrary royalty caps create economic inefficiencies similar to those generally created by price ceilings. Royalty caps function as a form of rent control; they impede price increases in the market for patent licenses. This would impede allocative efficiency in the market for patent licenses. When royalties are constrained systematically, rewards for inventors are diminished, which decreases incentives for invention. Aggregate royalty caps also will decrease incentives for R&D by technology adopters by artificially decreasing the costs of licensing existing inventions. By decreasing the market returns for inventors, royalty caps for SEPs diminish incentives for inventors to participate in standards organizations.

Courts affect the efficiency of market negotiation when they impose arbitrary aggregate royalty caps. Such aggregate caps effectively transform a group of SEP holders into an involuntary patent pool by choosing a collective royalty rate for a large set of patents. The difference between aggregate royalty caps and a patent pool is that patent holders do not establish the aggregate royalty rates nor do they negotiate apportionment.[361] Patent pools have far greater information and expertise than do courts.[362] Also, involuntary patent pools formed by courts cannot replace bilateral exchange.[363] Patent pools tend to pursue different objectives than parties involved in bilateral negotiation of patent license agreements.[364]

361. Robert P. Merges, *Institutions for Intellectual Property Transactions: The Case of Patent Pools*, Aug. 1999, at 24.

362. *Id.* at 42.

363. *See* Daniel F. Spulber, *Licensing Standard Essential Patents: Bargaining and Incentives to Invent* (Jan. 28, 2019).

364. *See* Mallinson, *supra* note 350, at 11 ("Most patent pool licensors are motivated more by their downstream interests, including minimizing costs as licensees (i.e. by

Telecommunication firms have experienced difficulties in negotiating such royalty caps.[365] Patent pools in mobile telecommunications represent only a small fraction of negotiated license revenues.[366] This suggests that bilateral exchange generally provides greater efficiencies than patent pools.

Royalty caps that are chosen arbitrarily by courts cause additional inefficiencies because they require arbitrary allocation of total royalties among patent holders. Such allocations of royalties are necessarily arbitrary whether they depend on the number of patents or various measures of patent quality. Bilateral negotiations in the market for patent license agreements are likely to anticipate total royalties and the allocation of royalties. Such negotiations are decentralized and involve a large number of separate interactions between SEP holders and implementers. It is highly unlikely that courts have the dispersed information of SEP holders and implementers in the market, and therefore, cannot be expected to replicate the complex set of bilateral contract negotiations needed to allocate royalties across patent holders and implementers. Furthermore, courts cannot guess what all willing licensors and licensees would choose through negotiation, nor the interaction of many bilateral agreements. These difficulties are mitigated when courts use comparable licenses to evaluate SEPs.

E. Adjudicated FRAND Commitments and Incremental Value of Standardized Technology

Courts potentially engage in another form of regulation when they choose royalties based on arbitrary estimates of incremental technology contributions. Although the concept of incremental contributions of technology draws upon economic analysis, arbitrary estimates of incremental contributions by courts or regulatory agencies can be problematic. Estimates of incremental contributions that systematically constrain royalties will decrease incentives for invention and reduce incentives to participate in standards organizations.

The incremental royalty approach is the basis for the "bottom-up" method for choosing reasonable royalty damages.[367] Judge

setting low rates) than they are in income generation as licensors; and patent pools tend not to attract the most valuable patents.").

365. Rudi Bekkers & Joel West, *The Limits to IPR Standardization Policies as Evidenced by Strategic Patenting in UMTS*, 33 TELECOMM. POL. 80 (2009) (stating that "attempts to negotiate voluntary cooperation to 'cap' royalties have thus far failed.").

366. Keith Mallinson, *Cumulative Mobile-SEP Royalty Payments No More than Around 5% of Mobile Handset Revenues*, WISEHARBOR (2015), https://www.wiseharbor.com/wp-content/uploads/2018/04/Mallinson-Critique-of-TCL-Ericsson-Decision-30-April-2018.pdf [https://perma.cc/PZ7W-WUHR].

367. Leonard & Lopez, *supra* note 7, at 86.

Holderman's decision in *In re Innovatio* applied the "bottom-up method", taking into account the cost of implementing "reasonable alternatives" to the patented technologies.[368] Judge Selna in *TCL v. Ericsson* cited *Ericsson v. D-Link*: "the royalty award is based on the incremental value that the patented invention adds to the product, not any value added by the standardization of that technology."[369]

SSO FRAND commitments, however, do not justify regulation of royalties based on the incremental value of patented technologies. As noted by the National Research Council, "absent further clarification of the meaning of FRAND, it is not clear whether members of SSOs intend that FRAND royalty commitments should reflect incremental values or some other notion of fair and reasonable pricing."[370] As Bartlett and Contreras observe: "[t]he bottom-up nature of reasonable royalty calculations in disputes involving standards-essential patents subject to FRAND commitments has yielded inconsistent and incongruous results in which patent holders can be over-compensated or under-compensated."[371]

Various commentators argue that FRAND commitments should place upper limits on royalties based on an estimate of the incremental contribution of SEPs to the technologies represented by standards.[372] The Federal Trade Commission (FTC) recommended that FRAND should be defined as the incremental value of the technology before standardization.[373] Layne-Farrar et al. propose that SSOs impose an adjusted incremental value rule on royalties.[374] Carlton and Shampine suggest that an economic interpretation of FRAND based on "non-discrimination" implies that royalties should be bounded above by the incremental value of the

368. In re Innovatio IP Ventures, LLC, No. 11 C 2303, 2013 WL 5593609, at *37 (N.D. Ill. Sep. 27, 2013) ("In essence, the Bottom Up approach suggests determining the cost of implementing reasonable alternatives to the Innovatio patents that could have been adopted into the standard, and dividing that cost by the total number of infringing units to determine the maximum per unit royalty Innovatio' s patents would have merited in the 1997 hypothetical negotiation.").

369. Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1232-33 (Fed. Cir. 2014); *see also* TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635, at *108 (C.D. Cal. Dec. 21, 2017).

370. NATIONAL RESEARCH COUNCIL, *supra* note 269.

371. Bartlett & Contreras, *supra* note 352, at 333.

372. *See* Thomas F. Cotter et al., *Chapter 1: Reasonable Royalties*, LAWARXIV (Dec.13, 2018), osf.io/preprints/lawarxiv/uc9qr [https://perma.cc/9CBG-B648].

373. FTC, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH EVOLVING COMPTETITION at 22-23 (2011) ("A definition of RAND based on the ex ante value of the patented technology at the time the standard is chosen is necessary for consumers to benefit from competition among technologies to be incorporated into the standard.").

374. Anne Layne-Farrar, Gerard Llobet & Jorge Padilla, *Payments and Participation: The Incentives to Join Cooperative Standard Setting Efforts*, 23 J. OF ECON & MGMT. STRATEGY 24 (2014).

technology.[375] Some recommend that the courts should limit royalties to the incremental contribution of SEPs.[376]

The notion of incremental value arose in earlier discussions of reasonable royalty damages for infringement. The ninth *Georgia-Pacific* factor suggests taking into account the "utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results."[377] Amy Landers argues that "apportionment requires an examination of the differences between the infringed claim and the prior art in a manner analogous to the identification of the differences between the claimed invention and the prior art in the nonobviousness analysis."[378] Daralyn Durie and Mark Lemley suggest that "[d]etermining the incremental contribution of the patented technology requires a baseline for comparison. Buyers are not buying the technology in a vacuum; they are almost always choosing among alternatives."[379]

The recommendation that patent license royalties should reflect incremental contributions of SEPs to a standard is a variant of the notion that patent license agreements should be negotiated *ex ante*, that is, before standardization. As explained previously, this mischaracterizes the interaction of invention, innovation, and standard setting. It is unlikely that such incremental contributions can be readily identified, because the total incremental contributions of individual patents are greater than the total contributions of the patents if the patents are "innovative complements".[380] Conversely, the total incremental contributions of individual patents are less than the total contributions of the patents if the patents are "innovative substitutes". This problem in identifying contributions also occurs if the patents are part of patent portfolios. The patent portfolios themselves can be "innovative complements" or "innovative substitutes".Regulatory determination of royalties based on the "bottom-up method" may not be based on evidence. The "bottom-up method" involves evaluating the incremental contribution of

375. Dennis W. Carlton & Allan L. Shampine, *An Economic Interpretation of Frand*, 9 J. COMPETITION L. & ECON. 531, 546 (2013) ("[C]ompeting firms are similarly situated if ex ante they expect to obtain the same incremental value from the patented technology compared with the next best alternative available to be incorporated into the standard.").

376. THOMAS F. COTTER & JOHN M. GOLDEN ET AL., PATENT REMEDIES AND COMPLEX PRODUCTS: TOWARD A GLOBAL CONSENSUS, Ch. 1 (Brad Biddle, Jorge L. Contreras et al. eds., Cambridge Univ. Press) (2019).

377. Georgia-Pacific v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970); Daralyn J. Durie & Mark A. Lemley, *A Structured Approach to Calculating Reasonable Royalties*, 14 LEWIS & CLARK L. REV. 627, 638 (2010).

378. Amy L. Landers, *Patent Claim Apportionment, Patentee Injury, and Sequential Invention*, 19 GEORGE MASON L. REV. 471, 476 (2012).

379. Durie & Lemley, *supra* note 378, at 638.

380. *See* Spulber, *supra* note 194.

SEPs in comparison with alternatives that may not exist, and compares SEPs with technologies not included in the standard.[381] It is difficult if not impossible to examine the features of alternative technologies that were not adopted in the standard. The technologies underlying alternative standards may not have been developed. This prevents any estimates of the incremental benefits of SEPs in comparison with alternative technologies. Also, there are likely to be no patent license royalties on those technologies so it is not feasible to calculate the net benefits to implementers from the alternative technologies.

Comparable licenses provide the best way to observe the effects of competition on the value of SEPs. The "bottom-up method" is unlikely to yield accurate estimates of market value.[382] Comparisons with hypothetical substitute technologies, however, do not provide an indication of the value of SEPs. An analysis of technology standards that were not adopted also does not indicate the effects of competition among technologies. The "bottom-up method" seeks to remove the effects of standardization from the market value of SEPs. However, the result is more likely to remove the value that SEPs add to the standardized technology. This would upset the balance between the interests of SEP holders and implementers sought by SSO FRAND commitments.[383]

CONCLUSION

SSO FRAND commitments are meaningful and significant. The three-stage process consisting of coordination, negotiation, and adjudication defines FRAND commitments. The three-stage FRAND process provides sufficient clarity and structure to address most public policy concerns about standardization and license royalties. The FRAND process substantially diminishes or eliminates the need for additional public policy interventions such as regulation of either SSOs or patent licensing.

381. Leonard & Lopez, *supra* note 7.

382. *See* Panduit Corp. v. Stahlin Bros. Fibre Works, Inc., 575 F.2d 1152, n. 9 (6th Cir. 1978) ("There are substitute products for virtually every patented product; the availability of railroads and box cameras should not of itself diminish royalties payable for infringement of the right to exclude others from making and selling the Wright airplane or the Polaroid camera.").

383. Unwired Planet International Ltd. v. Huawei Technologies Co. Ltd., [2017] EWHC (Pat) 711, ¶ 18 ("While the inventor must be entitled to a fair return for the use of their invention, in order for the standard to permit interoperability the inventor must not be able to prevent others from using the patented invention incorporated in the standard as long as implementers take an appropriate licence and pay a fair royalty. In this way a balance is struck, in the public interest, between the inventor and the implementers.").

SSOs introduce a coordinated FRAND commitment. The SSO coordinated FRAND commitment is more than an exhortation; it is a deliberate statement of neutrality designed to defer to market negotiation. The SSO FRAND commitment encourages participation in the organization, fosters organizational consensus, and promotes adoption of technology standards. Through the SSO FRAND commitment, SEP holders have a contractual obligation toward technology implementers. The SSO FRAND commitment is meaningful because courts can interpret the third-party obligation under the common law.

Building on the SSO FRAND commitment, SEP holders and technology implementers create negotiated FRAND commitments. Patent license agreements between SEP holders and technology implementers implicitly define FRAND through standard practice. Market negotiations offer the flexibility required to adapt to technological change. The large number of SEPs and the vast number of standardized products indicate the success of negotiated FRAND commitments. The widespread adoption of technology standards and extensive technological innovation also show the success of these commitments.

Finally, courts establish adjudicated FRAND commitments based on SSO FRAND commitments and marketplace FRAND commitments. Because of the contractual nature of SSO FRAND commitments, both SEP holders and technology implementers can be plaintiffs. The courts interpret the third-party obligation created by SSO FRAND commitments. The courts can address reasonable royalties by recognizing patent license agreements as contracts. Standard practices in the market for patent license contracts provide the best guidelines for reasonable royalty damages. The courts have applied negotiated FRAND commitments by emphasizing royalties in comparable SEP licenses. Courts also can use the value of SEPs in market transfers to infer comparable royalties.

The FRAND process has worked well in supporting invention, innovation, and standardization. However, the implementation of the 5G mobile telecommunications standard faces a number of significant risks. Public policy makers should be careful about the unintended consequences of interfering in the FRAND process. Regulatory approaches to FRAND commitments may decrease incentives for invention, innovation, and standardization.

Those advocating greater regulation or antitrust scrutiny of SSO rules and SEP licensing cannot base their arguments on the "vagueness" of the FRAND terminology. SSO IP rules already reflect industry consensus decision making. SSO IP rules already require disclosure of SEPs. SSO FRAND commitments already generate third-party obligations for SEP holders. Regulations that

control the royalty base to force SEP holders to license to all would result in the problem of "patent run-around", which would diminish incentives for standardization. Bilateral patent license negotiations in light of FRAND commitments are sufficient to address policy concerns about "SEP holdup", "royalty stacking", "patent thickets", and the "Tragedy of the Anti-Commons".

Overall, courts adjudicating SEP disputes should limit the scope of their decisions rather than extending their authority far beyond the case at hand. Courts should avoid regulation of standardization and SEP licensing through arbitrary aggregate royalty caps on all SEPs bearing on a set of standards, and should not attempt to determine the extent of incremental contributions made by standardized technologies. Royalty constraints based on arbitrary estimates of incremental contributions will diminish incentives for invention and innovation. Consensus decision-making by SSOs and voluntary negotiations in the marketplace provide the best indicators of what is fair, reasonable, and non-discriminatory.