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Ignorance Over Innovation: Why Misunderstanding Standard Setting Organizations Will Hinder Technological Progress

Kristen Osenga
University of Richmond, kosenga@richmond.edu

IGNORANCE OVER INNOVATION: WHY MISUNDERSTANDING STANDARD SETTING ORGANIZATIONS WILL HINDER TECHNOLOGICAL PROGRESS

Kristen Jakobsen Osenga[*]

"[W]ithout standardization there wouldn't be a modern economy."[1]

I. INTRODUCTION

On January 17, 2017, the Federal Trade Commission (FTC) sued Qualcomm Inc. in federal district court, alleging antitrust violations in the company's licensing of semiconductor chips used in cell phones and more.[2] The suit alleges, in part, that Qualcomm refuses to license its patents that cover innovations incorporated in technology standards (standard-essential patents, or SEPs), in contradiction of the company's promise to license this intellectual property on fair, reasonable, and nondiscriminatory (FRAND) terms.[3] According to the FTC, Qualcomm's behavior reduces competitors' ability to participate in the market, raises prices paid by consumers for products incorporating the standardized technology, and at bottom, impedes innovation.[4]

While there is plenty to criticize about the FTC's action,[5] the lawsuit is evidence of a much larger and more fundamental problem. The FTC's

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* Professor of Law, University of Richmond School of Law; Senior Scholar, Center for the Protection of Intellectual Property at Antonin Scalia Law School, George Mason University. I appreciate comments received on early versions of this paper at the 2015 Works in Progress IP, hosted by the George Washington University Law School and the U.S. Patent and Trademark Office.

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[1] James Surowiecki, *Turn of the Century*, WIRED (Jan. 1, 2002, 12:00 PM), http://www.wired.com/wired/archive/10.01/standards.html.

[2] *FTC Charges Qualcomm with Monopolizing Key Semiconductor Device Used in Cell Phones*, FED. TRADE COMM'N (Jan. 17, 2017), https://www.ftc.gov/news-events/press-releases/2017/01/ftc-charges-qualcomm-monopolizing-key-semiconductor-device-used.

[3] *See id.*; *see also* Melissa Lipman, *FTC Sues Qualcomm Over Standard-Essential Patent Licenses*, LAW360 (Jan. 17, 2017, 4:27 PM), https://www.law360.com/articles/881729/ftc-sues-qualcomm-over-standard-essential-patent-licenses [hereinafter Lipman, *FTC Sues Qualcomm*].

[4] Lipman, *FTC Sues Qualcomm*, *supra* note 3.

[5] Commissioner Maureen Ohlhausen dissented from the FTC's decision to file suit, noting various concerns. *See* Lipman, *FTC Sues Qualcomm*, *supra* note 3; Melissa Lipman, *5 Key Takeaways from the FTC's Qualcomm Patent Suit*, LAW360 (Jan. 18, 2017, 9:11 PM),

allegations are not based on sound economic analysis nor are they supported by evidentiary findings.[6] This is not due to haste or poor practices by the FTC; it is instead indicative of the FTC's ignorance. Put plainly, the FTC does not understand technology standards and the organizations that develop them. And the FTC is not alone in this lack of knowledge. Many courts and commentators have also demonstrated clear misunderstandings of standard setting organizations (SSOs). Unfortunately, this is not harmless error or mere academic diversion. Important legal, business, and policy decisions are being made based on these misunderstandings. These decisions have the potential to negatively impact the future of technology standards and, ultimately, innovation itself.

To understand why decisions that affect standards have a far-reaching impact on innovation, it is important to grasp the role that these standards play in today's society. As just one example, consider the remarkable level of interconnectivity and interoperability we rely on and enjoy. Using a wide variety of devices and a few simple clicks, we can be instantly connected to any other person or organization or piece of information, anywhere in the world, through any number of networks. The innovations and infrastructure that created today's connected reality did not occur by accident. Rather, the success of things we take for granted—the Internet, Wi-Fi, 3G and 4G (and soon 5G) networks, and the myriad devices with which we access these—is in large part due to technological standards. Particularly in the field of information and communications technology, although certainly not limited to this field, standards improve how we do business and enhance everyday experiences. Standards are prevalent in many and diverse other fields, including aeronautics, health and life sciences, renewable energy, and manufacturing.[7] In fact, standards-facilitated technologies have become so ubiquitous across all areas that most of us cannot imagine life without them.[8]

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https://www.law360.com/articles/882234/5-key-takeaways-from-the-ftc-s-qualcomm-patent-suit [hereinafter Lipman, *Five Key Takeaways*]. Specifically, she points out that the suit was filed on the eve of a change in administration and it was filed under controversial Section 5 of the Federal Trade Commission Act, among other issues. *See id.*

[6] *See* Lipman, *FTC Sues Qualcomm*, *supra* note 3; Lipman, *Five Key Takeaways*, *supra* note 5.

[7] *See, e.g.*, *Standards Setting Organizations and Standards List*, CONSORTIUMINFO.ORG, http://www.consortiuminfo.org/links (last visited April 22, 2018); NAT'L ACAD. OF SCI., PATENT CHALLENGES FOR STANDARD-SETTING IN THE GLOBAL ECONOMY 1 (Keith Maskus & Stephen A. Merrill eds., 2013) [hereinafter NAS PATENT CHALLENGES].

[8] It is estimated there are over 50,000 standards developed by more than 600 private sector industry groups, across a wide range of technologies; it is no wonder that standards are everywhere. *See* Am. Nat'l Standards Inst., *Overview of the U.S. Standardization System*, STANDARDSPORTAL.ORG, https://standardsportal.org/usa_en/standards_system.aspx (last visited July 16, 2017).

Despite our reliance on and enjoyment of these important innovations, rarely do we talk about technology standards that make them possible. Worse still, if standards are discussed, it is generally in conjunction with accusations of negative behaviors by the firms that contribute the technological innovations that become part of a standard.[9] For example, owners of patents incorporated in standards are sometimes accused of using patents to seek excessively high royalties from companies wanting to manufacture and sell products implementing the standard.[10] Others, like Qualcomm, are accused of unfair dealing when licensing patents covering standardized technology.[11] Although there is little to no evidence supporting the existence, extent, or effects of this alleged bad behavior,[12] the assertions alone have been sufficient to compel reaction against firms that participate in standard setting activities.[13] For example, courts have denied injunctive relief to firms who own patents, found to be infringed, simply because the technology covered by those patents is part of a standard.[14] Commentators and policy makers have urged both courts and standard setting organizations to adopt policies that weaken the patent rights of firms that participate in standard setting.[15] And unfortunately, standard setting organizations are heeding this call. In 2015, the Institute of Electrical and Electronics Engineers (IEEE), a major

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[9] *Id.*

[10] *See, e.g.*, Joseph Farrell et al., *Standard Setting, Patents, & Hold-Up*, 74 ANTITRUST L.J. 603, 603–04 (2007).

[11] *Id.* at 605.

[12] The purpose of this article is not to refute or confirm the prevalence or effect of bad behavior by firms or negative effects resulting from standard setting, as excellent research has been done by others in this area. *See, e.g.*, Damien Geradin, *The Meaning of "Fair and Reasonable" in the Context of Third Party Determinations of FRAND Terms*, 21 GEO. MASON L. REV. 919, 940 (2014) ("[A]lthough holdup and royalty stacking could occur in theory, there is little evidence that they regularly occur in the real world.") Geradin goes on to explain why they are also theoretically unlikely. *See id.* at 940–46; *see also* Sidak, *infra* note 73, at 718–19 (discussing studies that question the prevalence of hold-up and royalty stacking).

[13] Geradin, *supra* note 12, at 941.

[14] *See, e.g.*, Apple, Inc. v. Motorola, Inc., 869 F. Supp. 2d 901, 914 (N.D. Ill. 2012) (Judge Posner, sitting by designation, stating that he did not believe patents that cover technology standards would be eligible for injunctive relief). On appeal, the Federal Circuit denied that there exists such a bright line rule. *See* Apple, Inc. v. Motorola, Inc., 757 F.3d 1286, 1332 (Fed. Cir. 2014) ("To the extent that the district court applied a *per se* rule that injunctions are unavailable for [patents on standardized technology], it erred."), *overruled on other grounds by* Williamson v. Citrix, LLC, 972 F.3d 1339 (Fed. Cir. 2015); *see also infra* Section III.A.1.

[15] One of these patent weakening measures would require firms to agree to licensing rates before fully understanding the value and extent of the technology. *See, e.g.*, Jorge Contreras, *Technical Standards and Ex Ante Disclosure: Results and Analysis of an Empirical Study*, 53 JURIMETRICS J. 163, 168 n.17 ("[E]x ante licensing disclosure [policies] could prevent patent holder from demanding unexpectedly high royalties . . . after a standard has been adopted and locked-in."); *see also infra* Section III.A.2.

standard setting organization, became the first to adopt many of these suggested policies.[16]

Even accepting at face-value the assertions that some firms participating in standard setting activities behave badly and that this behavior has negative impacts, the fact that courts and commentators are trying to fix the problem without understanding SSOs is akin to renovating a house without checking for load-bearing walls. Standard setting is a complex, time-intensive, collaborative process that carries both significant risks and benefits for participating firms.[17] And yet, the so-called "reforms" being implemented and proposed drastically reduce the benefits to the innovative firms contributing foundational technology to standards, seemingly without any acknowledgement of the accompanying remaining risks and without analyzing the effects on the standard setting ecosystem as a whole. By failing to consider the risks while eviscerating the benefits, courts and commentators are implementing changes to law and policy that will serve to discourage participation by innovative firms in standard setting activities. Decreased participation in SSOs may then lead to fewer technologies submitted for incorporation into standards and, perhaps, less incentives to develop innovative technologies in the first instance. As fewer firms participate in standard setting, the quality of the technology incorporated into standards may wane, leading to suboptimal standards and less adoption of the standards by the marketplace. This, in turn, destroys a key value of standards—providing interconnectivity and interoperability. At the end of the day, disincentivizing participation in standard setting activities will hinder innovation.

The purpose of this article is to address the knowledge deficit surrounding SSOs by explaining the basics of standard setting and the firms that participate in standard setting activities. It will also discuss some of the common errors about SSOs that have been at the heart of the misunderstanding, such as the persistent confusion between SSOs and patent pools. A more accurate understanding of SSOs should allow courts and commentators to make better decisions about laws and policies surrounding SSOs, aimed at fixing whatever problems may exist without completely eroding the incentives to participate in standard setting.

This article will proceed in three parts. Part I will provide an overview of standard setting organizations, including the range of benefits they provide

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[16] *See generally*, J. Gregory Sidak, *The Antitrust Division's Devaluation of Standard Essential Patents*, 104 GEO. L.J. ONLINE 48 (2016). For a more detailed discussion of the IEEE's policy changes and the effects these changes have had, see *infra* Section I.B.

[17] Contreras, *supra* note 15, at 171.

to firms, competitors, and the public, as well as an in-depth discussion of how SSOs operate and are governed. Examples of SSOs will be described for illustration. Because a significant misunderstanding is the confusion and conflation surrounding SSOs and patent pools, Part II will explain patent pools in a similar fashion, with a particular emphasis on how patent pools differ from SSOs in both purpose and operation. Examples of patent pools will also be described. Finally, Part III will take a deeper look at how judges have treated SSOs in the patent infringement context, as well as how commentators have suggested that the behaviors of SSOs or patent owners of standardized technology be reformed or constrained. Specifically, this part will illustrate how these judges' and commentators' fundamental misunderstandings about SSOs are driving their opinions and proposals, respectively. Finally, this Part will demonstrate how a more accurate understanding of SSOs would lead to better law and policy for standardized technology and thus innovation going forward.

II. STANDARD SETTING ORGANIZATIONS

A standard is "any set of technical specifications which either does or is intended to provide a common design for a product or process" and is related to characteristics such as quality, safety, or interoperability.[18] Standards related to quality or safety serve to inform and/or protect consumers and ensure that products designed or manufactured in accordance with the standard meet some minimum specified threshold.[19] Interoperability and interconnectivity standards guarantee that standard-compliant products made by different companies are compatible with other products that also incorporate the standard, regardless of the manufacturer.[20] Occasionally, these goals overlap, such as when interconnectivity and interoperability requirements are required to attain a certain level of health and safety.[21] For

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[18] *See* HERBERT HOVENKAMP ET AL., 2 IP & ANTITRUST: AN ANALYSIS OF ANTITRUST PRINCIPLES APPLIED TO INTELLECTUAL PROPERTY LAW 35-3–35-4 (3d ed. 2017); *see also* Contreras, *supra* note 15, at 164 ("Technical standards are detailed sets of instructions, specifications, or protocols that are used to achieve a particular technical purpose.").

[19] Bruce H. Kobayashi & Joshua D. Wright, *Intellectual Property & Standard Setting*, *in* ABA HANDBOOK ON THE ANTITRUST ASPECTS OF STANDARDS SETTING 3 (2010), http://ssrn.com/abstract_id=1460997.

[20] *See id.*

[21] Health and safety standards, however, do not necessarily specify requirements necessary for interconnectivity and interoperability. For just one example, there are standards for protecting persons "from hazards arising from the installation, operation, or maintenance" of overhead and underground electric lines. *See C2-1990 National Electric Safety Code*, IEEE STANDARDS ASS'N, http://standards.ieee.org/findstds/standard/C2-1990.html (last visited July 16, 2017).

example, after the Great Baltimore Fire of 1904,[22] the National Fire Protection Association developed standards for hose and hydrant connections, hoping to avoid a future disaster where fire brigades from neighboring locales could not assist in firefighting efforts because their hose couplings would not fit the hydrants near the incident.[23] Next Generation 911 (NG911) standards provide a modern example, coordinating emergency services across a range of jurisdictions and technologies.[24] It is no exaggeration to say that we interact with standardized technology multiple times a day, every single day, to keep us not just connected, but also safe.

Standards are generally created in one of three ways: government mandate, market selection, or standard setting organization.[25] Although the government may endorse standards set by the market or SSO, government mandated standards refer to requirements developed by the government in the absence of a standard.[26] One example of government mandated standards includes fuel economy requirements for automobiles.[27] However, government mandated standards have become less common as standards established by the private sector have become more prominent.[28] Market selected standards are de facto standards, chosen by the public through an

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[22] Although the fire led to no direct fatalities, conservative estimates place the damage around $125M damages in 1904 (estimated $3.30B in 2017-dollar value). *See The Great Baltimore Fire*, SCI. AM., Feb. 20, 1904, at 154, 154.

[23] *See* Robert L. Stoll, *What You Should Know About US Standard-Essential Patents*, LAW360 (Sept. 25, 2013, 6:27 PM), https://www.law360.com/articles/472229/what-you-should-know-about-us-standard-essential-patents. Other physical products have been standardized for more than a century to allow for interoperability, including railroad gauges, drill bits, and electrical plugs. *See, e.g.*, ANDREW L. RUSSELL, OPEN STANDARDS AND THE DIGITAL AGE: HISTORY, IDEOLOGY, AND NETWORKS (2014); Dieter Ernst, *America's Voluntary Standards System—A Best Practice Model for Innovation Policy?* (E.-W. Ctr., Working Paper No. 128, 2012), https://www.eastwestcenter.org/publications/americas-voluntary-standards-system-best-practice-model-innovation-policy.

[24] *See The National 911 Program: Next Generation 911 (NG911) Standards Identification and Review*, 911.GOV 1 (March 2015), http://www.911.gov/pdf/NG911-Standards-Identification-and-Analysis-March2015.pdf (describing a set of standards coordinating "seamless transmission of data from the caller to 911, and on to emergency responders" across "multiple local, regional, state, and national public safety jurisdictions" and across a range of technologies).

[25] *See* Daniel J. Gifford, *Developing Models for a Coherent Treatment of Standard-Setting Issues Under the Patent, Copyright, and Antitrust Laws*, 43 IDEA 331, 338 (2003).

[26] *See, e.g.*, Jay P. Kesan & Rajiv C. Shah, *Shaping Code*, 18 HARV. J. LAW & TECH. 319, 332–333 (2005). Kesan and Shah identify three types of government mandated standards: 1) process standards, relating to interoperability, 2) product standards, relating to characteristics and information (labeling), and 3) control standards, relating to health, safety, and the environment. *See id.*

[27] See, for example, the Corporate Average Fuel Economy (CAFE) standards enacted by Congress in 1975 to reduce energy consumption in personal vehicles. *See, e.g.*, *Corporate Average Fuel Economy*, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., http://www.nhtsa.gov/fuel-economy (last visited July 30, 2017).

[28] *See, e.g.*, Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 CAL. L. REV. 1889, 1900 (2002).

exercise of preference.[29] The popularity of one choice creates a positive feedback loop and eventually, to enhance compatibility and connectivity, the market leader emerges as a "standard" of sorts. The selection of de facto standards based on the market remains common; consider for example the recent choice of Blu-ray over HD DVD.[30] Because government mandated standards and market selected standards are not created through agreement by industry participants, they have not been subject to the same criticisms as standards created by SSOs.[31]

The remainder of this article, therefore, will focus on standards developed by SSOs. SSOs are "voluntary collectives in which representatives from multiple private companies, who are often competitors of each other, work together to establish technology standards."[32] The standards that result from SSO activities are often referred to as "voluntary consensus standards."[33] This section describes the range of benefits that voluntary consensus standards provide to firms that participate in SSOs, implementing firms (which may also be SSO participants, but need not be), and consumers, as well as the criticisms surrounding these standards. Next this section explains in-depth how SSOs operate with particular attention to the issues that give rise to the critiques about standardized technology. This section concludes by illustrating the discussion with a few examples SSOs.

A. Advantages and Disadvantages of Voluntary Consensus Standards

In legal and policy circles, discussions about SSOs and standards are overwhelmingly focused on potential disadvantages of standardization due to possible misconduct by participating firms.[34] However, voluntary consensus standards also create a wide range of advantages for multiple,

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[29] *See* Adam Speegle, Note, *Antitrust Rulemaking as a Solution to Abuse of the Standard Setting Process*, 110 MICH. L. REV. 847, 848 (2012).

[30] *See id.* In the late 1970s and early 1980s, market selection also created the VHS standard, chosen over Betamax. *See* Gifford, *supra* note 25, at 344 (explaining the network effects that led to VHS prevailing over Betamax). Despite what may be inferred from these two examples, market selection standards can and do occur outside of the visual media industry.

[31] *See* Gifford, *supra* note 25, at 333.

[32] Jay P. Kesan & Carol M. Hayes, *FRANDs Forever: Standards, Patent Transfers, and Licensing Commitments*, 89 IND. L. REV. 1, 4 (2009). In addition to private companies, SSO participants may also include governmental delegates and academic researchers. *See* Joseph Scott Miller, *Standard Setting Patents and Access Lock-in: RAND Licensing and the Theory of the Firm*, 40 IND. L. REV. 351, 364 (2007) ("[SSO participants include] volunteers from interested firms (and sometimes from government agencies and academic departments) who are technical, not legal or business, experts.").

[33] *See, e.g.*, Peter L. Strauss, *Private Standards Organizations and Public Law*, 22 WM. & MARY BILL OF RTS. J. 497, 499 (2013).

[34] *See infra* Section I.A.2.

diverse groups. These include the firms that contribute technology and knowledge to SSOs (SSO participants), as well as firms that implement and incorporate standardized technology into their products (implementers) and consumers that utilize and enjoy the resulting products (consumers). Further, standards created by SSO participants have recognized positive effects on the economy[35] and our lives.[36] Before considering measures that impede standardization or make participation in standard setting less attractive for innovative firms, it is important to understand both the advantages and disadvantages of voluntary consensus standards.

1. Advantages

Multiple advantages arise from standardization. Some of these benefits arise from the process of standards setting, while others are the result of having a standard in place. Additionally, parties realize different advantages depending on their role as SSO participant, implementer, or consumer.

SSO participants are firms that participate in standard setting by contributing technology, knowledge, or both to the SSO.[37] From the perspective of an SSO participant, both engagement in SSO activities and the resulting technology standards provide a number of different types of benefits.[38] Active involvement by these firms in the processes by which standards are selected allows them to influence the direction and outcome of standard setting.[39] If an SSO participant's technology is selected to be incorporated in the standard, the firm may gain a potential income stream in the form of revenue from licensing the technology to implementers. In any case, being involved in the early stages of standards creation will often

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[35] *See* U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION 33 (2007), http://www.usdoj.gov/atr/public/hearings/ip/chapter_2.pdf ("Industry standards are widely acknowledged to be one of the engines driving the modern economy. Standards can make products less costly for firms to produce and more valuable to consumers. They can increase innovation, efficiency, and consumer choice; foster public health and safety; and serve as a 'fundamental building block for international trade.'").

[36] *See, e.g.*, Renata Hesse, *Six "Small" Proposals for SSOs Before Lunch, Remarks as Prepared for the ITU-T Patent Roundtable*, DEP'T OF JUST. 4 (Oct. 10, 2012), https://www.justice.gov/atr/file/518951/download ("Today, interoperability standards underpin myriad improvements in our lives including the exchange and protection of health information, the use of smart grids for the delivery of electricity and the mobile communication devices that have become hallmarks of our time.").

[37] *Id.*

[38] *Id.* at 4–5.

[39] *See* Andrew Updegrove, *The Essential Guide to Standards*, CONSORTIUMINFO.ORG § 2.1, http://www.consortiuminfo.org/essentialguide/participating1.php (last visited July 17, 2017).

provide a firm with a more seamless transition in ramping up for the design and manufacture of standards-compliant products and services.[40] Additionally, SSO participants may receive beneficial training and other information about the new technology and may be able claim certification in the standard.[41] These benefits are particularly important because participation in an SSO is voluntary and expensive.[42] There are multiple costs associated with being a part of an SSO, including membership dues as well as significant numbers of hours spent at, and preparing, for SSO meetings.[43] Additionally, SSO participants that contribute technology to the SSO with the hope of it being incorporated in the standard incur research and development costs with uncertain return on the investment.[44] The advantages afforded to SSO participants must be great enough to offset these costs, otherwise participation may suffer.

Once a technology standard is developed, benefits for implementers accrue. Implementers are firms that incorporate standardized technology into their products.[45] Implementers, as a category, may include SSO participants, but also includes firms that did not participate in the standard setting process yet wish to offer products or services that incorporate the technology of the standard.[46] Implementers have a distinct advantage because the specifications and other technical data for their project are already set by the standard. This allows implementers to realize a marketable product at lower costs and often via a more simplified design process.[47] Additionally, although there are certainly risks that consumers may reject any given standards-compliant product or even the standard itself, it is a much smaller risk than if an implementer develops and markets a product independently.[48] Particularly in cases of standards directed to interconnectivity and interoperability, the

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[40] Stoll, *supra* note 23.

[41] *See* Updegrove, *supra* note 39.

[42] *Id.* § 2.

[43] *See id.* § 4.2.1. The costs of the most influential levels of membership in SSOs typically costs between $10,000 and $60,000, but a few have dues ranging upwards from $200,000 to $1 million. *See id.* Most SSOs, however, offer multiple membership classes; some with lesser influence can be significantly less expensive.

In terms of man hours, some SSOs limit voting rights to participants with good attendance records; others require the dedicated services of one or more employees as a condition of membership of the classes with the most influence. *See id.* Recently, some of these "costs" of participation have become less onerous due to the development and use of remote meeting platforms and voting technology. *See Id.*

[44] *See id.* § 2.

[45] *See id.* § 2.1.

[46] *See id.* § 3.2.4.

[47] *See* Joshua D. Wright, *SSOs, FRAND, and Antitrust: Lessons from the Economics of Incomplete Contracts*, 21 GEO. MASON L. REV. 791, 793 (2014).

[48] *See* James C. DeVellis, *Patenting Industry Standards: Balancing the Rights of Patent Holders with the Need for Industry-Wide Standards*, 31 AIPLA Q. J. 301, 305 (2003).

implementer is further aided by network effects—a pipeline of customers that want to purchase products that comply with the standard in order to maximize their own beneficial use of the technology.[49] Lastly, implementers can also develop and compete for customers using innovative extra-standard features, an activity that benefits all parties involved.[50] Although implementers may need less incentive than SSO participants to adopt standardized technology, the above-mentioned advantages are still essential to cultivate the critical mass of implementers that gives rise to the favorable effects. The more popular and technologically robust the standard (made possible through diverse engagement of SSO participants), the more likely an implementer is to adopt the standardized technology.

Consumers may benefit the most from technology standards. While health and safety standards are specifically directed at consumers, interconnectivity and interoperability standards also create immense benefits for them as well. Standardization encourages horizontal competition, enabling multiple firms to compete for customers.[51] This can increase manufacturing volume, and thus supply, and allows a variety of firms to offer innovative products that are compatible with the standard at competitive prices.[52] Not only do consumers have a greater choice of manufacturers from whom to purchase products that embody the technology standard,[53] but they can also purchase complementary products and auxiliary devices with reassurance that these, and any, standard-compliant devices will work together smoothly.[54] This technological compatibility has the side benefit of decreasing search costs for the consumer.[55] Further, consumers do not become "locked in" to a particular manufacturer's product or, worse yet, "stranded" if a manufacturer chooses to no longer make or support a particular device; they are able to seamlessly continue by using products from other manufacturers that follow the same standard.[56] Additionally, with standardized technology, users benefit from network effects. Specifically, the more users of a technology that join a network, the more value that

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[49] *See id.*

[50] *See id.* at 307.

[51] *See* Benjamin M. Miller, *FRAND-Encumbered SEPs and Injunctions: Why Section 5 of the FTC Act is an Inappropriate Remedy*, 16 COLUM. SCI. & TECH. L. REV. 452, 460 (2015).

[52] *See, e.g., id.* at 460–61; *see also Standard Essential Patent Disputes and Antitrust Law: Hearing Before the Subcomm. on Antitrust, Competition Policy and Consumer Rights of the S. Comm. on the Judiciary*, 113th Cong. 3–4 (2013) (statement of Suzanne Munck, Chief Counsel for Intellectual Property, Federal Trade Commission).

[53] *See* Wright, *supra* note 47, at 793.

[54] *See id.*

[55] *See* Golden Bridge Tech., Inc., v. Motorola, Inc., 547 F.3d 266, 273 (5th Cir. 2008).

[56] *See* Wright, *supra* note 47, at 794.

network provides to its users.[57] In fact, the benefit derived from interoperability is so great that the actual standard selected is often less important than the simple fact that a standard exists and has been widely adopted.[58]

As an illustration of interoperability, consider the ubiquitous smart phone. Whether you have a phone made by Apple or Google or Samsung, you will be able to talk and text other people, regardless of what brand of smart phone they use. You will be able to access Wi-Fi via the router in your house, not matter what company manufactures that router—and you will be able to hop onto Wi-Fi hotspots at the local library, coffee shop, and many other places. When not on Wi-Fi, you will be able to access the LTE network, whether you use Verizon, T-Mobile, or another cell phone service provider. Technology standards make all these things, and so many other aspects of modern life, possible.

The above benefits of standardized technology are true regardless of whether the standard is set by government mandate, market choice, or SSO. There are, however, additional benefits specific to voluntary consensus, or SSO-developed, standards. An SSO-developed standard avoids the "standards war" that often arises from market choice, allowing firms to avoid significant costs by selecting the standard at an early phase of product development, rather than after the product is fully developed and is already being manufactured and sold.[59] The "standards war," or competition between firms seeking to become the standardized technology by winning market selection, further requires firms to expend significant resources in trying to attract the larger market share.[60] Moreover, when standards are set via market selection, a clear winner does not always arise at the end of the day, sometimes defeating the very interoperability and interconnectivity aspects that standards are intended to create.[61] If the competing products possess distinct attributes and customers prefer that variety, there may instead be two or more groups of co-existing, incompatible products rather than one standard.[62] Additionally, when there are competing standards in the marketplace, some consumers delay purchasing until after the de facto

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[57] *See* Kesan & Hayes, *supra* note 32, at 237 (noting that interoperability enhances network effects, or "the positive effects that emerge as more people use technology"); Lemley, *supra* note 28, at 1896–97.

[58] *See* Lemley, *supra* note 28, at 1897.

[59] *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, 162 (2015).

[60] *See* Miller, *supra* note 32, at 359.

[61] *See, e.g.*, Hiram Melendez-Juarbe, *DRM Interoperability*, 15 B.U. J. SCI. & TECH. L. 181, 208 (2009).

[62] *See id.*

standard is selected to avoid the costs of choosing the losing standard, either having to use a suboptimal product or needing to buy a second product to enjoy the benefits that come with standardization.[63] Some examples of the fallout from standards wars include the Blu-ray–HD DVD battle, mentioned above, where consumers refrained from buying players initially, hoping that one technology would emerge as a standard, and the battle between Xbox and PlayStation, where some consumers must purchase both gaming systems to have access to the full range of desired games. [64]

2. Disadvantages

Any discussion of advantages without a corresponding mention of disadvantages would be incomplete and disingenuous. There are three primary areas where potentially negative aspects of standardization, particularly voluntary consensus or SSO-developed standardization, may occur. Specifically, some critics argue that standardization may have negative effects or impacts on 1) innovation generally, 2) firms that participate in standard setting activities, and 3) implementers and consumers wishing to make and use products that incorporate technology covered by standards.

First, standardization has been purported to delay further innovation or even encourage stagnation in a particular technology sector.[65] Because standard setting is based on lengthy deliberations to achieve a level of consensus among participants, there is inevitably some amount of delay and bureaucracy that exists.[66] However, the result of the delay is ideally an optimal solution to a technological problem and is "worth the wait." Some have also argued that standardization discourages further invention, resulting in technology stagnation, because incentives to develop improved or alternative technologies are lacking for firms inside and outside the standard setting process.[67] The premise of the argument is that once a standard is developed, there is little motivation to continue innovating. This concern, however, does not seem to be an actual problem, as evidenced by the great amount of work being done in and around the area of current standards to either improve upon or create "next generation" standards. One example of

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[63] *See* Tsai & Wright, *supra* note 59, at 162.

[64] *See supra* note 30 and accompanying text.

[65] *See* Melonie L. McKenzie, *How Should Competing Software Programs Marry? The Antitrust Ramifications of Private Standard-Setting Consortia in the Software Industry*, 52 SYRACUSE L. REV. 139, 141 (2002).

[66] *See id.* at 155.

[67] *See id.*

this continued innovation after standardization is the evolution from 3G to 4G, and now to the current work being done on the 5G communications standard.[68]

Second, standardization may also have negative consequences for SSO participants, or firms that participate in standard setting. These consequences include wasted or lost resources, resulting from competition and free-riding. Competition occurs within any given SSO, as well as potentially between multiple SSOs working to solve the same technological problems. It is, in fact, this competition that allows SSOs to derive the "best" solution. Firms participate in these SSOs by developing and contributing technology for consideration by the SSO; if the SSO does not select the technology a firm develops, that firm may be seen to have wasted some resources. However, the incentives that accrue to SSO participants, described above, help ameliorate this concern.[69] The negative impact of lost resources from multiple competing SSOs, that is SSOs seeking to address the same technological problem, is more difficult. Although each SSO will promote its own standard, at some point it is likely that one standard will receive widespread adoption while the other standard fades away.[70] Some SSO participants will participate in these multiple competing SSOs to hedge their bets in this situation, but at an extra expense in membership dues, man hours, and technology research and development. Other SSO participants will align with only one of the competing SSOs, facing a marked disadvantage of possibly having "spent their time and money adopting the 'obsolete' standards" and may end up paying even more to license the new standard.[71] Last, but not least, standard setting does create an incentive for free-riding, allowing implementers of standardized technology to enter a technology market with little cost to them but at the expense of SSO participants.[72] This too may be realized as a lost or wasted resource by the SSO participant, but should often be outweighed by the many other benefits that are part of participating in standard setting activities.

Third, standardization is said to have a negative impact on implementers of products incorporating technology standards and consumers desiring those

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[68] *See* Paul Nikolich et al., *Standards for 5G and Beyond: Their Use Cases and Applications*, IEEE 5G (June 2017), https://5g.ieee.org/tech-focus/june-2017/standards-for-5g-and-beyond (discussing the development of 5G communications standards).

[69] These benefits that ameliorate the concern are often overlooked by those proposing reforms. *See infra* Section III.

[70] Consider the parallel SSO tracks of 3GPP and 3GPP2 standards, which caused problems for SSO participants and implementers alike. *See, e.g.*, Junko Yoshida, *Dual Paths to 3G a Vendor Headache*, EE TIMES (Mar. 6, 2001), http://www.eetimes.com/document.asp?doc_id=1143166.

[71] *See* McKenzie, *supra* note 66, at 155.

[72] *See* Kobayashi & Wright, *supra* note 19, at 4.

products because it allows SSO participants to engage in unfair behavior. The unfair behavior allegedly causes the production and purchases of these products to be unduly expensive. Two main theories have been presented to support this concern: patent hold-up and royalty stacking.[73] Patent hold-up theory hypothesizes that patent owners can use the possibility of an injunction to force implementers to pay what is alleged to be excessively high royalty rates to use the patented technology necessary to practice a standard.[74] Royalty stacking theory hypothesizes that since final products incorporating standardized technology, as sold to end users, incorporate a large number of patented innovations from a variety of firms, implementers are forced to pay an excessive "stack" of royalties that far exceeds the value of the underlying patented innovation.[75] The premise is that, if an owner of one of these patents requests a high royalty to allow use of a technology for which there is no substitute, all other patent owners would seek higher royalties as well. This cascade of higher royalties could then cause the total amount of royalty payments necessary to implement the standard and manufacture the product to skyrocket, resulting in a very high cost to the end user or a refusal by the implementer to manufacture the product at all because the royalty payments have become cost prohibitive.

Both patent hold-up and royalty stacking, however, are theoretical problems. The existence and extent of patent hold-up and royalty stacking have been questioned by numerous commentators due to a lack of evidence and even evidence to the contrary.[76] Despite this lack of evidence, many courts and commentators are nonetheless striving to "fix" these alleged problems; therefore, patent hold-up and royalty stacking will be described in more detail below.

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[73] *See, e.g.*, Mark A. Lemley & Carl Shapiro, *Patent Holdup & Royalty Stacking*, 85 TEX. L. REV. 1991, 2010–17 (2007).

[74] *See, e.g.*, J. Gregory Sidak, *Holdup, Royalty Stacking, and the Presumption of Injunctive Relief for Patent Infringement: A Reply to Lemley & Shapiro*, 82 MINN. L. REV. 714, 714 (2008) (citing Lemley & Shapiro, *supra* note 72, at 1992–93).

[75] *See id.* (citing Lemley & Shapiro, *supra* note 74, at 1993).

[76] *See e.g.*, Damien Geradin & Miguel Rato, *Can Standard-Setting Lead to Exploitative Abuse? A Dissonant View on Patent Hold-Up, Royalty-Stacking, and the Meaning of FRAND*, 3 EURO. COMPETITION J. 101, 101–02 (2007); Kirti Gupta, *The Patent Policy Debate in the High Tech World*, 9 J. COMPETITION L. & ECON. 827 (2013); F. Scott Kieff & Anne Layne-Farrar, *Incentive Effects from Different Approaches to Holdup Mitigation Surrounding Patent Remedies and Standard-Setting Organizations*, 9 J. COMPETITION L. & ECON. 1091 (2013).

Even the FTC Commissioner Maureen K. Ohlhausen has raised questions about whether these issues are problems in fact or just in theory. "Patent-holdup theory drove the FTC's recent interventions into the standard-setting arena ... Theory is all well and good, but what I did not see in [the cases I mentioned] was evidence that an SEP owner's pursuit of an injunction actually caused patent holdup. It was merely theorized." Maureen K. Ohlhausen, *The Federal Trade Commission's Path Ahead*, 2 CRITERION J. INNOVATION 31, 33 (2017).

a. Patent Hold-up

The concern behind patent hold-up in the technology standards space is that patent owners could force firms wishing to implement a standard an excessively high royalty rate to use the patented technology by relying on the fear of injunctive relief if the implementer fails to pay the royalty.[77] But patent hold-up is just as theoretically possible in the absence of standardization. Any time a property owner has a good that others want for which there is no perfect substitute, the owner could seek excessively high rates.[78] There are numerous markets that exhibit this characteristic, and yet market forces ensure that those seeking the good are able to fairly negotiate for access. The fact that market forces have successfully prevented hold-up in other circumstances helps underscore why the issue is simply theoretical in the case of standard-essential patents (SEPs).

Although critics make it seem as though patent hold-up is a regularly occurring phenomenon, it is by no means a natural by-product of standardization. Rather, actual holdup requires both opportunity and action by the patent holder.[79] With respect to opportunity, simply owning an SEP does not automatically create a situation where a patent holder can seek and obtain excessive royalties. Additionally, not all patents are created equal.[80] The value of the *technology* covered by the patent is what actually drives the royalty rates, not a patent's designation as an SEP.[81] Ultimately, seeking excessively high licensing rates poses many risks to patent owners that often overshadow the opportunity to do so. For instance, standardization is often a repeat-player game; if a patent holder acts in an unfair manner, it is unlikely that other firms will be willing to urge adoption of that patent holder's technology in future standard setting proceedings.[82] Additionally, there are risks for the patent holder in engaging in unfair negotiations with implementers. These implementers may also hold SEPs that the patent holder

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[77] *See, e.g.*, Sidak, *supra* note 75 (citing Lemley & Shapiro, *supra* note 72, at 1992–93).

[78] *See, e.g.*, Christopher B. Seaman, *Reconsidering the* Georgia-Pacific *Standard for Reasonable Royalty Patent Damages*, 2010 BYU L. REV. 1661, 1711 (2010) (discussing how non-infringing substitutes or lack thereof should factor into calculation of royalty rates for patent infringement damages).

[79] *See* Anne Layne-Farrar & Koren Wong-Ervin, *Methodologies for Calculating FRAND Damages: Part 1*, LAW360 (Oct. 8, 2014, 10:26 AM), https://www.law360.com/articles/584906/methodologies-for-calculating-frand-damages-part-1 [hereinafter Layne-Farrar & Wong-Ervin, *Methodologies for Calculating FRAND Damages*].

[80] *See, e.g.*, Jean O. Lanjuw et al., *How to Count Patents and Value Intellectual Property: The Uses of Patent Renewal and Application Data*, 46 J. INDUS. ECON. 405, 406 (1998) ("The importance of the innovations protected by individual patents varies widely.").

[81] *See* Layne-Farrar & Wong-Ervin, *Methodologies for Calculating FRAND Damages*, *supra* note 78.

[82] *See* Wright, *supra* note 47, at 802 (discussing the repeat-player nature of standards setting).

may need to cross-license or may be important firms for commercializing the patent holder's technology.[83] For these reasons and others, the supposed leverage of the patent holder to act unfairly is outweighed by many factors that decrease the likelihood of patent hold-up.

It is also important to understand that hold-up is a phenomenon that can occur on both sides of the licensing table. Hold-up requires lock-in. Standard-implementing companies with asset-specific investments can be locked into the technologies defined by the standards, but innovators that contribute technology to the standard can also be locked in if their technologies only have a market within the standard.[84] Patent owners can also enjoy a first-mover advantage if their technology is adopted quickly without time-consuming licensing battles: "As a result, patent owners who manufacture products using standardized technology may find it more profitable to offer attractive licensing terms in order to promote adoption of the product using the standard, increasing demand for its product rather than extracting high royalties."[85]

The flipside of patent hold-up is known as patent hold-out or reverse hold-up.[86] In these cases, the implementer may refuse to pay a reasonable royalty.[87] To more adequately capture this idea, some scholars are advancing the term "patent trespass" instead of hold-out or reverse hold-up; specifically, the term "captures the idea that the product of a technology implementer involves a 'relatively gross invasion' over a technology developer's patent claims."[88] Because injunctive relief is often unavailable to SEP owners as part of court and commentator efforts to "fix" patent hold-up, the patent owner has little recourse other than to sue the refusing implementer for

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[83] J. Gregory Sidak, *The Meaning of FRAND, Part I: Royalties*, 9 J. COMPETITION L. & ECON. 931 (2013) (explaining the value of cross-licensing to owners of SEPs).

[84] *See* Anne Layne-Farrar & Koren Wong-Ervin, *An Analysis of the Federal Circuit's Decision in* Ericsson v. D-Link, CPI ANTITRUST CHRON., Mar. 2015, at 1, 6, https://www.crai.com/sites/default/files/publications/An-Analysis-of-the-Federal-Circuits-Decision-in-Ericsson-v-D-Link.pdf [hereinafter Layne-Farrar & Wong-Ervin, *An Analysis of* Ericsson].

[85] *Prepared Statement of the Federal Trade Commission Before the U.S. Senate Committee on the Judiciary Concerning "Standard Essential Patent Disputes and Antitrust Law"*, FED. TRADE COMM'N 6 (July 30, 2013), http://www.ftc.gov/sites/default/files/documents/public_statements/prepared-statemetn-federal-trade-commission-concerning-standard-essential-patent-disputes-and/130730standardessentialpatents.pdf.

[86] *See* Kieff & Farrar, *supra* note 77, § IV(C).

[87] *See id.*

[88] *See* Bowman Heiden & Nicolas Petit, *Patent Trespass and the Royalty Gap: Exploring the Nature and Impact of 'Patent Holdout'* 30 (Hoover IP2, Working Paper No. 17010, 2017), http://hooverip2.org/working-paper/wp17010/. Heiden & Petit go on to theoretically and empirically examine the phenomenon of patent trespass, concluding "strong empirical backing to the theoretical proposition." *See id.* at 57.

payment of a reasonable royalty . . . the same thing it was seeking in the first instance.[89] In theory, this would be the rational strategy of all implementers.

As noted earlier, there is little to no empirical evidence of patent hold-up and no real-life examples the phenomenon or its supposed effects on innovation—it is a largely theoretical concern. Interestingly, however, there is work that contradicts the theory. For example, a recent paper by Galetovic and Haber demonstrates that the patent hold-up theory is based on a set of fallacies that undermine the viability of the theory.[90] Another paper empirically examines the alleged result of patent hold-up—slowing of innovation—and finds no support for the phenomenon.[91] Although this phenomenon is, at best, a theoretical problem and may not be a problem at all, courts and commentators continue to try to "solve" patent hold-up.

b. Royalty Stacking

Royalty stacking theory hypothesizes that many suppliers may sell complementary inputs to downstream firms, act non-cooperatively, and set a linear price, thereby charging more for the bundle of inputs than a single monopolist would because each supplier ignores that increasing her price reduces the profits of all other suppliers.[92] This problem is theoretically possible in the standardized technology arena, as many standard-compliant products incorporate technology from hundreds, if not thousands, of SEPs, owned by many different patent owners. In theory, excessive royalty rates can be stacked upon each other and result in an unsustainably high charge.[93] Royalty stacking is alleged to slow down product introduction, increase prices paid by consumers, and slow or derail subsequent innovation, with the ultimate downfall being market collapse.[94]

Data regarding royalty stacking is difficult to find because patent royalty rates are often protected by confidentiality agreements. Furthermore, even if

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[89] *See, e.g.*, Kieff & Layne-Farrar, *supra* note 77; Gregory J. Sidak, *The Meaning of FRAND, Part II: Injunctions*, 11 J. COMPETITION L. & ECON. 201, 236 (2015).

[90] *See* Alexander Galetovic & Stephen H. Haber, *The Fallacies of Patent Holdup Theory* (Hoover IP2, Working Paper No. 16009, 2017), http://hooverip2.org/working-paper/wp16009/.

[91] *See* Alexander Galetovic et al., *An Empirical Examination of Patent Hold-up* (Nat'l Bureau of Econ. Research, Working Paper No. 21090, 2015), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2583169. ("[T]he rate of innovation—as reflected in quality adjusted relative prices—has rarely, if ever, been faster than it is today in exactly those products that scholars agree are theoretically subject to . . . [patent] hold-up.").

[92] *See* Alexander Galetovic & Kirti Gupta, *Royalty Stacking and Standard Essential Patents: Theory and Evidence from the World Mobile Wireless Industry* 2 (Hoover IP2, Working Paper No. 15012, 2015), http://hooverip2.org/working-paper/wp15012/.

[93] *See id.* at 2.

[94] *See* Lemley & Shapiro, *supra* note 74, at 2022.

actual royalty rates are known, it would be difficult to determine what, if any, portion of the royalties are attributable to stacking of *excessive* royalties. As an example, consider the mobile phone industry. Estimates of royalty burden on products implementing ETSI's 3G GSM standard range from 10%–40% of the end product price and an estimated aggregate royalty burden on ETSI's 4G LTE standard of about 15% of the end product price.[95] Others have estimated the royalty "stack" on smart phone devices to be, absent cross-licensing, about $122 of the end product's price.[96]

However, whether these numbers, or even a portion of these numbers, are excessive is unknown. Instead, the only way to determine whether excessive royalty rates are being charged is to examine whether the expected negative effects are being seen, such as stagnating innovation and increased pricing. The determination of excessive royalty rates is further complicated because the appearance of excessive rates could instead be caused by the aggregate royalty burden, which simply reflects the accumulation of necessary SEPs and a burden that includes *supra-competitive* rates.[97] In any other industry, aggregate input costs are rarely given a second thought; consider the input costs of the many components needed to produce a car.[98] As long as the inputs for multi-component products are priced according to the value of the patented contribution to the end product, no SEP holder can be faulted either for hold-up or stacking.[99]

Looking at evidence in the mobile communications space, it appears that royalty stacking is not happening. For example, royalty stacking theory predicts that, as the number of SEP owners grows, sales of phones will decline (or at least stagnate despite increased quality of the technology).[100] However, between 1994 and 2013, sales of mobile communication devices

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[95] *See* Erik Stasik, *Royalty Rates and Licensing Strategies for Essential Patents on LTE (4G) Telecommunications Standards*, LES NOUVELLES, Sept. 2010, at 114, 114.

[96] *See* Ann Armstrong, Joseph J. Mueller & Timothy D. Syrett, The Smartphone Royalty Stack: Surveying Royalty Demands for the Components Within Modern Smart Phones 68 (2014) (unpublished manuscript), http://www.wilmerhale.com/uploadedFiles/Shared_Content/Editorial/Publications/Documents/The-Smartphone-Royalty-Stack-Armstrong-Mueller-Syrett.pdf. This study has been challenged by Keith Mallinson and Anne Layne-Farrar. *See* Kieth Mallison, *Smartphone Revolution: Technology Patenting and Licensing Fosters Innovation, Market Entry, and Exceptional Growth*, IEEE CONSUMER ELECTRICS MAG., Apr. 2015, at 60; Anne Layne-Farrar, *Patent Holdup and Royalty Stacking Theory and Evidence: Where Do We Stand After 15 Years of History?*, OECD.ORG (Nov. 18, 2014), http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/WD%282014%2984&doclanguage=en.

[97] *See* Layne-Farrar & Wong-Ervin, *An Analysis* Ericsson, *supra* note 85.

[98] *See id.*

[99] *See id.*

[100] *See* Galetovic & Gupta, *supra* note 93, at 4.

experienced a 62-fold increase.[101] Richard Epstein puts it even more colorfully, stating that the "notion that implementers . . . are being suffocated by an insurmountable patent royalty stack has turned out to be nothing more than horror fiction" and supports his claim pointing to multiple large companies that have recently entered the mobile communication device field.[102]

Similarly, royalty stacking theory predicts that as the number of SEP owners grows, the price of devices will increase or (if quality increases demand) at least stagnate.[103] However, between 1994 and 2013, the average price of mobile devices fell between -11.4% and -24.8% a year.[104] Royalty stacking theory predicts that as the number of SEP owners grows, SEP owners' and downstream manufacturers' profit margins will fall, but researchers found no downward trend in gross margin.[105] And finally, royalty stacking theory predicts that as the number of SEP owners grows, the number of device manufacturers will decrease and industry concentration will rise.[106] The exact opposite appears to be happening; the number of device manufacturers has increased from one in 1994 to forty-three in 2013, and the concentration has fallen.[107]

Despite the uncertainty about the existence and extent of these concerns, courts and commentators are still striving to "fix" patent hold-up and royalty stacking. Section III below explains how courts and commentators are attempting to address these problems and why the solutions are worse than the actual problem. In part, the solutions fail because they are based on a distinct lack of understanding of how standard setting organizations actually function. The next part of this article seeks to explain how SSOs work with the intention to alleviate the knowledge deficit surrounding them.

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[101] *See id.* at 5. In 1994, there was one manufacturer that sold 29 million phones; by 2013, there were fourty-three manufacturers that sold 1,810 million phones. *See id.*

[102] *See* Richard A. Epstein & Kayvan B. Noroozi, *Why Incentives for "Patent Holdout" Threaten to Dismantle FRAND, and Why It Matters* 27 (Hoover IP2, Working Paper No. 17006, 2017), https://hooverip2.org/wp-content/uploads/ip2-17006-paper-1.pdf.

[103] *See* Galetovic & Gupta, *supra* note 101, at 4.

[104] *See id.* at 5.

[105] *See id.*

[106] *See id.*

[107] *See id.* For an excellent summary of Galetovic & Gupta's paper, see Devil Hartline & Matthew Barblan, *Deunking the Royalty Stacking Theory: Real-World Evidence from the Mobile Wireless Industry*, CTR. PROTECTION OF INTELL. PROP. (Jan. 2016), https://sls.gmu.edu/cpip/wp-content/uploads/sites/31/2016/01/Hartline-Barblan-Debunking-the-Royalty-Stacking-Theory.pdf.

B. How SSOs Operate

The purpose of an SSO is to solve a technological problem or reach a desired technical outcome, be it related to interoperability, safety, or some other criteria.[108] To achieve this purpose, SSO participants engage in an extended and iterative process that involves both collaboration and consensus building. To better understand this process, this subpart first looks at what types of entities participate in SSOs. Next, the logistics and mechanics of standard setting are explored to explain how SSO participants collaborate and build consensus. Finally, this subpart concludes by discussing a number of relevant policies and procedures that govern SSO operations, particularly those that have been implicated in the negative aspects of standardization, including patent hold-up and royalty stacking.

The makeup of participants in any given SSO is diverse. However, there are a few discrete categories into which most participants will fall: firms, universities, government, individuals, and public interest groups.[109] Firms are by far the most prevalent group. Most SSOs include a large number of private companies, many of which may be competitors with each other.[110] Although this group is the most numerous, it is also the most heterogeneous. Firms that participate in SSOs include companies devoted to technology development, companies that manufacture components, companies that manufacture or market consumer products, companies that provide services or infrastructure, and companies that do any mix of the above.[111] Universities and government agencies also regularly participate in SSOs, although with less frequency than private firms, given the limited budgets under which these entities often operate.[112] SSOs have varying rules about whether individuals are permitted to participate, with many SSOs prohibiting individual participation.[113] Finally, public interest groups or other non-profit organizations may be SSO participants, although their participation is more common with SSOs that are directed towards health and safety issues.[114]

These diverse participants work together to develop standards through a complicated process, which from the outside may seem a bit like sausage

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[108] *See* Daniel S. Sternberg, *A Brief History of RAND*, 20 B.U. J. SCI. 211, 223 (2013).

[109] *See* Updegrove, *supra* note 39, § 3.2.

[110] *See* Kesan & Hayes, *supra* note 32; Updegrove, *supra* note 39, § 3.2.1; *see also* Lemley, *supra* note 28, at 1947 ("[SSOs] are built on agreement among horizontal competitors.").

[111] *See* Updegrove, *supra* note 39, § 3.21.

[112] *See* Miller, *supra* note 32, at 364 (noting that members of SSO working groups include "volunteers from the interested firms (and sometimes from government agencies and academic departments) who are technical, not legal or business, experts"); Updegrove, *supra* note 39, §§ 3.2.2–3.2.3.

[113] *See* Updegrove, *supra* note 39, § 3.2.4.

[114] *See id.* § 3.2.5.

making—a mix of stuff goes in and a single cohesive thing comes out that is better than the sum of its parts. Sausage making, however, is much less complicated. At any given point during the standard setting process, which often takes multiple years, there are many levels of activities occurring involving a variety of different actors. For one example, consider the Third Generation Partnership Project, or 3GPP. This organization was formed in 1998 to develop a common wireless system for Europe, Asia, and North America.[115] It brought together seven telecommunication SSOs and is responsible for generating the standards endorsed by the member SSOs.[116] One of the seven SSOs, ETSI, is in charge of the day-to-day management of 3GPP.[117] Membership is voluntary and members choose the technologies that become standards by consensus or majority voting.[118] Nearly 500 organizations participated in the development of the standards, spending around 3.5 million man-hours attending some 850 working group meetings.[119]

Most SSOs will have an overarching technology theme—such as 3GPP telephony or Wi-Fi. Under that penumbra, there are usually a number of sub-tracks or groups concerned with addressing particular objectives or solving specific issues within that technology space. For example, the 3GPP SSO has four technical specification groups, each organized around a particular technical area within mobile telephony.[120] The objectives for the subgroups are then further broken into a multitude of specific goals or features, each representing an aspect or functionality to be added to the standard.[121] These specific goals are then assigned to a particular working group.[122] It is within these smaller working groups that most of the technical activity occurs.[123]

A common misunderstanding about SSOs is the belief that much of the work is done by business and legal experts. In reality, the working groups, where the true work of the SSOs is done, are generally comprised of engineers and technical experts, as the emphasis of any working group's

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[115] *See, e.g.*, Kirti Gupta, How SSOs Work: Unpacking the Mobile Industry's 3GPP Standards (Nov. 2017) (unpublished manuscript), https://ssrn.com/abstract=3063360.

[116] *See id.*

[117] *See id.*

[118] *See id.*

[119] *See id.*

[120] *See* Justus Baron et al., *Unpacking 3GPP Standards* § 4.1 (Nw. L. & Econ., Research Paper No. 18-09, 2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3119112. The four technical specification groups (TSGs) include RAN (Radio-Access Network), SA (Service and System Aspects), CT (Core Network and Terminals), and GERAN (GSM/EDGE Radio Access Network). *Id.*

[121] *See id.*

[122] *See id.*

[123] *See id.*

activity is seeking the best technological solution to implement a specific feature or solve a given problem.[124] Consider this description of the activity and participants involved with W3C (World Wide Web Consortium), a standards organization devoted to internet issues: "Historically, W3C and IETF have viewed their role as primarily limited to technical protocols" and have focused "their activities to closely align with the skills and roles of computer scientists and engineers."[125] Technology is always at the front and center of standard setting, even where the issue moves beyond the strictly technical. For example, working group discussions may involve the societal impact and policy issues created by technology, such as concerns of privacy regarding the internet.[126] At bottom, the real issue is always the technology. This focus on developing technical protocols and assessing submitted technology proposals is also one reason why some SSOs do not allow participation by individuals, who may or may not have the technological skills necessary to fully participate.[127]

Each SSO may have slightly different mechanisms, but standard setting will proceed generally as follows. SSO participants can submit technological proposals related to any open aspect or functionality being developed by the SSO.[128] The working group assigned to that aspect will then review and evaluate the submitted technology proposals.[129] Through a series of collaborative and iterative discussions that may involve accepting, rejecting, and even seeking changes to the submitted technology proposals, the working groups determine the best technologies to implement the relevant portion of the standard.[130] Working groups may meet multiple times a year, in person or virtually, to discuss the merits of the various submitted technology proposals.[131]

For example, working groups involved in the development of the 3GPP standard met approximately six to eight times per year over the course of multiple years.[132] The submissions ultimately selected by a working group

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[124] *See* Sternberg, *supra* note 109, at 213–14.

[125] *See* Nick Doty & Deidre K. Mulligan, *Internet Multistakeholder Processes and Techno-Policy Standards: Initial Reflections on Privacy at the World Wide Web Consortium*, 11 J. TELECOMM. & HIGH TECH. L. 135, 140–141 (2013).

[126] *See id.* ("[P]rotocols inevitably embed values and that they [the engineers] must consider the impact of their protocols on important societal outcomes.").

[127] *See* Baron et al., *supra* note 121.

[128] For more information about how this works in one particular SSO, see Kirti Gupta, *Technology Standards and Competition in the Mobile Wireless Industry*, 22 GEO. MASON L. REV. 865, 878 (2015).

[129] *See id.*

[130] *See id.* at 866.

[131] *See id.* at 878–79.

[132] *See id.* at 878.

are then presented to the larger subgroup for that technical area, which may result in further collaboration and iterative discussion of the merits. The subgroups of the 3GPP standard met two to four times annually, again over the course of many years, to consider the working groups' recommendations.[133] To keep all of this simultaneous activity organized, the working groups and subgroups may be coordinated by yet another group or, alternatively, an administrative arm of the SSO.

The proposals submitted by SSO participants are known as contributions and consist of technical specifications and details.[134] It is not unusual for hundreds of these contributions to be submitted and discussed in the process of developing just one single technical aspect or feature of the much larger standard.[135] Generally, the contributions are submitted in advance of working group meetings and distributed to members of the working group. At working group meetings, the contributions are presented and discussed by the attendees. The purpose of these meetings is to reach consensus.[136] To achieve consensus, the discussions at these meetings may result in revisions to the technical contributions in order to address any other member's concerns. This process may take many iterations, multiple revisions, and several months (or even years) to arrive at what ultimately becomes the selected standard.[137] Interestingly, although each working group may be populated by representatives from several different SSO participants, very few firms actively submit contributions.[138] Other SSO participants are content to participate by reviewing, discussing, and helping choose from the submitted contributions.

Technology underlying the contributions submitted by SSO participants is often protected by patents or patent applications pending while the standard is being developed.[139] The status of the technology, vis a vis intellectual property protection, however, is not the focus. The working groups discussing the merits of technology contributions are generally engineering or technical experts; the focus of these working groups is selecting the best

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[133] *See id.*

[134] *See* Baron et al., *supra* note 121.

[135] *See id.*

[136] *See* Gupta, *supra* note 129. In some SSOs, failure to reach consensus can be overcome by a supermajority vote. *See id.*

[137] *See* Baron et al., *supra* note 121. The authors of that paper have extensive data about the number of contributions, man hours, etc., spent in developing various aspects of the 3GPP standard. *See* Baron et al., *supra* note 119.

[138] *See* Gupta, *supra* note 129, at 870–71. Gupta studied data from 3GPP standard setting activities and found only approximately 30% of SSO participants made even a single technology contribution and fewer still consistently submitted technology to the working groups. *See id.*

[139] NAS PATENT CHALLENGES, *supra* note 7.

technological solution to achieve the desired outcomes, regardless of the value that being incorporated into a standard would provide to any particular company or individual.[140] During the discussion of standards technology at the working group level, participants may not even know which SSO participants have contributed technology covered by intellectual property protection.[141] Some SSOs specifically discourage discussion of intellectual property rights at this level to avoid antitrust liability.[142] As such, it is not until after the standard is agreed upon and consensus is reached that patent ownership and licensing concerns move to the forefront.[143]

The existence of patents covering standardized technology can lead to tension between the SSO participants holding patents and implementers of standards-compliant products. Patent owners will rationally want to seek an economic return on the investments made for research and development of the technology they contribute to the standard, while implementers will rationally hope to access the patented technology on the cheapest terms possible.[144] To address this tension as well as alleviate potential antitrust concerns, SSOs utilize a number of policies to encourage transparency and openness, particularly with respect to intellectual property rights.[145]

Policies regarding intellectual property rights (IPR) vary widely amongst different SSOs. Unfortunately, many IPR policies began as ad hoc arrangements and have been haphazardly amended, resulting in what are often confusing and inconsistent documents.[146] Regardless of what any given SSO's IPR policy looks like, the two most salient issues for the purposes of this discussion are disclosure of IPR and licensing of IPR. Disclosure policies will describe whether and what amount of disclosure is required by the SSO, as well as whether a firm is required to affirmatively search for relevant intellectual property to disclose.[147] Licensing policies will describe what licensing terms are permitted as well as what licensing terms are required for SEPs.[148] IPR policies that govern the conduct of SSO participants are enforceable contract commitments.[149]

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[140] *See* Miller, *supra* note 32, at 364–65.

[141] *See id.* at 365.

[142] *See* Lemley, *supra* note 28, at 275 ("[M]any SSOs discourage any discussion of patents or potential licenses for fear of antitrust consequences.").

[143] *See* Sternberg, *supra* note 109, at 213–14.

[144] *See id.*

[145] *See* Lemley, *supra* note 28, at 1959–60.

[146] *See id.* at 1956.

[147] *See id.* at 1943.

[148] *See id.* at 1973. Lemley also used these factors in an empirical study of SSO IPR policies. *See id.*

[149] *See* Tsai & Wright, *supra* note 59, at 158.

1. Disclosure and Search

Most SSO IPR policies have provisions requiring disclosure to the SSO of relevant intellectual property held by each SSO participant.[150] Many SSOs only require disclosure of patents known to a designated group of people, such as the engineers participating in a working group or the company's legal or patent department.[151] Other SSOs also impose on participants an affirmative duty to search their intellectual property portfolios to discover potentially relevant rights.[152] The purpose of disclosure and search provisions is to avoid possible patent hold-up issues by permitting the SSO to seek alternative technological solutions that may not be covered by patents held by SSO participants.[153] These disclosure and search provisions, however, do not alert SSOs to IPR held by non-SSO participants.[154]

Whether the provision relates to disclosure or search, the inquiry seeks to identify technology that is essential to practice the standard, or "standard essential patents" (SEPs).[155] Whether a technology is essential to practice a standard can be construed literally, in that there is no other technological alternative available to implement the standard, or commercially, if there is instead no economically viable alternative.[156] These determinations of the essential nature of technology are made by the patent owners and are not generally reviewed by the SSO.[157]

One problem with these disclosure and search provisions is the wide variety and ambiguity in rules. Some ways these provisions vary between SSOs include whose patents must be disclosed, what qualifies as an essential patent claim, when disclosures must be made during the standards development process, whether blanket (non-patent specific or non-claim

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[150] *See id.*

[151] *See* Jorge L. Contreras & Andrew Updegrove, *A Practical Guide to Patent Policies of Standards Development Organizations*, STANDARDS ENGINEERING, Nov.–Dec. 2015, at 1, 3.

[152] *See id.*

[153] *See* Kobayashi & Wright, *supra* note 19, at 11–12.

[154] *See id.* at 12.

[155] "[A] patent is considered standard essential when it is declared or incorporated into an industry standard . . . subsequently requiring manufacturers to license the patent for any technology that implements the standard." MAUREEN K. OHLHAUSEN, COMM'R, RECENT DEVELOPMENTS IN INTELLECTUAL PROPERTY AND ANTITRUST LAWS IN THE UNITED STATES, FED. TRADE COMM'N 2 (2013).

[156] *See* Contreras & Updegrove, *supra* note 152, at 3. Contreras and Updegrove note that some SSOs restrict "essential" claims to those that are "required or mandatory elements" of the standard but not to optional elements while other SSOs consider a patent essential if necessary to implement the entire standard. *See id.* They further note that some SSOs define "essential" to mean "technically essential" (i.e., a product cannot conform to the standard without infringing) while other SSOs include "commercially essential" (i.e., a standard cannot be implemented in a commercially viable way without infringing). *See id.*

[157] *See id.*

specific) disclosures are sufficient, to whom the disclosed information is provided, and whether there is an obligation to update disclosures, for example, as the standard evolves or if a patent issues or is ultimately denied.[158] Policies also differ as to whether disclosure requirements refer to only patents or also to pending applications.[159] The variety and uncertainty of requirements can increase the cost for SSO participants to comply, especially if they participate in multiple different SSOs, each having differing obligations.

Even where the disclosure and search provisions are perfectly clear, these requirements place significant burdens on SSO participants, in terms of time and resources required to identify and disclose essential patents. Additionally, certain policy choices made with respect to these provisions may increase or decrease the burden on SSO participants. One example that impacts the burden significantly is whether the SSO participant can simply disclose essential patents or whether the disclosure must identify particular claims within each patent designated essential.[160] Clearly it is a much higher burden to read each identified patent and enumerate the claims implicated. This burden increases exponentially for larger, more innovative firms holding many possible SEPs. While small firms with few patents that participate in only one or two SSOs may face only a small inconvenience for compliance, the more typical example would be a large company with thousands of patents in its portfolio that participates in multiple SSOs. In that case, the burden can be extraordinary.[161]

It would seem that SSO participants would have an incentive to under-disclose. After all, if the point of these provisions is to permit SSOs to select technologies free from patent encumbrances, failure to disclose may increase an SSO participant's chances of having its technology selected, allowing for potential additional revenue streams associated with licensing. However, there are significant penalties for non-designation of SEPs.[162] For example, SSOs may require an SSO participant who failed to timely disclose SEPs to grant royalty-free licenses on the non-disclosed patents to all implementers.[163] Courts may punish SSO participants for failure to disclose,

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[158] *See* NAS PATENT CHALLENGES, *supra* note 7, at 4.

[159] *See* Kobayashi & Wright, *supra* note 19, at 11.

[160] *See* Contreras & Updegrove, *supra* note 152.

[161] *See id.* ("For such companies, conducting a conscientious patent review in connection with every draft standard could consume the full time of a very large team of attorneys."); *see also* Kesan & Hayes, *supra* note 32, at 245.

[162] *See* Contreras & Updegrove, *supra* note 152, at 4–5.

[163] *See id.* at 3. SSOs may also impose other penalties, such as suspension of participation or rejection of technical contributions. *See id.* at 5.

for example, by holding non-disclosed SEPs to be unenforceable or declining to issue an injunction for infringement of these patents.[164] Firms also have significant incentives to maximize the number of SEPs they hold.[165] The penalties for non-disclosure and the incentives to disclose may actually result in over-disclosure.[166] Additionally, the policies of the SSOs themselves may contribute to over-disclosure in requiring participants to declare all patents that might potentially be considered an SEP.[167]

2. Licensing

In addition to disclosure and search policies, SSOs use licensing provisions to ease tensions between patent-owning SSO participants and implementers wishing to make and sell products that embody the standardized technology. The most important provisions are those that require SSO participants to license their patented technology to any implementer for either a reasonable royalty or for no royalty at all. Other licensing terms may also be mandated or encouraged by SSOs.

SSO licensing provisions also vary widely and are some of the more contentious issues with respect to SSOs today. As noted above, most SSOs require participants to identify known SEPs. Although some SSOs will attempt to create standards not encumbered by any patents, others will allow technology covered by patents to be incorporated into a standard.[168] SSOs that do not prohibit incorporation of SEP technology typically require the patent holder to sign a Fair, Reasonable, and Non-Discriminatory (FRAND) licensing commitment.[169] This compromise allows participants to seek patent rights for their technical contributions and investments made during the standard setting process as an incentive to participate and contribute, while still permitting other participants, and even non-participants, to practice the resulting standard once developed. For example, the American

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[164] *See id.* at 5.

[165] *See id.* at 2.

[166] *See, e.g.*, *Analysis of Patents Declared as Essential to GSM as of June 6, 2007*, FAIRFIELD RESOURCES, INC. (Dec. 31, 2007), http://frlicense.com/GSM_FINAL.pdf; David J. Goodman & Robert A. Myers, *3G Cellular Standards and Patents*, 1 INT'L CONF. ON WIRELESS COMM. NETWORKING, & MOBILE COMPUTING 415, 415–18 (2005).

[167] *See* Marc van Audenrode et al., Over-Declaration of Standard Essential Patents and Determinants of Essentiality (Oct. 28, 2017) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2951617.

[168] *See* Contreras & Updegrove, *supra* note 152, at 2.

[169] *See* Kesan & Hayes, *supra* note 32, at 244. At least one federal judge has noted that "the word 'fair' adds nothing to 'reasonable' and 'nondiscriminatory.'" *See* Apple, Inc. v. Motorola, Inc., 869 F. Supp. 2d 901, 912 (N.D. Ill. 2012) (Posner, J., sitting by designation), *rev'd on other grounds*, 757 F.3d 1286 (Fed. Cir. 2014). The terms RAND and FRAND are often used interchangeably.

National Standards Institute IPR policy states there is "no objection in principle" to an American National Standard that includes "an essential claim (one whose use would be required for compliance with that standard)" so long as there are adequate technical justifications and so long as the patent holder has provided a FRAND declaration.[170] Similarly, the SSOs that comprise the 3GPP organizations require firms to declare patents that are potentially essential to implementation of the standards.[171]

Some SSOs provide guidance as to the meaning of "reasonable," while others do not.[172] In some cases, SSOs may require patent owners to make a uniform FRAND assurance available to all implementers; other SSOs may allow patent owners more freedom to license within the spirit of these terms.[173] Regardless of how the FRAND commitment is expressed to the SSO, after the standard is selected, SSO participants must then negotiate a FRAND licensing rate with any implementer wishing to use the standardized technology.[174] FRAND rates are determined on the facts of each case.[175] Since FRAND contracts are willing agreements between highly competent parties, "it logically follows that such agreements, correctly interpreted, must generate valuable benefits to innovators and implementers alike."[176]

On the other hand, some SSOs will include patented technology in a standard only if the patent holder either agrees to grant royalty-free licenses to implementers or agrees not to enforce its patent rights against implementers of the standard. For example, the IPR policy for the W3C standard states "to promote the widest adoption of Web standards . . . [it] will not approve a Recommendation if it is aware that Essential Claims exist which are not available on Royalty-Free terms."[177] Much has been written about FRAND issues, particularly from the perspective that FRAND declarations exist to protect implementers; however, some more recent literature is contradicting that viewpoint.[178] This misunderstanding of the

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[170] *See ANSI Essential Requirements: Due Process Requirements for American National Standards*, AM. NAT'L STANDARDS INST. § 3.1 (Jan. 2017), https://share.ansi.org/shared%20documents/Standards%20Activities/American%20National%20Standards/Procedures,%20Guides,%20and%20Forms/2017_ANSI_Essential_Requirements.pdf.

[171] *See* Galetovic & Gupta, *supra* note 93, at 7.

[172] *See* Tsai & Wright, *supra* note 59, at 7.

[173] *See id.*

[174] *See* Kesan & Hayes, *supra* note 32, at 244.

[175] *See* Contreras, *supra* note 15, at 172. Factors to be considered include market norms for royalties, as well as non-monetary details such as grant backs, reciprocity, defensive suspension, and confidentiality. *See id.* (citing STANDARDS DEVELOPMENT PATENT POLICY MANUAL 57 (Jorge L. Contreras ed., 2007)).

[176] Epstein & Noroozi, *supra* note 103, at 2.

[177] *W3C Patent Policy*, W3C (Feb. 5, 2004), https://www.w3.org/Consortium/Patent-Policy-20040205/.

[178] *See* Epstein & Noroozi, *supra* note 103, at i ("An increasing number of judges, legislators and

purpose of FRAND commitments is implicated in the reform proposals discussed below.

Other policies related to licensing terms are even more varied and potentially more ambiguous. Some of these terms include what specific limitations are imposed by a commitment to FRAND; what is meant by the terms fair, reasonable, and non-discriminatory; whether a maximum royalty must be posted ex ante; how FRAND applies to portfolio licenses and cross-licenses; how non-royalty licensing terms (e.g., grant backs, geographical or field use limitations, etc.) are treated; and whether royalty-free licensing is encouraged or required.[179]

These varied and ambiguous terms can be quite problematic. Take, for example, the recent movement by the Institute for Electrical and Electronics Engineers (IEEE) to require ex ante disclosure of licensing terms. IEEE is a large organization, boasting over 400,000 individual members across the world and engaging in a variety of activities, including professional development and education.[180] Through the IEEE Standards Association (IEEE-SA), the organization also engages in standard setting activities in fields ranging from information and communication technology (ICT) to networking to electrical power and more.[181] Prior to the 1990s, IEEE permitted inclusion of patented technology in an IEEE standard if the patent holder agreed to FRAND licensing terms and assured that "the technology will be made available at nominal competitive costs to all who seek to use it for compliance with [the] standard."[182] Disclosure of ex ante licensing terms was permitted, but not required.[183] Later, the permissive disclosure clause of the IEEE policy was removed; instead, in the policy version approved in January 2005, disclosing the terms or costs of licensing specific patents was specifically prohibited.[184] IEEE members remained dissatisfied with the vagueness of the organization's FRAND licensing provision and the inability to compare costs when debating the merits of adopting a particular technology, and so, in 2006, additional amendments were made to the policy,

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scholars wrongly believe that the FRAND commitment was principally created to advance the interests of technology implementers.").

[179] *See* NAS PATENT CHALLENGES, *supra* note 7, at 4.

[180] *See IEEE at a Glance*, IEEE, https://www.ieee.org/about/today/at_a_glance.html (last visited Apr. 5, 2018).

[181] *See About the IEEE Standards Association*, IIEE STANDARDS ASS'N, http://standards.ieee.org/about/ieeesa.html (last visited Apr. 5, 2018).

[182] *See* Contreras, *supra* note 15, at 10–11.

[183] *See id.*

[184] *See id.*

allowing optional ex ante disclosure of licensing terms.[185] This remained the stance of IEEE until 2015.

In 2015, however, and with the "encouragement and subsequent blessing of the Antitrust Division of the DOJ," IEEE became the first SSO to closely regulate FRAND royalty calculations and other licensing terms for patents included in the SSO's standards.[186] The stated purpose of the amendments to IEEE's patent policy was to address patent hold-up and royalty stacking,[187] but the resulting changes went much further. Instead, the amendments broadened the binding nature of the FRAND commitment made by SSO participants, diminished the ability to enforce SEPs by restricting availability of injunctive relief, and suppressed royalty rates that SEP owners would be permitted to charge.[188] Additionally these provisions recommend that reasonable royalty rates be based on the smallest saleable patent practicing component, a practice that is often used by courts but is misaligned with normal licensing practices between businesses.[189]

In general, the minimum goal of IPR policies, whether related to search and disclosure or licensing, is to ensure that all essential patent claims are reasonably known to SSO participants and are available for licensing to implementers of the standardized technology.[190] The flipside is that IPR policies must not be too onerous or too vague for SSO participants to comply;[191] if SSO participants are unclear on how to satisfy the policies or unhappy with burden associated with compliance, they may decline to participate in standard setting. IPR policies must also not unfairly or excessively diminish the rights that typically accompany ownership of patents or innovative firms that regularly seek patents will be disinclined to participate in SSOs. This is not simply an academic theory; empirical work done by Ron Katznelson following the adoption of the IEEE IPR policy amendments described above indicates a significant decline in participation and the delay of some working groups due to failures to agree to the new policies.[192]

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[185] *See id.*

[186] *See* Sidak, *supra* note 16, at 49.

[187] *See id.* at 50.

[188] *See* Sidak, *supra* note 16, at 50. Sidak argues that these provisions look potentially like price fixing and other non-competitive behavior; IEEE sought and received a favorable business review letter from the DOJ's Antitrust Division regarding these policies. *See id.* at 50–51.

[189] *See id.* at 59.

[190] *See* NAS PATENT CHALLENGES, *supra* note 7, at 4.

[191] Additionally, the SSO's policies must not be inconsistent with a firm's own policies. *See, e.g.*, Contreras & Updegrove, *supra* note 152, at 1.

[192] *See* Ron D. Katznelson, Presentation of IEEE's Controversial Policy on Standard Essential Patents at the Symposium on Antitrust, Standard Essential Patents, and the Fallacy of the Anticommons Tragedy,

When fewer firms participate in SSOs, it may weaken any standard that results.[193] This decline in quality may be due to lesser contributions being available for consideration, less rigorous discussions during the selection of contributions to incorporate into the standard, or both. Studies have shown that SSO participants do engage in "forum shopping" when deciding to participate in an SSO and are more likely to choose SSOs with less rigid IPR policies and other participant-friendly provisions.[194] That said, SSOs also must have policies that are attractive to implementers; after all, standards are most valuable to everyone when adopted widely.[195]

C. Examples of SSOs

SSOs exist in a wide range of industries, from ICT (Information and Communications Technology) to health care to education and beyond. From interoperability and interconnectivity to safety and specifications, the world we live in today would be quite different without SSOs. This section highlights a few different SSOs to illustrate the diversity and importance of the roles SSOs play in our society.

As noted above, one well known SSO is 3GPP, or the Third Generation Partnership Project. Standards developed and maintained by this SSO have become a household name, as we regularly use the terms 4G and LTE to talk about our ever-present wireless phones. Some of the member firms develop communications technology, while others create products utilizing the technology.[196] These firms may make devices, such as smartphones or tablets, or network infrastructure, such as base stations and servers.[197] Still other member firms specialize in deploying large networks or providing wireless services to customers.[198] It is from this wide membership pool that technology contributions are received, based on that particular members' expertise. Without the standards developed by 3GPP, we would likely not

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Berkeley, CA (October 29, 2016), http://bit.ly/IEEE-LOAs.

[193] Although there are few instances of SSO participants leaving SSOs, the possibility is quite real. See, for example, the case of the SSO VITA, who adopted an ex ante disclosure policy in 2007. *See* Contreras, *supra* note 15, at 174–75. Motorola opposed this policy, arguing that the policy would discourage participation and result in lower quality standards. *See id.* When the policy was adopted, Motorola withdrew from participating in VITA. *See id.*

[194] *See* Tsai & Wright, *supra* note 59, at 161 (discussing Josh Lerner & Jean Tirole, *A Model of Forum Shopping*, 96 AM. ECON. REV. 1091 (2006)).

[195] *See* Tsai & Wright, *supra* note 59, at 168.

[196] *See* Galetovic & Gupta, *supra* note 93, at 19.

[197] *See id.*

[198] *See id.*

enjoy the level of interconnectivity and interoperability we enjoy using our wireless devices.

Another SSO mentioned above is the IEEE, or Institute for Electrical and Electronics Engineers. The IEEE traces its roots back to 1884 and early professional engineering societies.[199] Through the IEEE Standards Association (IEEE-SA), the organization engages in standard setting activities.[200] IEEE standards cover a wide range of technologies, from computer networking and communications, to electrical safety, equipment disposal, batteries, Smart Grid technology, and transportation.[201] Some of "the best-known IEEE standards today are the 802.3 Ethernet standard series and the 802.11 Wi-Fi wireless networking standards."[202] These networking standards have definitely changed the way we work and play as the level of ubiquity of these standards supports our connected lifestyles. However, even standards that are not as well-known also have great influence over how we live and the technologies we enjoy. For example, some IEEE standards also cover, among other things, the batteries that power our connected gadgets as well as safety aspects of these electronic devices.[203]

Although the standards that are most familiar to people are in the information and communications technology space, especially as related to consumer electronics generally and mobile telephony, nearly every area of our lives benefits from SSOs and the standards these organizations create. Some of these standards make our lives easier or more convenient by facilitating interconnectivity or interoperability behind the scenes. One example is the Health Level Seven International (HL7) standards that define how electronic medical information is structured and shared between health care systems.[204] These standards enhance our experience by allowing a primary doctor to share information with an emergency room doctor, or a medical imaging facility, or the billing department, and more without requiring the patient to repeat his medical history or insurance data at every step of the treatment process.[205] Other standards are important to ensure our

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[199] *See* Jorge L. Contreras, *An Empirical Study of the Effects of* Ex Ante *Licensing Disclosure Policies on the Development of Voluntary Technical Standards* 10 (Nat'l Inst. of Standards and Tech., Working Paper No. GCR 11-934, 2011), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1916743.

[200] *See id.*

[201] *Id.*

[202] *Id.*

[203] *See, e.g., IEEE/AIEE 36-1928—AIEE Storage Batteries (Revised)*, IEEE, https://standards.ieee.org/findstds/standard/36-1928.html (last visited Apr. 5, 2018) (describing just one of many types of standards related to batteries by the IEEE).

[204] *See About HL7*, HEALTH LEVEL SEVEN INT'L, http://www.hl7.org/about/index.cfm (last visited Apr. 5, 2018).

[205] For a short video explaining how HL7 standards work, see iNTERFACEWARE, *How Does HL7*

safety and comfort. One example is the standards developed and maintained by the National Fire Protection Association (NFPA). NFPA has standards covering everything from fire extinguishers and sprinkler systems to safety systems for parking garages and dry-cleaning facilities to processing and storing flammable materials, and more.[206] While we may be less familiar with these, and other, standards, it is clear that standards touch and improve many aspects of life today.

With a better understanding of SSOs and how essential these organizations and the standards they develop and maintain are to everyday life, this article will now turn to patent pools.

III. PATENT POOLS

Unlike SSOs, which are convened to solve technological problems as described above, patent pools exist to solve legal and business problems, such as alleviating concerns about overlapping patent rights and providing one-stop shopping for implementers of a certain technology.[207] However, just as many courts and commentators do not understand SSOs and how they operate, these same courts and commentators do not understand patent pools and, most importantly, how they differ from SSOs. In fact, courts and commentators often conflate or confuse the two different entities. This section will explain patent pools in some detail to help make the demarcation between patent pools and SSOs clearer.

A. Benefits of Patent Pools

A patent pool is "an arrangement under which patent holders in a common technology or market commit their patents to a single holder who then licenses them out to the original patentees and perhaps also to outsiders."[208] Patent pools are valuable because today's complex products are generally assemblies of multiple separate components.[209] It is not uncommon for each of these separate components to be covered by one or

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Work?, YOUTUBE (Dec. 19, 2009), https://www.youtube.com/watch?v=qewOJPxz4-c.

[206] *See List of NFPA Codes and Standards*, NATIONAL FIRE PROTECTION ASSOCIATION, http://www.nfpa.org/Codes-and-Standards/All-Codes-and-Standards/List-of-Codes-and-Standards (last visited Apr. 5, 2018).

[207] *See* Sternberg, *supra* note 109, at 223–24.

[208] *See* Erik Hovenkamp & Herbert Hovenkamp, *Patent Pools and Related Technology Sharing*, *in* THE CAMBRIDGE HANDBOOK OF ANTITRUST, INTELLECTUAL PROPERTY, AND HIGH TECH § 18 (Roger Blair & D. Daniel Sokol eds., 2017), https://ssrn.com/abstract=2645905.

[209] *See, e.g.*, Robert P. Merges & Michael Mattioli, *Measuring the Costs and Benefits of Patent Pools*, 78 OHIO ST. L.J. 281, 284 (2017).

more patents, and these patents may be held by many different companies.[210] In order for a manufacturer of the complex product to legally assemble the product, he must obtain a license from each of the many varying companies to make, use, and/or sell the component technology.[211] As can be imagined, it may be expensive in terms of time and money to obtain these licenses—a business problem. In fact, if the transaction costs are too high, it may not be feasible to procure the necessary licenses. In that case, a manufacturer has to choose between not making the product at all or risking patent infringement liability for going forward without permission. Similarly, the multiple patents of varying scope held by diverse patent owners can result in overlapping patent rights—a legal problem. Patent pools exist to address these issues and other coordination problems.[212]

This phenomenon of patent rights held by multiple, diverse patent owners is not unusual in fields where technology standards are present. This is because each of the SSO participants who contribute technology that is incorporated into the standard may have one or more patents covering varying aspects of the standard. Before making, using, or selling a standards-compliant product, an implementer would similarly need to obtain a license from each of the many varying SSO participants who hold SEPs, or else that implementer may be liable for patent infringement. Although SSOs and patent pools are different entities with different purposes, there is a symbiotic relationship between the two. Specifically, patent pools that include SEPs enable competitive production of standards-compliant products by facilitating implementer access to the necessary technology.[213] Patent pools for SEPs are not formed before a standard is selected; rather these patent pools form late in the standardization cycle.[214]

Patent pools have emerged as a popular mechanism for sharing intellectual property.[215] Over $100 billion of sales are generated each year in the United States from products or devices that are based in whole or in part on technologies in patent pools.[216] Not only are patent pools a major force in today's innovation economy, they also offer benefits to firms that contribute

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[210] *See id.*

[211] *See id.*

[212] *See* Justus Baron & Tim Pohlman, The Effect of Patent Pools on Patenting and Innovation – Evidence from Contemporary Patent Standards 1 (Jan. 30, 2015) (unpublished manuscript), https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=IIOC2015&paper_id=405.

[213] *See* Hovenkamp & Hovenkamp, *supra* note 209.

[214] *See* Baron & Pohlman, *supra* note 213, at 12.

[215] *See* Nancy Gallini, *Cooperating with Competitors: Patent Pooling and Choice of a New Standard*, 36 INT'L J. OF INDUS. ORG. 4, 4 (2014).

[216] *See* Gavin Clarkson & David deKorte, *The Problem of Patent Thickets in Convergent Technologies*, 1093 ANN. N.Y. ACAD. SCI. 180, 188 (2006).

patents to the pool (patent contributors), firms that license patent rights from the patent pool (licensees), and consumers. With respect to patent contributors, patent pools provide compensation in the form of licensing revenue at a decreased cost because the patent contributor does not need to engage in separate licensing negotiations with multiple parties.[217] Similarly, licensees benefit from "one stop shopping," which decreases their transaction costs. Patent contributors that are also manufacturers or implementers can benefit from access to the technology as a licensee in addition to receiving revenue as a contributor. Further, patent pools can alleviate concerns (even if these concerns are poorly founded) of patent hold-up and royalty stacking.[218] Finally, consumers benefit from the cost-savings realized by both the patent owners and licensees, as well as improved product quality and variety.[219]

Beyond these direct benefits related to solving the business problem of patent rights held by multiple, diverse patent owners, patent pools provide a second significant advantage. For both patent contributors and licensees, patent pools provide an efficient solution to the difficult legal problem of identifying boundaries, especially in a situation of potentially overlapping rights.[220] Developers and manufacturers tend to know their own technology and products well, but they may be less certain about which patents owned by others cover their products.[221] Identifying what patents cover which products, whether for enforcement in the case of patent contributors or to avoid infringement in the case of licensees, is expensive; failure to identify the boundaries correctly can be even more costly.[222] Because patent pools give members access to all the patents in the pool, patent contributors and licensees do not need to determine boundaries at the individual patent or patent holder level because the patent pool provides access to all included patents.[223] This, too, decreases costs to all parties involved.

Patent pools are sometimes believed to be anti-competitive. After all, they are often arrangements between competitors that could in theory artificially raise prices or encourage some other collusive behavior.[224] There are, however, numerous pro-competitive benefits, such as reducing transaction costs, eliminating the increased costs of patent overlap, and

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[217] *See* Merges & Mattioli, *supra* note 210, at 317–18.

[218] *See id.* at 285 ("[P]atent pools reduce the odds that any patent holder, aware that its permission is necessary to a licensee, will strategically hold out for exorbitant licensing fees.").

[219] *See* Hovenkamp & Hovenkamp, *supra* note 209.

[220] *See id.*

[221] *See id.*

[222] *See id.*

[223] *See id.*

[224] *See* Merges & Mattioli, *supra* note 210, at 298–99.

providing a private mechanism for settling patent infringement litigation.[225] At least one recent study of patent pools has found these pro-competitive benefits to vastly outweigh any potential anti-competitive risks posed by patent pools. Specifically, Merges and Mattioli found patent pools save companies "enormous amounts of money" based on the "mind-blowingly efficient" manner in which patents can be licensed.[226] Because of this, Merges and Mattioli posit that proposed patent pools should be viewed as pro-competitive unless there is actual, quantifiable harm to consumers caused by an arrangement.[227]

B. How Patent Pools Operate

A patent pool, at its simplest, is an agreement between two or more patent owners to offer a license on a set of related or complementary patents for a single product.[228] Although the patent owners who contribute patents to a patent pool generally receive a license to use the bundled patents,[229] patent pools are not simply cross-licenses. Cross-licenses involve the bilateral exchange of patent rights, while patent pools generally involve the pooling of multiple patents from multiple owners.[230] The bundled rights are then licensed back to the patent contributors, to outside licensees, or to both.[231]

Patent pools can be organized in different ways. Some are operated as corporations, where the patent contributors assign ownership of their patents to the corporation in exchange for shares.[232] Others are operated in a more contractual fashion, with the patent pool consisting of myriad agreements between the patent contributors and licensees.[233] Jonathan Barnett indicates that patent pools can be categorized by reference to three parameters: directional relationship, asset flows, and management function.[234] Directional relationships within patent pools can be horizontal or vertical.[235] As Barnett notes, there will always be a horizontal relationship between

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[225] *See* Standard Oil Co. v. U.S., 283 U.S. 163 (1931); Kobayashi & Wright, *supra* note 19, at 40.

[226] *See* Merges & Mattioli, *supra* note 210, at 288–89.

[227] *See id.*

[228] *See id.* at 296.

[229] *See id.* at 285.

[230] *See* Kobayashi & Wright, *supra* note 19, at 40. Some patent pools, however, are defined by a multiplicity of cross-licenses that define the cooperative arrangement. *See* Merges & Mattioli, *supra* note 205, at 314.

[231] *See* Merges & Mattioli, *supra* note 210, at 296.

[232] *See id.*

[233] *See id.*

[234] *See* Johnathan M. Barnett, *From Patent Thickets to Patent Networks: The Legal Infrastructures of the Digital Economy*, 55 JURIMETRICS J. 1, 13–15 (2014).

[235] *See id.*

patent contributors; in some cases there will also be a vertical relationship between the pool and licensees.[236] Similarly, there will almost always be asset flows of intellectual property between patent contributors—each member contributes patents or other IP assets to the pool in exchange for access to other members' IP assets.[237] Where there are external licensees, there are also monetary asset flows from the licensees to the pool, which may then allocate the revenue among the patent contributors.[238] The third parameter, management function, can either be handled internally by members or externally by a third party administrator who is generally paid for its efforts.[239] Although there are certainly other ways that patent pools can be structured and other parameters that can be used to distinguish one from another, these typical structures and standard parameters do the bulk of the descriptive work when considering patent pools.

One important benefit of patent pools, as noted above, is the ability of patent contributors to realize licensing revenue based on their contributions. This is also one area where patent pools differ greatly from each other. How much revenue is allocated to each contributor varies widely. Some patent pools divide their revenue based strictly on ex ante agreement between the founding contributors; oftentimes these arrangements do not permit any new patents to be added to the pool.[240] Other pools, particularly those set up as corporations, pay patent contributors in the form of corporate dividends; the distribution amounts are then calculated by the officers of the business organization.[241] Finally, and most common today, are more formulaic determinations of revenue share. Each patent pool has one or more individual evaluators who verify that a particular patent should be added to the pool and then apply a profit-sharing formula to determine the patent contributor's share.[242] Some of the formulas are simple pro rata equations.[243] For example, the MPEG-2 patent pool, which covers patents related to digital video technologies, allocates royalties based on the following formula: (P/N) x M.[244] P is the number of MPEG-2 portfolio patents held by the patent contributor in the country at issue and N is the total number of MPEG-2

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[236] *See id.*

[237] *See id.* Additionally, there may be horizontal monetary flows if some members make side payments to reflect the difference in value of their intellectual property contributions. *See id.*

[238] *See id.*

[239] *See id.*

[240] *See* Michael Mattioli, *Power and Governance in Patent Pools*, 27 HARV. J. L. & TECH. 421, 440 (2014).

[241] *See id.*

[242] *See id.*

[243] *See id.* at 446.

[244] *See id.* at 446–47.

portfolio patents in that country.[245] Other formulas are more complex and may take into account value over time or other criteria.[246]

Unlike SSOs, where working groups and committees meet regularly over the course of many years to develop a technological standard, creation of a patent pool is much simpler. For Via, a company that manages multiple patent pools including the LTE patent pool and the 802.11 patent pool, creation of a patent pool program is relatively simple and straightforward.[247] During that time, the founding members of the patent pool are not solving technological problems, but are instead reaching consensus amongst multiple global firms with respect to licensing terms, such as the profit-sharing formula to be used, and so on.[248]

C. Examples of Patent Pools

As noted above, patent pools can occur inside and outside of standardized technology and in a variety of fields, although they are most common in ICT.[249] This section illustrates the above concepts by describing a few patent pools in greater detail.

One patent pool that covers a popular consumer product is the DVD6C Licensing Agency, a patent pool formed in 1999 between Toshiba, Hitachi, Matsushita, Mitsubishi, Time Warner, and Victor Company of Japan to coordinate licensing efforts for patents related to DVD technology.[250] Toshiba Corporation acts as the licensor in the agreement.[251] In exchange for royalties, licensees are granted access to the DVD patents administered by the agency.[252] Additionally, all licensees must grant to each of the patent

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[245] *See id.*

[246] *See id.* at 447.

[247] *See Licensing*, VIA-CORP, http://www.via-corp.com/us/en/licensing.html (last visited Apr. 6, 2018); *LTE Patent Pools Taking Shape*, PCWORLD, https://www.pcworld.com/article/196721/article.html (last visited Apr. 6, 2018).

[248] *See, e.g.*, Amy Dockser Marcus et al., *Crisper Patent-Holders Move Toward Easing Access to Gene-Editing Technology*, WALL ST. J. (Jan. 8, 2017, 11:33 AM), https://www.wsj.com/articles/crispr-patent-holders-move-toward-easing-access-to-gene-editing-technology-1499527983; Press Release, MPEG LA, MPEG LA Invites CRISPER-Cas9 Patents to be Pooled in a One-Stop License (Apr. 25, 2017), http://www.mpegla.com/Lists/MPEG%20LA%20News%20List/Attachments/103/CRISPRPatentCallPrsRls2017-04-25.pdf.

[249] *See* Barnett, *supra* note 235, at 12 (presenting a table that illustrates common ICT standards and the patent pools associated with those standards).

[250] *See* David Serafino, *Survey of Patent Pools Demonstrates Variety of Purposes and Management Structures* 26–27 (Knowledge Ecology Int'l, Research Note 2007:6, 2007), http://www.keionline.org/misc-docs/ds-patentpools.pdf.

[251] *See id.*

[252] *See id.*

contributors (and their licensees) a non-exclusive license to use any of their patents—a grant back clause that provides an additional benefit to both patent contributors and licensees.[253] The US Department of Justice and the European Commission both considered and approved the DVD6C patent pool, based on the beneficial effect for consumers and licensees to deal only with the pool, rather than multiple companies on an individual basis.[254]

As another example, consider the well-known patent pools covering the MPEG-2 and MPEG-4 video/system technology standards.[255] These patent pools are administered by MPEG-LA, a third party administrator that supports a variety of patent pools.[256] MPEG-2 is a video compression technology for digital television adopted as a standard by the Motion Picture Expert Group (MPEG) International Standards Organization (ISO) in 1994.[257] The MPEG-2 Patent Pool was formed in 1997 after receiving a favorable business review letter from the DOJ.[258] The purpose of the MPEG-2 Patent Pool is to offer one-stop shopping to license the technology required to make MPEG-2 compliant products.[259] Specifically, the MPEG-2 Patent Pool licenses, via non-discriminatory terms, essential MPEG-2 video and systems patents held by a number of patent contributors, including Columbia University, Fujitsu, GE Technology Development, LG Electronics, Mitsubishi, Samsung, Sony, and many more.[260] The MPEG-2 Patent Pool is credited with facilitating widespread adoption and use of MPEG-2 technology.[261] Similarly, MPEG-LA's MPEG-4 Patent Pool provides convenient access to patents that cover the MPEG-4 technology.[262] In addition to providing "one-stop" shopping for these licenses, the MPEG-4 Patent Pool license includes annual limitations "to provide cost predictability, lowered thresholds to encourage early-stage adopters, and report-free

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[253] *See id.*

[254] *See id.*

[255] *See A History of Success—A Future in Innovation*, MPEG LA, http://www.mpegla.com/main/Pages/AboutHistory.aspx (last visited Apr. 6, 2018).

[256] *See About*, MPEG LA, http://www.mpegla.com/main/Pages/About.aspx (last visited Apr. 6, 2018). MPEG LA claims to be a "packager of patent pools" and a leader in the "many to many" licensing model. *See id.*

[257] *See Who We Are*, MPEG, https://mpeg.chiariglione.org/who-we-are (last visited Apr. 6, 2018).

[258] *See* Letter from Joel I. Klein, Assistant Attorney General, Dep't of Justice, to Gerrard R. Benney (June 26, 1997), https://www.justice.gov/atr/response-trustees-columbia-university-fujitsu-limited-general-instrument-corp-lucent.

[259] *See* Serafino, *supra* note 251, at 17–18.

[260] *See id.*

[261] *See MPEG-2 Introduction*, MPEG LA, http://www.mpegla.com/main/programs/M2/Pages/Intro.aspx (last visited Apr. 6, 2018).

[262] *See MPEG-4 Visual Introduction*, MPEG LA, http://www.mpegla.com/main/programs/M4V/Pages/Intro.aspx (last visited Apr. 6, 2018).

licensing options to decrease the burden on implementers.[263] These MPEG-LA administered patent pools illustrate the value of patent pools as something more than just a revenue source for patent contributors; licensees benefit not only from the ability to access patents held by a large number of companies, but also from licensing terms specifically aimed at encouraging use of the patent pools. Consumers, of course, receive the benefit of high quality video products on their televisions, computers, and digital devices at a reasonable cost.

As an example in the non-ICT space, MPEG-LA is currently working to form a patent pool covering CRISPR technology.[264] CRISPR is a genome engineering technology with widespread applications, including medical, agricultural, environmental, and others; this technology has incredible potential in many areas.[265] The patents that cover CRISPR technology and its uses, however, are held by an ever-increasing number of companies.[266] For this reason, MPEG-LA seeks to extend the model of patent pool licensing it applied in the digital video field (with the MPEG-2 and MPEG-4 Patent Pools) and apply it to CRISPR.[267] This situation of an important technology being covered by many potentially overlapping patents, held by multiple and diverse patent owners, is precisely the type of business and legal problem that patent pools are designed to solve.

IV. IGNORANCE ABOUT SSOS AND HOW IT HARMS INNOVATION

To the extent that courts and commentators discuss standardized technology and SSOs at all, it is usually with suspicion or allegations of harm. Rarely, if ever, are the benefits of SSOs raised—benefits to innovative companies that participate in SSOs, to manufacturers that implement the standard, to society at large are simply not mentioned. The most commonly-raised concerns about SSOs and standardized technology are based on the patent hold-up and royalty stacking theories.[268] Related to these concerns are fights about the meaning of FRAND, including the royalty amounts and how much negotiation is permitted or even required under a FRAND

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[263] *See id.*

[264] *See CRISPR*, MPEG LA, http://www.mpegla.com/main/pid/CRISPR/Initiative.aspx (last visited Apr. 6, 2018).

[265] *See id.*

[266] *See, e.g.*, *The IPStudies 2017 CRISPR Patent Landscape Is Out, Don't Miss It!*, IPSTUDIES, https://www.ipstudies.ch/2017/01/the-ipstudies-2017-crispr-patent-landscape-is-out-dont-miss-it/ (last visited Apr. 6, 2018).

[267] *See CRISPR*, *supra* note 265.

[268] *See, e.g.*, Lemley & Shapiro, *supra* note 74, at 1991.

commitment.[269] Unfortunately, many claims of patent hold-up and royalty stacking are simply related to disagreements over how much the licensee would prefer to pay versus how much the patent holder is requesting.[270] The fact that these disagreements are not uncommon does not mean, however, that patent hold-up or royalty stacking is taking place. After all, businesses frequently engage in aggressive price negotiations over all sorts of products, and IP licensing is no different. In fact, as also noted above, there is little actual evidence of patent hold-up and royalty stacking.[271] In contrast, evidence points against this reality—in the field of mobile telephony, there is continuous innovation, lowering of prices, and increasing market penetration, including new and returning market entrants.[272] In a disturbing trend, even without any evidence that patent hold-up or royalty stacking actually occurs in practice, courts and commentators are still using concerns over these theoretical problems to justify efforts to "reform" behavior by SSOs and SSO participants. This section explains courts' and commentators' misguided efforts in this regard and concludes by discussing how these proposals are based on or rooted in fundamental misunderstandings of SSOs.

A. Proposals to Fix the Imagined SSO Problems

Courts and commentators are actively attempting to solve the purported problems caused by standardization. Courts are approaching the issue largely by crafting creative remedies or worse, outright denying some remedies to SEP owners. Commentators, on the other hand, are seeking to influence change through proposals aimed at altering the behavior of either SSOs, SSO participants, or both. This section describes these efforts.

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[269] *See, e.g.*, Ove Granstrand & Marcus Holgersson, *The 25% Rule Revisited and A New Investment-Based Method for Determining FRAND Licensing Royalties*, 47 LES NOUVELLES 188, 188–89 (2012).

[270] *See, e.g.*, Microsoft Corp. v. Motorola Inc., 696 F.3d 872, 877–79 (2012) (discussing litigation arising out of a negotiation breakdown in patent licensing).

[271] *See* Sidak, *supra* note 75, at 718–19 (discussing studies by Damien Geradin, Anne Layne-Farra, and Jorge Padilla, as well as by Damien Geradin and Miguel Rato). *See also* Geradin et al., *The Complements Problem Within Standard Setting: Assessing the Evidence on Royalty Stacking*, 14 B.U. J. SCI. & TECH. 144, 145 (2008); Kirti Gupta, *Technology Standards and Competition in the Mobile Wireless Industry*, 22 GEO. MASON L. REV. 865, 866 (2016) (citing statements of experts in a patent infringement case involving SEPs, where the experts were unable to point to evidence of actual patent hold-up); 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 25 (Apr. 2006) (unpublished manuscript), http://ssrn.com/abstract=946792.

[272] *See* Epstein & Noroozi, *supra* note 103, at 4 nn.12–14.

1. The Courts

Courts have addressed theoretical concerns about patent hold-up and royalty stacking in general by using their power to shape remedies in patent infringement cases involving SEPs. Both damages calculations and availability of injunctive relief have been in some cases modified to achieve these courts' goals. The easiest way to illustrate how courts are approaching the alleged problems with standardized technology is to review cases where judges have addressed the issues in question.

a. Damages

One way courts have approached theoretical concerns about patent hold-up and royalty stacking is to specifically inject consideration of these issues into the damages calculation process. Although very few courts have considered FRAND rates in SEP cases, they have all taken slightly different approaches.[273] In all the cases, however, the judges have altered the typical damage award calculation to reflect what are believed to be problems with SEPs.

In *Microsoft Corp. v. Motorola, Inc.*,[274] Judge Robart in the Western District of Washington sought to determine a reasonable royalty for Motorola's patents covering two industry standards (ITU's H.264 audiovisual compression standard and IEEE's 802.11 wireless networking standards).[275] In doing so, Judge Robart first looked to the reasonable royalty damages analysis based on *Georgia-Pacific*, a typical way to determine reasonable royalty rates in patent infringement cases that attempts to recreate a hypothetical negotiation between a willing licensor and licensee.[276] Judge Robart, however, reasoned that the parties would "look[] at the importance of the SEPs to the standard and the importance of the standard and the SEPs to the product at issue" when negotiating a royalty.[277] To account for this issue, Judge Robart, then opined that construction of a hypothetical negotiation in a case involving SEPs must "consider alternatives that could have been written into the standard instead of the patented technology" with

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[273] *See* Ryan Davis, *4 Things to Know About the Latest FRAND Rate-Setting Case*, LAW360 (Jan. 4, 2018, 9:36 PM), https://www.law360.com/articles/998063/4-things-to-know-about-the-latest-frand-rate-setting-case.

[274] No. C10-1823JLR, 2013 WL 2111217 (W.D. Wash. Apr. 25, 2013).

[275] *Id.* at *1–2.

[276] *See* Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970) (enumerating factors for calculating reasonable royalties). *See also* Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1324–36 (Fed. Cir. 2009) (affirming and applying the *Georgia-Pacific* factors).

[277] *Microsoft Corp.*, 2013 WL 2111217, at *3.

a focus "on the period before the standard was adopted and implemented (i.e., *ex ante*)."[278] To realize this hypothetical negotiation, Judge Robart crafted the following methodology that reflects his concerns. According to Judge Robart, royalties should:

> [1.] Be set at a level consistent with the SSOs' goal of promoting widespread adoption of their standards . . . .
> [2.] [R]ecognize and seek to mitigate the risk of patent hold-up . . . .
> [3.] [A]ddress the risk of royalty stacking by considering the aggregate royalties that would apply if other SEP holders made royalty demands of the implementer. . . .
> [4.] [G]uarantee that holders of valuable intellectual property will receive reasonable royalties on that property. . . . [and]
> [5.] [I]nterpret[] [the FRAND commitment] to limit a patent holder to a reasonable royalty on the economic value of the patented technology itself, apart from the value associated with incorporation of the patented technology into the standard.[279]

This approach has some significant problems, especially as it elevates the importance of patent hold-up and royalty stacking, which are merely theoretical problems, and inserts these doctrines into what is supposed to be a hypothetical negotiation between the parties, which would unlikely ever consider these issues when determining the value of the technology. However, Judge Robart takes this error-filled approach to determining royalty rates even further down the wrong pathway by considering patent pool licensing rates in "determining a royalty rate and range."[280] As discussed in Section II above, the activities and purposes of SSOs and patent pools are very different; SSOs collaborate to solve technical problems, while patent pools exist to solve business and legal problems. Assuming, as Judge Robart did, that patent pool licensing rates are an appropriate source of determining reasonable royalty rates for SEPs is woefully misguided.

Unfortunately, Judge Robart is not alone in his approach to calculating FRAND rates, which specifically injects theoretical concerns about patent hold-up and royalty stacking into the calculation of damages in SEP infringement cases. In *In re Innovatio IP Ventures, LLC Patent Litigation*,[281] Judge Holderman of the Northern District of Illinois followed generally the framework laid out by Judge Robart.[282] Judge Holderman explicitly stated

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[278] *See id.* at *13.
[279] *See id.* at *12.
[280] *See id.* at *19.
[281] No. 11 C 9308, 2013 WL 5593609 (N.D. Ill. Oct. 3, 2013).
[282] *See id.* at *9.

that avoiding the "substantial problem" of patent hold-up and preventing royalty stacking were two important considerations when determining a FRAND royalty rate.[283]

In the most recent case to address FRAND rates in an SEP infringement case, *TCL Communication Technology Holdings Inc. v. Ericsson Inc.*, Judge Selna of the Central District of California also was concerned about royalty stacking and patent hold-up in determining his approach to royalty rate calculation.[284] To avoid issues related to royalty stacking and patent hold-up, Judge Selna used the top down method to calculate the FRAND rate.[285] Specifically, because the starting point of the top down method begins with the maximum aggregate royalty burden and works downwards to find a reasonable royalty, it avoids that possibility that any licensee would be forced to pay "an unreasonable amount in total."[286] Additionally, it prohibits SEP owners from charging a premium, preventing patent hold-up.[287]

While commentators applauded Selna's approach, the top down method is not without problems.[288] First, as Judge Selna acknowledges, the approach is not a substitute for a market approach that considers comparable licenses.[289] Second, there are difficulties in determining where to assess the maximum aggregate royalty burden—at an upstream component level or at a downstream end-consumer device, or somewhere in between.[290] Finally, the primary question—assessing the value of the SEP in question relative to all SEPs related to the standard in order to divide the maximum aggregate royalty fairly—remains a challenging issue.[291] Even putting aside the difficulties inherent in this approach, the bottom line is that Judge Selna selected this method specifically to prevent the theoretical problems of

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[283] *See id.*

[284] TCL Commc'n Tech. Holdings Inc. v. Telefonaktiebolaget LM Ericsson, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635 (C.D. Cal. Dec. 21, 2017).

Judge Selna also imposed a stricter definition of "non-discriminatory" than has been typically considered in these cases; however, although this is a key issue for the case, it is not as directly tied to the points of royalty stacking and patent hold-up that are at issue in this Section. *Id.* at *49–50.

[285] *See id.* at *8–9.

[286] *See id.*

[287] *See id.*

[288] *See* Davis, *supra* note 274 (quoting Professor Thomas Cotter as saying the approach "has a lot going for it in trying to figure out a rational way to apportion the value of patents" and Professor Jorge Contreras, "Top-down is the only way to do it that makes any sense, in my opinion").

[289] *See TCL Communication*, 2017 WL 6611635, at *8–9.

[290] *See* Gregory K. Leonard & Mario A. Lopez, *Determining RAND Royalty Rates for Standard-Essential Patents*, ANTITRUST, Fall 2014, at 86, 89–90.

[291] *See id.*

royalty stacking and patent hold-up, regardless of whether this method would arrive at a fair and true royalty rate for the SEP owner.[292]

Ericsson has already appealed this most recent case to the Federal Circuit, and so we are likely to receive guidance on FRAND calculations in the near future, although it is unlikely to provide a clear methodology.[293] In fact, the Federal Circuit has weighed in on FRAND royalty calculations in earlier cases and the result was anything but clear. In *Ericsson v. D-Link*, the Federal Circuit reversed and remanded in a case where the district court's jury instruction involved applying the *Georgia-Pacific* factors without modification.[294] In this case, the Federal Circuit stated that a jury "must be told to consider the difference between the added value of the technological invention and the added value of that invention's standardization."[295] FRAND royalties "must be premised on the value of the patented feature, not any value added by the standard's adoption of the patented technology."[296] To reach this end, the Federal Circuit determined that "widespread adoption due to standardization" was not an inherent benefit of SEPs,[297] when quite the opposite is true. The bottom line after this case is that it is essential to disaggregate the value of standardization (that comes from reduction in transaction costs for implementers and network effects generated by interoperability) from the value of the technologies incorporated in the standard.[298]

The Federal Circuit has reiterated this concept again in *Commonwealth Scientific and Industrial Research Organisation v Cisco Systems*, where it stated that SSO participants are not entitled to share in the "benefit created by standardization—benefit that would otherwise flow to consumers and businesses practicing the standard."[299] Instead, the Federal Circuit remanded the trial court's damages award to consider an adjustment in view of the standard's role in the product's commercial success—i.e., decreasing the reasonable royalty.[300]

Based on these cases, it seems that damages calculations via FRAND determination must attempt to mitigate the risk of patent hold-up and address the risk of royalty stacking "that would apply if other SEP holders made

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[292] *See TCL Communication*, 2017 WL 6611635, at *14.

[293] *See id., appeal docketed*, 2018-1363 (Fed. Cir. 2018).

[294] 773 F.3d 1201, 1232 (Fed. Cir. 2014).

[295] *Id.* at 1233.

[296] *See id.* at 1232.

[297] *Id.* at 1233.

[298] *See, e.g.*, J. Gregory Sidak, *The Value of the Standard Versus the Value of Standardization*, 68 BAYLOR L. REV. 59, 60 (2016).

[299] 809 F.3d 1295, 1305 (Fed. Cir. 2015).

[300] *Id.* at 1305–06.

royalty demands of the implementer."[301] Both Judge Robart and Judge Holderman addressed the risk of royalty stacking by considering the aggregate royalties that would apply if other SEP holders made similar royalty demands on the implementer, without requiring the implementers to show what royalties they were currently paying.[302] Robart rejected Motorola's argument that potential royalty stacking concerns had not, to date, impeded the widespread adoption of the relevant standards, stating that the "argument is misplaced."[303] The court reasoned that "[w]hether other SEP holders have complied with their RAND obligations says nothing as to whether Motorola has met its own. Thus, the court must determine a reasonable royalty rate for Motorola's SEPs based on the principles underlying the RAND commitment, one of which is the concern for royalty stacking."[304] Judge Selna similarly began from a position of trying to avoid royalty stacking and patent hold-up, without any evidence that these were issues in the *TCL Communications* case or even issues at all.[305]

The one bright spot in this discussion of judges, charging at royalty stacking and patent hold-up like Don Quixote charged at windmills, is Judge Davis, who presided over the district court trial in *Ericsson Inc. v. D-Link*.[306] Judge Davis refused to reduce the FRAND royalty rate determined by the jury based on theoretical concerns about hold-up and royalty stacking, finding the defendants "failed to present any evidence of actual hold-up or royalty stacking" and noticed that defendant's experts "never even attempted to determine the actual amount of royalties Defendants currently pay for . . . [the relevant] patents."[307] Additionally, Ericsson presented evidence that it considered royalty stacking issues when it established its rates and therefore Ericsson's FRAND rate did not fail to account for hold-up or royalty stacking.[308]

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[301] Layne-Farrar & Wong-Ervin, *supra* note 81.

[302] *See* Microsoft Corp. v. Motorola, Inc., No. C10-1823JLR, 2013 WL 2111217, at *11–12 (W.D. Wash Apr. 25, 2013); *In re* Innovatio IP Ventures, L.L.C., No. 11 C 9308, 2013 WL 5593609, at *9–10 (N.D. Ill. Oct. 3, 2013).

[303] *Microsoft Corp.*, 2013 WL 2111217, at *74.

[304] *Id.*

[305] *See* TCL Commc'n Tech. Holdings, L.T.D. v. Telefonaktiebolaget LM Ericsson, No. SACV 14-341 JVS(DFMx), 2017 WL 6611635, at *8 (C.D. Cal. Dec. 21, 2017).

[306] Ericsson Inc. v. D-Link Sys., Inc., No. 6:10-CV-473, 2013 WL 4046225 (E.D. Tex. Aug. 6, 2013), *rev'd on other grounds*, 773 F.3d 1201 (Fed. Cir. 2014); *see also Ericsson, Inc.*, 773 F.3d at 1233–35 ("In this case, we agree with the district court that D-Link failed to provide evidence of patent hold-up and royalty stacking . . . . A jury, moreover, need not be instructed regarding royalty stacking unless there is actual evidence of stacking.").

[307] *See Ericsson Inc.*, 2013 WL 4046225, at *18, *26.

[308] *See id.*

b. Injunctive Relief

District courts and the International Trade Commission (ITC) have also used the availability of injunctive relief for infringement of SEPs, or more accurately, the denial of injunctive relief, as another means to alter SSO participant behavior.[309] This is particularly acute at the ITC because the primary remedy available is a restriction on importation—effectively an injunction.[310] Denial of injunctive relief, as a tool to prevent generally theoretical problems, is even more troubling than the changes in damage calculations detailed above.

In *Apple, Inc. v. Motorola, Inc.*, the Federal Circuit considered Motorola's request for an injunction, seeking to prevent Apple's sales of allegedly infringing RAND-encumbered patents essential to certain wireless telecommunications standards.[311] Motorola contended that Apple negotiated in bad faith by refusing Motorola's allegedly FRAND-compliant terms and stalling negotiations.[312] The trial court with the Seventh Circuit's Judge Posner sitting by designation, denied Motorola's request, reasoning that in making a RAND commitment, the patent holder has already acknowledged that money, in the form of royalties, would be adequate compensation, eliminating the factor of irreparable harm under *eBay*.[313] The Federal Circuit upheld Judge Posner's decision, but offered different reasoning for denying the injunction. First, "to the extent that the district court applied a *per se* rule that injunctions are unavailable for SEPs it erred."[314] Although it may be difficult to establish irreparable harm, Judge Reyna noted that "an injunction may be justified where an infringer unilaterally refuses a FRAND royalty or unreasonably delays negotiations to the same effect."[315] The Federal Circuit, however, upheld the denial of injunction because "negotiations have been

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[309] *See* Doris Johnson Hines & J. Preston Long, *Un-FRAND-ly Behavior*, 87 BNA PAT. TRADEMARK & COPYRIGHT J. 572 (2014).

[310] *See id.*

[311] 757 F.3d 1286 (Fed. Cir. 2014), *overruled by* Williamson v. Citrix Online, L.L.C., 792 F.3d 1339 (2015).

[312] *See Apple, Inc.*, 757 F.3d at 1332.

[313] *See id.* Factors considered in issuing a permanent injunction include: "(1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction." eBay, Inc. v. MercExchange, L.L.C., 547 U.S. 388, 391 (2006).

[314] *Apple, Inc.*, 757 F.3d at 1331. This is not dissimilar to statement in *eBay*—*per se* grant or denial of injunction based on any one fact is improper. *Id.* at 1332. Judge Prost took the opposite viewpoint, that an implementer's negotiation conduct (or lack thereof) should still never justify the grant of an injunction. *Id.* at 1342–43 (Prost, J., dissenting in part).

[315] *See id.* at 1332.

ongoing, and there is no evidence that Apple has been, for example, unilaterally refusing to agree to a deal."[316] Judge Rader concurred that a unilateral refusal to take a FRAND license could trigger injunction but dissented from the denial of Motorola's injunction request because there was evidence that Apple was a patent holdout.[317] He also pointed to evidence that Apple failed to even discuss a license for years while infringing Motorola's patent.[318]

The Ninth Circuit also weighed in on injunctive relief when it reviewed the *Microsoft v. Motorola* case, discussed above.[319] Microsoft sued Motorola, asserting Motorola's initial offer was a breach of its FRAND commitments, and Motorola responded by filing a countersuit seeking an injunction, as well as filing for an injunction with the ITC.[320] The Ninth Circuit accepted the jury's finding that Motorola had breached its duty of good faith and fair dealing by pursuing these injunctions.[321] Specifically, the court found that Motorola lacked a legitimate fear of irreparable harm and embraced the theory that "a FRAND-encumbered patentee may violate its duty of good faith and fair dealing and breach its FRAND commitment by seeking injunctive relief."[322]

The facts of this case and the court's reasoning for denying an injunction demonstrate just how far the deck has been stacked against SEP owners. Motorola, an innovative company, contributed technology to an SSO which was then selected by the SSO to be included in the technology standard.[323] Microsoft was using the standardized technology in its product and thus was likely infringing Motorola's patents. Motorola did what patentees often do in these situations—it sent a letter to Microsoft offering to license these patents.[324] Rather than contacting Motorola to accept Motorola's offer or viewing the offer as an invitation to negotiate license terms, Microsoft filed a lawsuit, taking umbrage with Motorola's opening offer as a breach of its FRAND commitment.[325] This alone seems bizarre; how could Motorola's offer to license (which in many cases is simply an invitation to negotiate) be a breach? But from there, the case only got stranger. Motorola responded to the filing of the lawsuit by Microsoft by countersuing, alleging patent

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[316] *Id.*

[317] *Id.* at 1332–34 (Rader, J., dissenting in part).

[318] *See id.*

[319] *See supra* notes 275–84, 303–05 and accompanying text.

[320] Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024, 1032 (9th Cir. 2015).

[321] *Id.* at 1047.

[322] *See* Epstein & Noroozi, *supra* note 103, at 32–33 (citing *Microsoft Corp.*, 795 F.3d at 1048–49).

[323] *See Microsoft Corp.*, 795 F.3d at 1032.

[324] *See id.*

[325] *See id.*

infringement and seeking an injunction,[326] as patent owners often do when sued. Judge Robart used this action, completely ordinary and common behavior of patent owners, as evidence that Motorola breached its duty of good faith and fair dealing.[327] Even though Microsoft chose to sue, rather than attempt to negotiate, the court punished Motorola for the simple act of trying to enforce its patent rights.

The result of the deck being stacked against the SEP owner, as illustrated by how Judge Robart treated Motorola, is that implementers are perversely incentivized to infringe at will and wait for the SEP owner to litigate. If, at best, the SEP owner will get damages in the amount of a FRAND royalty rate (and as was discussed above, these royalty rates have been greatly decreased by the courts due to the presence of the standard), there is no incentive for an implementer to negotiate or accept a license from the SEP owner. With the threat of injunction removed, there is no difference to the implementer between accepting a licensing offer or simply waiting to be sued. An illustration of how the courts' denials of injunction change incentives to negotiate is found in *Core Wireless v. LG Electronics*.[328] Core Wireless, a joint endeavor of Microsoft and Nokia to hold multiple patents, assigned its portfolio to Conversant Intellectual Property Management.[329] Conversant initiated negotiations with LG Electronics; LG ultimately responded with a "terse one-page presentation stating that a lawsuit was . . . 'preferable' to a license, and that LG would prefer to wait until another major cell phone manufacturer licensed the portfolio . . . ."[330] LG, thus, pursued a path of patent hold-out,[331] forcing Core Wireless to expend considerable resources in legal and attorney fees to obtain the license fees it originally sought. Without a credible injunctive threat, implementers simply have no incentive to negotiate in good faith.

2. The Commentators

Courts are not the only entities seeking to solve the imagined problems with standardization. Commentators have also developed several proposals aimed at mitigating or eliminating the theoretical concerns of patent hold-up

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[326] *See id.*

[327] *See id.* at 1046–47.

[328] *See* Core Wireless Licensing S.A.R.L. v. LG Electronics, Inc., 2:14-cv-912-JRG, 2016 WL 10749825 (E.D. Tex. Nov. 2, 2016).

[329] Epstein & Noroozi, *supra* note 103, at 35–36. Conversant is a patent licensing firm that assumed responsibility for licensing Core Wireless's portfolio and other obligations in exchange for revenue sharing. *See id.*

[330] *See Core Wireless Licensing S.A.R.L.*, 2016 WL 10749825, at *1.

[331] *See id.*

and royalty stacking. Some of these proposals mirror the efforts of the courts, but others have not yet been seen in the litigation setting. All of these proposals, however, have the ultimate effect of stacking the deck against SEP owners and SSO participants in favor of implementers, which decrease the appeal for any innovative company to participate in SSOs. As noted earlier, technology standards are most robust and standard adoption is more effective when participation in SSOs is attractive to innovative firms.

One commonly raised proposal is for SSOs to insist that SSO participants agree to ex ante licensing of any patent that may eventually be designated as an SEP. Many SSOs have FRAND licensing policies that do not describe the specific terms of the obligations, allowing instead for the members to fill in the missing details and hopefully avoid running afoul of courts and competition enforcement agencies.[332] Ex ante licensing rules would require patent owners to disclose the maximum royalty rate they would charge, thus eliminating a patent holder's ability to engage in ex post negotiations in a supra-competitive environment.[333] This provision clearly weighs in favor of the implementer by tying the hands of the SSO participant.

Another typical suggestion by commentators is to focus the FRAND inquiry specifically towards the mitigation of opportunistic behavior by SEP owners; that is, these proposals view FRAND from an implementer-centric perspective and use an SEP owner's FRAND commitment as a way to tightly constrain that SSO participant.[334] FRAND royalties must provide the patent owner with reasonable compensation, while at the same time limiting the patent holder to a reasonable royalty on the economic value of the patented technology itself, apart from the value associated with the patent's incorporation into the standard, using comparable licenses where possible.[335] The FRAND issue that has been most controversial of late is the methodology of determining a "reasonable royalty."[336] An interpretation of reasonable royalty is that value that emerges from ex post bilateral bargaining between a willing licensor and a willing licensee.[337] The prevailing damage analysis is set out in *Georgia-Pacific Corp. v. United States Plywood Corp.*,[338] although it is not directly applicable to the FRAND question; in fact, some

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[332] *See* Jorge L. Contreras & Richard J. Gilbert, *A Unified Framework for RAND and Other Reasonable Royalties*, 30 BERKELEY TECH. L.J. 1451, 1453 (2015).

[333] *See* Kobayashi & Wright, *supra* note 19, at 33.

[334] *See* Contreras & Gilbert, *supra* note 333, at 1454. But see Epstein & Noroozi, *supra* note 103 for another perspective.

[335] *See* Layne-Farrar & Wong-Ervin, *Methodologies for Calculating FRAND Damages*, *supra* note 78.

[336] *See* Contreras & Gilbert, *supra* note 333, at 1458.

[337] *See id.* at 1467.

[338] 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970).

factors are contrary to FRAND principles.[339] For this reason, as noted above, courts have recently modified the *Georgia-Pacific* factors to accommodate the unique issues of FRAND.[340] Commentators too have suggested these and other modifications to the *Georgia-Pacific* factors should be implemented to alleviate patent hold-up and royalty stacking.[341]

Other primary disputed and open issues with respect to FRAND include: whether methodologies for determining FRAND royalty rates or damages must take into account concerns about patent hold-up and royalty stacking or whether implementers must provide actual proof of hold-up or royalty stacking; whether courts should apply the incremental value rule in determining FRAND rates and damages; what constitutes a comparable license for benchmarking purposes; and whether the appropriate royalty base is limited to the "smallest salable patent practicing unit" and what that actually means (i.e., whether a patent is fully implemented by the end user device, such as the handset, or component part, such as the chipset).[342] This is problematic, however, because it represents a departure from real-world licensing practices; actual licenses specify reasonable royalty rates as a percentage of a downstream product.[343] To base licenses instead on the smallest salable patent practicing unit means that rates will be determined without consideration of market data from comparable licenses, because this type of royalty base is not used by the market.

Commentators argue that the patent owner should be entitled to no more than the "incremental value" of the patented technology, relative to its next-best alternative and measured before the standard has been adopted.[344] Indeed, the 2011 FTC report entitled "*The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition*," states that sound practice requires "when it can be determined, [for] the incremental value of the patented invention over the next-best alternative [to] establish[ ] the maximum amount that a willing licensee would pay in a hypothetical

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[339] *See* Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1230 (Fed. Cir. 2014) ("In a case involving RAND-encumbered patents, many of the *Georgia-Pacific* factors simply are not relevant; many are even contrary to RAND principles.").

[340] *See, e.g.*, *id.* at 1231–32.

[341] *See, e.g.*, Christopher B. Seaman, *Reconsidering the Georgia-Pacific Standard for Reasonable Royalty Patent Damages*, 2010 BYU L. REV. 1661 (2010); Norman V. Siebrasse & Thomas F. Cotter, *The Value of the Standard*, 101 MINN. L. REV. 1159, 1164 (2017).

[342] *See* Layne-Farrar & Wong-Ervin, *Methodologies for Calculating FRAND Damages*, *supra* note 80.

[343] *See* Sidak, *supra* note 299, at 59–60.

[344] *See* Contreras & Gilbert, *supra* note 333, at 12–13.

negotiation"[345] as a maximum limit on reasonable royalties. But determining the next best alternative or how the rate should be set is far from clear.[346]

Many commentators also insist that courts should limit the circumstances in which a patentee may receive injunctive relief.[347] A per se ban on injunctions, however, would discourage participation in SSOs.[348] As noted above, in March 2015, IEEE adopted a set of IPR policy revisions that stated a FRAND commitment to the IEEE "precludes seeking, or seeking to enforce" an injunction unless 1) "the implementer fails to participate in, or to comply with the outcome of, an adjudication including an affirming first-level appellate review" or 2) in "jurisdictions where the failure to request a Prohibitive Order in a pleading waives the right to seek a Prohibitive Order at a later time."[349] This is even more restrictive than the courts' denial of injunctions; at least the Ninth Circuit and Federal Circuit left open the possibility of an injunction if the implementer categorically refused to negotiate.[350] IEEE also included a hint of the *Ericsson* opinion, requiring that "reasonable rates" under FRAND must exclude the value resulting from inclusion in the standard.[351] And just as discussed above, per se denial of injunctive relief in SEP infringement cases definitely favors the implementer at the expense of the SSO participant.

Last, but certainly not least, Renata Hesse, previously former Acting Assistant Attorney General, overseeing the Antitrust Division of the U.S. Department of Justice, offered what she deemed procompetitive policy choices for SSOs.[352] These included:

> Establish procedures to identify, in advance, technology that involves patents which the patent holder has not agreed to license on F/RAND terms and determine whether that technology should be included in the standard;

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[345] FED. TRADE COMM'N, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION 189 (2011).

[346] *See* Richard A. Epstein, F. Scott Kieff & Daniel Spulber, *The FTC, IP, and SSOs: Government Hold-Up Replacement Private Coordination*, 8 J. COMPETITION L. & ECON. 1 (2012), https://doi.org/10.1093/joclec/nhs002 (offering a robust criticism of the 2011 FTC report, and instead advocating for the maintenance of the status quo).

[347] *See* Lemley & Shapiro, *supra* note 74, at 2035–39 (suggesting injunctive relief be limited to instances where the patent protects a significant portion of the final product value).

[348] *See* Douglas H. Ginsburg, Taylor M. Owings & Joshua D. Wright, *Enjoining Injunctions: The Case Against Antitrust Liability for Standard Essential Patents*, ANTITRUST SOURCE, Oct. 2014, at 1, 1–2.

[349] *IEEE-SA Standards Board Bylaws*, IEEE STANDARDS ASS'N § 6.2 (Dec. 2015), http://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf.

[350] *See* Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024, 1048 (9th Cir. 2015); Apple, Inc. v. Motorola, Inc., 757 F.3d 1286, 1332 (Fed. Cir. 2014).

[351] *See IEEE-SA Standards Board Bylaws*, *supra* note 350, § 6.1.

[352] *See* Hesse, *supra* note 36.

> Make it clear that licensing commitments made to the standards body are intended to bind both the current patent holder and subsequent purchasers of the patents and that commitments extend to all implementers of the standard, whether or not they are a member of the standards body;
> Give licensees the option to license F/RAND-encumbered patents essential to a standard on a cash-only basis and prohibit mandatory cross-licensing of patents that are not essential . . . while permitting voluntary cross-licensing of all patents;
> Place some limitations on the right of the patent holder who has made a F/RAND licensing commitment who seeks to exclude a willing and able licensee from market through an injunction. . . .
> Make improvements to lower the transaction costs of determining F/RAND licensing terms. . . . [and]
> Consider ways to increase certainty that patent holders believe that disclosed patents are essential to standard after it is set.[353]
> As is clear from these proposals, Ms. Hesse suggests something akin to *ex ante* licensing and denial of injunctive relief in addition to other proposals constraining the behavior of SSOs and SSO participants. Not only do all of Ms. Hesse's suggestions clearly demonstrate a pro-implementer perspective (or perhaps an anti-SSO participant perspective), but as noted earlier, are based, at best, on concern about theoretical problems. In any case, it is difficult to view Ms. Hesse's comments as pro-competitive.[354]

There are some bright spots, however, in what had recently been a very pro-implementer/anti-SSO participant perspective in the United States Government. In January 2017, Maureen Ohlhausen was named Acting FTC Chairman.[355] Ms. Ohlhausen has been critical of the FTC's "well intentioned" efforts to advance the interests of likely infringers and has been unwilling to wholeheartedly adopt the theoretical concerns about royalty stacking and patent hold-up.[356] Instead, although she accepts that these problems are possible, the reality is that there is a "larger and more complicated picture to consider."[357] Thus, she has criticized, among other

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[353] *See id.* at 9–10.

[354] For example, Gregory Sidak has written a very compelling dismantling of Ms. Hesse's policy preferences and approval of the IEEE amended IPR policies, noting how instead of being procompetitive, they actually go against antitrust law and policy. Sidak, *supra* note 16

[355] *Maureen K. Ohlhausen*, FED. TRADE COMMISSION, https://www.ftc.gov/about-ftc/biographies/maureen-k-ohlhausen (last visited Apr. 7, 2018).

[356] *See, e.g.*, David Teece, *How the FTC Has Erred on Innovation Policy Issues*, LAW360, (Sept. 13, 2017), https://www.law360.com/articles/963535/how-the-ftc-has-erred-on-innovation-policy-issues.

[357] *See id.*

things, the no injunction rule[358] as well as the zealous FTC enforcement actions against SSO participants and SEP owners.[359]

A second bright spot is Makan Delrahim, confirmed as Assistant Attorney General for the Antitrust Division at the Department of Justice in September 2017.[360] Mr. Delrahim announced in November 2017 that the DOJ would be realigning its policy and enforcement priorities with respect to SSOs and SEPs.[361] Mr. Delrahim noted that "enforcers have strayed too far in accommodating the concerns of technology implementers" at the risk of "undermining incentives for IP creators, who are entitled to an appropriate reward for developing break-through technologies."[362] Additionally, he recognizes that hold-out, where implementers threaten to not take a license, is a more serious risk than hold-up.[363] He specifically calls out some of the court decisions, described above, as erroneous and notes that the Antitrust Division will "be skeptical of rules that SSOs impose that appear designed to specifically shift bargaining leverage from IP creators to implementers, or vice versa."[364]

Ms. Ohlhausen and Mr. Delrahim provide some hope that policies will shift back to a more even place between SSO participants and implementers, which would benefit innovation and consumers. However, it is important to at least understand why so many courts and commentators have gone in the other direction, stacking the deck in favor of implementers. The next section will explain that basic misunderstandings about how SSOs work and the benefits that SSOs provide have led to so many bad decisions.

B. How These "Fixes" Illustrate Significant Misunderstanding of SSOs and Standards

Putting aside for a moment the actual existence and extent of patent hold-up and royalty stacking in fields with standardized technology, the solutions implemented and proposed by courts and commentators reflect a very basic lack of understanding about how standard setting occurs. It seems that courts

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[358] *See id.*

[359] *See supra* note 5 and accompanying text.

[360] *Meet the Assistant Attorney General*, DEP'T OF JUSTICE, https://www.justice.gov/atr/staff-profile/meet-assistant-attorney-general (last visited Apr. 7, 2018).

[361] *See* Makan Delrahim, Assistant Attorney General, Dep't of Justice, Address at the USC Gould School of Law's Center for Transnational Law and Business Conference (November 10, 2017), https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-usc-gould-school-laws-center.

[362] *See id.*

[363] *See id.*

[364] *See id.*

and commentators believe that SSOs are comprised of a bunch of lawyers, sitting around in a dark-paneled room, hashing out the next great standard based on intellectual property rights and horse trading. Patent valuation and the power of the companies involved seems to be at the forefront of their minds. In this image, the lawyers swap technologies in and out of the standard like sophisticated children trade Monopoly properties near the end of a game. The bartering has less to do with optimizing the technology at hand and more to do with ensuring that each of the key players ends up with an acceptable cut of license fees at the end of the day. Regardless of how colorful this imagined version is, it has very little to do with reality.

Instead, this imagined view of how SSOs work is more like patent pools, where the participants' intellectual property actually comprises the cards on the table. This is because, as discussed above, patent pools are formed very late in the standardization process when parties know which technology has been incorporated.[365] On the other hand, during the many years that go into standard setting activity, SSO participants do not know if they will end up being a patent owner or a licensee of the chosen technological standard, or both.[366] Additionally, SSOs and patent pools are set up to solve very different problems, have different modes of operating, and function very differently. Patent pools also, by themselves, alleviate much of the concern about patent hold-up and royalty stacking[367] and should be viewed as a partial solution to those theoretical problems, rather than being conflated with SSOs.

Even giving courts and commentators the greatest benefit of the doubt, their solutions for the alleged problems of patent hold-up and royalty stacking are based, at the very best, on an erroneous view of what SSOs are doing. These organizations are not picking from a pre-made list of essentially equivalent alternatives; there is not a menu of equally good technologies, from which the SSO is simply making a selection. Rather, SSOs today are at the forefront of innovation. The technology that arises from an SSO did not exist before. The SSO develops these technological advancements by bringing together innovators and creating a collaborative environment by which these gathered great minds can achieve something beyond which any individual company could do for itself.

Yet, this collaborative community of innovators does not come without a cost. Each of the innovative companies that agrees to be an SSO participant does so with the understanding of the investments they have made in research, development, and participation, as well as the risks that their

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[365] *See* Baron & Pohlman, *supra* note 213.

[366] *See* Sternberg, *supra* note 109, at 223–24.

[367] *See* Layne-Farrar & Wong-Ervin, *Analysis of* Ericcsson, *supra* note 85, at 6–7.

innovations may not be selected for incorporation in the standard. They bear these investments and risk with the further understanding that they will receive adequate and fair remuneration as part of the FRAND commitment they have made to the SSO. Unfortunately, the actions of the courts and the proposals by commentators are greatly undermining the value and benefits of SSO participation that are expected in at least two respects. First, while attempting to fix the unproven, theoretical patent hold-up by SSO participants, the changes are actually encouraging and facilitating patent hold-out by implementers. Second, it is likely transaction costs for SSO participants are increasing while a similar increase is not being imposed upon implementers and consumers. The potential consequence of these two issues is that contribution of technology SSOs will decrease.

FRAND commitments reflect benefits and obligations for both the SSO participant and the implementer. The SSO participant discloses their innovative technology and agrees to license this technology in exchange for being incorporated into the standard and receiving a fair and reasonable royalty when licensing its standard-essential technology. FRAND also imposes on the implementer the duty to negotiate with SSO participants in good faith in exchange for a license to use the technology.[368]

A FRAND commitment manifests a waiver of the ability to categorically refuse to grant a license as well as the right to seek an injunction against an implementer without first attempting to negotiate in good faith; however, there is nothing about the FRAND commitment that requires (as some courts have construed) the SSO participant waive injunctive relief when the implementer refuses to negotiate in good faith.[369] Absent injunctive relief in all cases, an implementer would have the incentive to never negotiate—leading to patent holdout.[370] It is, of course, the threat of injunction that "brings parties to the negotiating table and motivates them to draw upon the full scope of their knowledge and creativity in forming contractual and institutional solutions to the perceived holdup problem."[371]

The above cases suggest that SSO participants should be required to continue to negotiate even after they have offered a license on FRAND-terms, necessarily eroding their bargaining power. The cases also suggest

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[368] *See* Epstein & Noroozi, *supra* note 103, at 5.

[369] *See id.* at 20.

[370] *See, e.g.*, Anne Layne-Farrar, *Business Models and the Standard Setting Process*, *in* THE PROS AND CONS OF STANDARD SETTING 34, 49 (2010) ("[O]nce upstream patent holders have no option of seeking injunctive relief, they will have no bargaining power at all in licensing negotiations. Especially within standard setting contexts, where parties typically commit to license via a FRAND promise, such a rule would amount to compulsory licensing, leaving up-stream patent holders at the mercy of licensees.").

[371] *See* Epstein & Noroozi, *supra* note 103, at 23–24.

that an injunction may not be available unless an implementer refuses to engage in any licensing discussions at all.[372] After the injunction cases (and IEEE's IPR policy revision), implementers have numerous motivations and no disincentives to respond to an opening licensing offer with a lowball counter-offer; if years down the road, after infringement litigation is initiated and resolved, the SSO's opening offer is later found to be FRAND-compliant, the implementer can simply accept at that time, at no additional peril.[373] Additionally, an SSO participant must necessarily offer a FRAND-ready opening (lest they be immediately sued for breach of contract) taking away their ability to bargain, and an implementer will obviously bargain down from the FRAND-ready opening, pressuring SSO participants to take an even lower license. This creates a lose-lose cycle for the SSO participant and creates numerous motivations for implementers to infringe and to litigate rather than negotiate.

Another problem with all of this is that most SSO participants signed their FRAND commitments in the past, without understanding that FRAND would be interpreted to effectively preclude a patent owner from seeking injunction. Nothing about the FRAND commitment contracts discussed above included a waiver of injunctive rights.[374] In fact, since the IEEE revised its IPR policy to include a waiver of injunctive relief, key innovators, including Qualcomm, Nokia, Ericsson, and Interdigital are refusing to make further FRAND commitments with IEEE.[375] However, the FRAND agreements in the cases above, where injunctive relief was denied, do not include any such waiver.[376] Rather than a broad waiver of injunctive relief, a fairer test may be the following: injunctive relief may be appropriate for infringement of FRAND-encumbered patents where the licensee has either refused to pay what has been determined a FRAND royalty rate, refused to negotiate in good faith, constructively refused to negotiate by insisting on unfair terms during negotiation, or is not subject to jurisdiction for the award of damages.[377] Additional circumstances could also support award of an injunction, including if the implementer engaged in opportunistic or collusive actions to pay an unfair rate or other bad behavior.[378] It is more logical for

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[372] *See id.* at 31.

[373] *See id.* at 34–35.

[374] *See id.* at 38–39.

[375] *See id.* at 38.

[376] *See id.; see, e.g.*, Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024, 1032 (9th Cir. 2015).

[377] *See* Pamela Jones, *Blackberry Tells the Federal Circuit Judge Posner Got It Wrong Re No Injunctions for FRAND Patents in Apple v. Motorola*, GROKLAW (May 10, 2013, 2:47AM), http://www.groklaw.net/articlebasic.php?story=20130510002810301.

[378] *See id.*

courts to push parties toward negotiated and coordinated solutions through strong recognition of property rights backed by principal preference for injunctive relief.[379] To achieve this, implementers must be required to also negotiate in good faith for FRAND and allow injunctions when that is not the case.[380] These tweaks to the assessment of requests for injunctive relief would go a long way towards more fairly balancing the interests of both implementers and SSO participants.

Additionally, the determination of whether an offered royalty rate is FRAND should also be balanced as between the implementer and the SSO participant, with particular concern for ensuring that the SSO participant is receiving fair market value and an adequate return for the investment and risk it bears. One helpful way to think about whether a given royalty rate is FRAND-compliant includes the following factors: 1) will this rate encourage the SSO participant's continued participation in standard setting activities; 2) does the implementer have reasonable access to the standard; 3) is the rate consistent with a reasonable aggregate royalty amount for the implementer's product; and 4) does the rate approximate those of similarly situated licenses.[381] Furthermore, both the SSO participant and the implementer must have the ability to negotiate. An initial offer by the SSO participant should be viewed simply as a starting point and not a FRAND violation simply because the implementer would like to pay less, just as an implementer does not violate its obligation to negotiate by refusing the initial offer, so long as it has indicated a willingness to negotiate further in good faith.[382] Again, these simple changes, rather than wide-sweeping modifications, should address the theoretical concerns about patent hold-up and royalty stacking, while preserving the ability of the SSO participant to receive adequate value for their participation.

Providing sufficient incentives for innovative firms to continue to participate in SSOs is critical for many reasons. First, standards are more valuable based on widespread acceptance and adoption.[383] This enhances the network effects described above and provides benefits for SSO participants, implementers, and consumers alike. Second, standards are likely to be more innovative and technologically robust with more participation. Any standard is only as good as the technological contributions it has to select from, and these technological contributions are made even better through the iterative

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[379] *See* Epstein & Noroozi, *supra* note 103, at 27.

[380] *See id.* at 37.

[381] *See* Ericsson, Inc. v. D-Link Sys., Inc., No. 6:10-CV-473, 2013 WL 4046225, at *25 (E.D. Tex. Aug. 6, 2013).

[382] *See id.*

[383] *See* Contreras & Gilbert, *supra* note 333, at 32.

review and revision process that SSOs provide. Decreased SSO participation may mean fewer technological contributions, and may also result in a weaker community of scientists and engineers reviewing and making suggestions for improvement. Third, because of FRAND commitments, participation in an SSO by an innovative firm means that technology covered by SEPs will be made widely available for license to implementers.[384] Finally, participation in SSOs creates a competition amongst firms in the particular technology space, increasing the pace of innovation.[385] The collaboration that follows this competition further hastens the rate of innovation. All of these positive aspects of standardization require extensive and active participation by numerous innovative firms.

To continue to attract the most active and innovative firms to the standard setting process, policies surrounding SSO participants must acknowledge and protect these firms' intellectual property rights. "[T]he incentive to develop new products and processes on which to base future standardization will be lost if the standard-making process is carried out without due regard for intellectual property rights."[386] These innovative firms may instead opt to decline to participate in standard setting activities to avoid the burdens and detrimental aspects associated with SSOs and SEPs. In fact, the absence of intellectual property rights may lead to the underproduction of standards.[387] Worse still, as these innovative firms stop participating in SSOs, they may also be less inclined to license their technology to the industry or may even decrease resources allocated to research and development altogether.[388]

Some may contend that this is merely a parade of horribles and that the changes being implemented by the courts and proposed by commentators are not going to have actual detrimental effects. Although there are few data points, it is not mere argument that SSO participants will decrease participation if the costs of standard setting activity become greater than the benefits afforded. For example, ETSI's initial efforts at crafting an IPR policy included substantial restrictions on SSO participants, including setting maximum royalty rates and a waiver of injunctive relief.[389] Many SSO participants and other SSOs were highly critical of these provisions and even

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[384] *See* Stoll, *supra* note 23.

[385] *See* Robert P. Taylor, *Standard Setting: A Growing Morass*, *in* INTELLECTUAL PROPERTY ANTITRUST 2002 545, 547 (David Bender ed., 2002) ("Collaborative standard setting is pervasive in the modern economy and increasingly important to healthy competition in numerous industries.").

[386] Commission of the European Communities, *Communication from the Commission: Intellectual Property Rights and Standardization*, at 1, COM (1992) 445 final (Oct. 27, 1992).

[387] *See* Kobayashi & Wright, *supra* note 19, at 4.

[388] *See id.* at 29.

[389] *See* Roger G. Brooks & Damien Geradin, *Interpreting and Enforcing the Voluntary FRAND Commitment*, 9 INT'L J. IT STANDARDS & STANDARDIZATION RES. 1, 17 (2011).

threatened to withdraw from ETSI, leading ETSI to abandon these more restrictive provisions in favor of a more traditional FRAND policy.[390] As policies affecting SSO participants become more unfavorable to innovative firms contributing their technology to standards, it would be foolish to assume that they will simply accept the new terms and continue contributing technology to SSOs.

V. CONCLUSION

Returning to the lawsuit mentioned in the Introduction to this article, the FTC has brought suit against Qualcomm, alleging that the company's SEP licensing practices hinder innovation.[391] However, the reality is that the opposite is true. What will actually impede innovation is courts and commentators, and now the FTC, interfering with SSOs and SSO participants, making participation in standard setting activities less attractive. One reason for this is that the changes in policy being implemented and proposed are coming from entities that do not understand the complexities of the standard setting process. Specifically, there are significant investments being made and risks being assumed by SSO participants in exchange for a limited set of benefits. Recent legal and policy changes to SEP licensing are eviscerating these benefits with no regard for the investments and risks undertaken. As participation in SSOs becomes less appealing, innovative firms are likely to opt out of participation in standard setting and, possibly, out of innovation altogether. In essence, the ignorance about standard setting will win over innovation.

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[390] *See id.* at 17, 21. Additionally, ETSI has twice since tried to define its IPR policies and FRAND provisions in ways that were more restrictive to SSO participants and both times subsequently backed down from the change due to SSO participant pressure. *See id.* at 18–21.

[391] *See* Lipman, *FTC Sues Qualcomm*, *supra* note 3.