

Standard-Essential Patents and the Problem of Hold-Up

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Introduction

Commitments to license patents essential to industry standards on fair, reasonable and non-discriminatory (“FRAND”) or on reasonable and nondiscriminatory (“RAND”) terms are ubiquitous in high-tech industries, but the commercial and legal consequences of these promises remain far from resolved.¹ This uncertainty does not reflect a lack of attention or interest in the topic. To the contrary, a substantial body of commentary and a developing body of case law and enforcement agency guidance has addressed the proper interpretation and enforcement of FRAND commitments by owners of standard essential patents (“SEPs”). Despite general recognition that breaches of FRAND commitments by SEP owners carry the potential to hold up implementers of industry standards through post-contractual opportunism, some SEP holders and their advocates have questioned the existence of such a problem and have argued that SEP holders themselves are subject to hold-up by standard implementers that refuse their royalty demands.

Following a brief review of the background and policy considerations underlying FRAND commitments to standard-setting organizations (“SSOs”), this article reviews evidence of efforts by holders of FRAND-encumbered SEPs to evade FRAND commitments. A growing body of case law now adds empirical heft to the viewpoint that the concerns over breaches of FRAND commitments are real, and that patent hold-up poses a substantial risk of subverting the system of cooperative standard-setting and thereby undermining the widespread benefits that it confers on society. After discussing this case law and its implications for the debate regarding the hold-up problem, we consider a number of arguments that have been interposed to suggest that patent hold-up is not a serious concern, and demonstrate that they are flawed.

Preventing Hold-Up in Standard-Setting Through FRAND Commitments

The basic purposes served by FRAND commitments are well-known. They are designed to prevent the exploitation of unearned market power that patentees may gain from the incorporation of their patents into industry standards. These standards are typically developed cooperatively under the auspices of SSOs, with the participation of various industry stakeholders.² At the most basic level, standards enable products from different manufacturers to interoperate, or

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¹ The two terms are generally considered to be equivalent. This article uses the term FRAND.

² These organizations are referred to by some as standards development organizations (“SDOs”).

work together. By facilitating interoperability, standards “simplify product development,”³ “facilitate the sharing of information among purchasers of products from competing manufacturers,” “enhanc[e] the utility of all products and enlarg[e] the overall consumer market.”⁴ Standards also “lower costs by increasing product manufacturing volume” and “increase price competition by eliminating ‘switching costs’ for consumers who desire to switch from products manufactured by one firm to those manufactured by another.”⁵

SSOs typically choose from among “multiple available technologies” that offer “alternative approaches” to solving each technological issue that the standard addresses.⁶ Companies with patents that may cover these alternative solutions compete vigorously for inclusion of their preferred technologies into each standard.⁷ That technological competition for inclusion in a standard, however, is eliminated once a standard is set. Afterward, patents that cover the chosen technology become essential because they must be used to comply with the standard, while patents that embody the alternative approaches go largely unused.⁸ Once a standard achieves commercial acceptance, compliance with the standard becomes a matter of commercial necessity, as failing to comply would render a product incompatible with other companies’ products, and therefore unmarketable in nearly all cases. This phenomenon creates a “lock-in” effect, whereby companies that make or use standard-compliant products must use the SEPs that are incorporated into the standards that they implement.⁹ The lock-in is reinforced by the sunk nature of R&D costs already incurred by standard implementers. Switching away from the standardized technology would require new R&D investments and forgoing further returns on existing investments in standard-compliant products.

Adoption of a standard thus greatly strengthens the bargaining position of a SEP holder relative to potential licensees. Because of the lock-in effect, a SEP holder’s “bargaining power surges because a prospective licensee has no alternative to licensing the patent; he is at the pa-

³ Brief of Amicus Curiae The Institute Of Electrical and Electronics Engineers, Inc., in support of No Party, *Apple, Inc. v. Motorola, Inc.* at 4 No. 2012-1548 (Fed. Cir. Dec. 19, 2012) (“IEEE Amicus Brief”).

⁴ *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297, 308 (3d Cir. 2007).

⁵ *Apple, Inc. v. Motorola Mobility, Inc.*, 2011 WL 7324582, at *1 (W.D. Wis. June 7, 2011).

⁶ IEEE Amicus Brief, at 19. As one SEP owner recently stated, SSO participants “typically” reach a consensus-based decision after considering “multiple proposed solutions to the same technical problem.” *Ericsson on FRAND and SEP Litigation*, submission to the International Telecommunications Union (Oct. 10, 2012), at 1 available at www.itu.int/dms_pub/itu-t/oth/06/5B/T065B0000340007MSWE.docx.

⁷ IEEE Amicus Brief at 19; see Amicus Curiae Br. of the IEEE, VITA, OASIS Open, The Open Group, and PC Indus. Computer Mfrs. Group In Support of Neither Party, *Broadcom Corp. v. Qualcomm Inc.*, at 19, 22, No. 06-4292 (3d Cir. Dec. 19, 2006) (“SSO Amicus Br.”).

⁸ See *Broadcom*, 501 F.3d at 314 (“A standard, by definition, eliminates alternative technologies.”).

⁹ *Apple, Inc. v. Motorola, Inc.*, 869 F. Supp. 2d 901, 913 (N.D. Ill. 2012), *rev’d in part on other grounds*, 2014 WL 1646435 (Fed. Cir. Apr. 25, 2014).

tentee’s mercy.”¹⁰ Importantly, the SEP holder’s strengthened bargaining power after the adoption of a standard is directly attributable to the elimination of the alternatives to the SEP resulting from the adoption of a standard. As a result, unless a SEP holder is constrained by a FRAND commitment, it may engage in what economists call “patent hold-up”—the exploitation of the locked-in position of standard implementers to obtain supracompetitive royalties that are significantly higher than the SEP holder could have obtained before its patent was incorporated into the standard.¹¹

To prevent hold-ups by SEP holders, most SSOs require that, before a patent may be incorporated into a standard, standard-setting participants must commit to license their SEPs on FRAND terms to every company that makes, uses, or sells standard-compliant products. As Judge Posner observed, “[t]he purpose of the FRAND requirements ... is to confine the patentee’s royalty demand to the value conferred by the patent itself as distinct from the additional value—the hold-up value—conferred by the patent’s being designated as standard-essential.”¹² The value conferred by the patent itself is generally viewed as the amount that the SEP holder could have received from licensing before the adoption of a standard, when the patent still faced competition from alternative technologies, or the *ex ante* value.¹³ Thus, a leading technology SSO, the IEEE-SA, “use[s] [] licensing commitments [a]s part of an effort to preserve the competitive benefits of ex ante technology competition.”¹⁴ The SSOs’ interest in “reasonable” royalties does not reflect a desire to regulate pricing. Rather, it is to ensure the commercial viability of the standards that are promulgated under their auspices. As the IEEE-SA put it, the organization’s objective is “to produce standards that any willing implementer can use and that will become widely adopted.”¹⁵

One reasonably might ask why patent holders would agree to make a FRAND commitment and thereby surrender a substantial part of the property rights that their patents confer. The answer is that they do so because they gain valuable benefits in exchange. By taking part in standard-setting activities, patent holders gain the opportunity to influence the development of standards and to include their patented technologies within standards, which in turn may confer a competitive advantage in downstream product markets and provides a guaranteed pool of licen-

¹⁰ *Apple*, 869 F. Supp. 2d at 913.

¹¹ See Joseph Farrell, John Hayes, Carl Shapiro & Theresa Sullivan, *Standard Setting, Patents, and Hold-Up*, 74 ANTITRUST L.J. 603, 613 (2007); see also U.S. Dep’t of Justice and Fed. Trade Comm’n, ANTI-TRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION at 35 (2007), available at <http://www.justice.gov/atr/public/hearings/ip/222655.pdf>.

¹² *Apple*, 869 F. Supp. 2d at 913. See also *Research In Motion Ltd. v. Motorola, Inc.*, 644 F. Supp. 2d 788, 795–96 (N.D. Tex. 2008) (FRAND commitment is as “a ‘bulwark’ against the unlawful accumulation of monopoly power that antitrust laws are designed to prevent”).

¹³ See Federal Trade Commission, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION 194 (2011); Farrell et al. at 610.

¹⁴ SSO Amicus Br. at 10.

¹⁵ Comments of IEEE-SA, FTC Patent Standards Workshop at 2 (Aug. 5, 2011), available at <http://www.ftc.gov/os/comments/patentstandardsworkshop/00046-80184.pdf>.

sees that otherwise may not have used the patents at all.¹⁶ In other words, in exchange for constraints on the financial exploitation of patents for which a commercial market might not have existed absent the standard, SEP holders that make FRAND commitments gain the ability to obtain reasonable royalties from a large body of standard implementers. SEP holders also benefit when their technologies are adopted in a standard because it is generally easier to make compliant products utilizing one's own technologies as opposed to those developed by some other party.

The nature of the FRAND commitment, however, leaves room for interpretation and creates the opportunity for SEP holders to renege on their commitments in order to capture the hold-up value of their patents. Because SSOs typically do not become involved in enforcing FRAND commitments or providing guidance on the content of FRAND-compliant licenses, these issues are left to bilateral negotiations between SEP holders and standard implementers and, where negotiations fail, to the courts. Most of these negotiations occur outside the public eye and are settled by license agreements whose terms are known only to the parties. As a result, it has been difficult to measure the actual incidence of patent hold-up. In recent times, however, an increasing number of negotiations has pitted against each other companies whose differences on the appropriate royalty level for FRAND-encumbered SEPs are measured not by degree but by orders of magnitude. This has produced a rising tide of FRAND litigation and, with it, increasing visibility into the hold-up problem. A brief review of some of the litigated cases will shed some light on whether the problem is real or, as some SEP holders and their advocates claim, purely theoretical or nonexistent.

The Mounting Evidence of Patent Hold-up

Recent litigation has demonstrated that some holders of FRAND-encumbered SEPs have sought to exploit the locked-in position of standard implementers by demanding outsized—indeed, eye-popping—royalty payments, which they have backed up with threats of injunctive relief (or, equivalently, International Trade Commission exclusion orders). This threat of injunction, as a number of courts,¹⁷ the U.S. antitrust enforcement agencies,¹⁸ the U.S. Patent and

¹⁶ *Apple*, 2011 WL 7324582 at *9 (“[B]ecause the 3G Project policy requires its members to abide by the intellectual property policies of the Institute [ETSI], Motorola’s membership in the 3G Project created a contractual obligation among the Institute, Motorola and the 3G Project.”). See also Statement of Joseph F. Wayland Acting Assistant Attorney General, Antitrust Division, Before The Committee on The Judiciary, United States Senate, Regarding “Oversight of The Impact on Competition of Exclusion Orders to Enforce Standards-Essential Patents” (July 11, 2012), available at <http://www.justice.gov/atr/public/testimony/284982.pdf> (“[A] patent holder that also sells products and services related to the standard benefits from expanded marketing opportunities, and patent holders that focus on licensing their inventions benefit from an expanded source of revenue.”).

¹⁷ See, e.g., *Microsoft Corp. v. Motorola, Inc.*, 696 F.3d 872, 877 (9th Cir. 2012); *Apple*, 869 F. Supp. 2d at 914; *Realtek Semiconductor Corp. v. LSI Corp.*, 946 F. Supp. 2d 998 (N.D. Cal. 2012).

¹⁸ See United States Department of Justice and United States Patent & Trademark Office, Policy Statement on Remedies for Standard-Essential Patents Subject to Voluntary F/RAND Commitments, (Jan. 8, 2013), at 5, available at <http://www.justice.gov/atr/public/guidelines/290994.pdf> (“DOJ-PTO Statement”); *Standard Essential Patent Disputes and Antitrust Law*, Prepared Statement of the FTC Before
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Trademark Office,¹⁹ the European Commission,²⁰ and many commentators²¹ have observed, may enable SEP holders to obtain royalties or other licensing terms that reflect the hold-up value, rather than the true economic value, of their SEPs.

We discuss below royalty demands made by holders of FRAND-encumbered SEPs in several recent litigations. To put these demands in perspective, it is important to understand the total number of patents that potentially read on modern technology products, and the impact of such royalty demands on the cumulative royalties, or “royalty stack,” that would burden technology products if such demands were deemed reasonable. According to one widely cited estimate, more than 250,000 patents may be used in a smartphone.²² Although no comparable estimate exists for the number of SEPs that are used in any particular product, it is estimated that thousands of SEPs are used in some standards.²³ Moreover, the number of standards implemented in many technology products is itself quite large. A study of standards implemented in notebook computers found that a typical notebook PC implements at least 251 standards.²⁴ Thus, as one U.S. district court recently described it, the royalty stacking problem “arises because most standards implicate hundreds, if not thousands of patents, and the cumulative royalty payments to all standard-essential patent holders can quickly become excessive and discourage adoption of the standard.”²⁵

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the Subcomm. on Antitrust, Competition Policy and Consumer Rights of S. Comm. on the Judiciary, 113th Cong. (July 30, 2013).

¹⁹ See DOJ-PTO Statement.

²⁰ See European Commission, *Commission finds that Motorola Mobility infringed EU competition rules by misusing standard essential patents* (29 Apr. 2014), available at http://europa.eu/rapid/press-release_IP-14-489_en.pdf; European Commission, *Commission accepts legally binding commitments by Samsung Electronics on standard essential patent injunctions* (29 Apr. 2014), available at http://europa.eu/rapid/press-release_IP-14-490_en.pdf; European Commission, *Antitrust decisions on standard essential patents (SEPs) - Motorola Mobility and Samsung Electronics – Frequently asked questions* (29 Apr. 2014), available at http://europa.eu/rapid/press-release_MEMO-14-322_en.pdf.

²¹ See, e.g., Mark A. Lemley & Carl Shapiro, Patent Holdup and Royalty Stacking, 95 TEX. L. REV. 1991 (2007).

²² See RPX Corporation, Amendment No. 3 to Form S-1, 11 Apr. 2011, at 59, available at <http://www.sec.gov/Archives/edgar/data/1509432/000119312511101007/ds1a.htm>; Steve Lohr, Apple-Samsung Case Shows Smartphone as Legal Magnet, N.Y. Times, 25 Aug. 2012, available at <http://www.nytimes.com/2012/08/26/technology/apple-samsung-case-shows-smartphone-as-lawsuit-magnet.html>.

²³ Lemley & Shapiro, 85 Tex. L. Rev. at 1992.

²⁴ Brad Biddle et al., *How Many Standards in a Laptop? (And Other Empirical Questions)*, (2010), available at www.standardslaw.org/How_Many_Standards.pdf.

²⁵ *In re Innovatio IP Ventures, LLC Patent Litig.*, 2013 WL 5593609 at *9 (N.D. Ill. Oct. 3, 2013).

It is with this perspective in mind that Motorola's royalty demand in *Microsoft v. Motorola*, backed by the threat of injunctive relief, should be evaluated.²⁶ Motorola demanded a "reasonable royalty of 2.25% per unit ... calculated based on the price of the end product (e.g., each Xbox 360 product)" for 11 asserted SEPs covering certain technical aspects of the IEEE 802.11 wireless networking (Wi-Fi) standard and 16 asserted SEPs covering the ITU H.264 video coding standard, as well as a grantback license to Microsoft's own SEPs.²⁷ In litigation against Apple, Motorola asserted an entitlement to a royalty range of 0.90% to 1.125% of the price of Apple devices for a single asserted Wi-Fi SEP.²⁸ The theory propounded by Motorola's expert in support of this demand was that a single SEP should garner 40-50% of the royalty on the entire portfolio of Wi-Fi SEPs,²⁹ reportedly on the theory that "it only takes one bullet to kill."³⁰

To understand better the implications of a royalty demand in the range of 1% of a complex product for a single SEP or 2.25% for a small set of SEPs, it is useful to understand what these SEPs represent both numerically and in terms of their significance. Motorola's asserted Wi-Fi SEPs and its H.264 patents accounted for less than 1% of the estimated number of SEPs under each of those standards.³¹ Moreover, the *Microsoft* court determined that Motorola's Wi-Fi patents "contribute very little to the standard" and that its H.264 patents "provide only minor importance to the overall functionality of Microsoft's Xbox product."³² The cumulative royalty implied by Motorola's demand for its sliver of insignificant SEPs out of a universe of thousands for a single standard are staggering, even before accounting for the multiplicity of standards implemented in modern technology products and the multitude of patents that are not standard essential that may read on such a product. In Motorola's litigation against Microsoft, the court found that the reasonable royalty for the company's Wi-Fi SEPs was \$0.03471 per unit and \$0.0555 per unit for its H.264 SEPs,³³ a tiny fraction of the \$6 to \$8 per unit that a 2.25% royalty

²⁶ *Microsoft Corp. v. Motorola, Inc.*, 2013 U.S. Dist. LEXIS 60233 (W.D. Wash. Apr. 25, 2013).

²⁷ *Microsoft*, 2013 U.S. Dist. LEXIS 60233 at *14.

²⁸ *Apple*, 869 F. Supp. 2d at 913.

²⁹ *Id.*

³⁰ See Florian Mueller, *Motorola likens its enforcement of FRAND patents to bank robbery: 'it only takes one bullet to kill,'* available at <http://www.fosspatents.com/2012/02/motorola-likens-its-enforcement-of.html>.

³¹ The number of Wi-Fi SEPs is estimated to be as high as 3,000. *In re Innovatio*, 2013 WL 5593609 at *43. With respect to H.264 patents, a single patent pool administered by MPEG LA includes 275 U.S. SEPs and over 2,400 SEPs worldwide. *Microsoft*, 2013 U.S. Dist. LEXIS 60233 at *228. That count obviously excludes patents whose owners have not offered to license through that pool. If only U.S. patents are counted, Motorola's asserted SEPs accounted for no more than 5.7% of the total, and in all likelihood less.

³² *Microsoft*, 2013 U.S. Dist. LEXIS 60233 at *138, *189.

³³ *Id.* at *259-262; *295-302.

would have produced.³⁴ In its case against Apple, Motorola fared even worse. The court awarded no royalty for its “one bullet.”

Motorola is not alone in making outsized royalty demands for FRAND-encumbered SEPs relating to the 802.11 Wi-Fi standard. In another recent case, the SEP holder’s royalty demands for two FRAND-encumbered patents exceeded the selling price for the prospective licensee’s product. In *Realtek Semiconductor Corp. v. LSI Corp.*, LSI sought an ITC exclusion order against the plaintiff and demanded “a royalty that exceeds the selling price of Realtek’s products.”³⁵ Although it is conceivable that a patent on an extraordinary innovation could command that kind of remuneration, there is no evidence that LSI’s asserted SEPs were anything but minor. LSI did not claim as much, and an examination of the development of the 802.11 standard by the *Microsoft* court produced a determination that “the majority of the technologies available to and/or adopted by the 802.11 drafters were in the public domain and not covered by patent[.]”³⁶ LSI’s demand for a royalty that exceeded the selling price of the product implementing the standard was not unique. Motorola’s demand for a \$6 to \$8 royalty on Microsoft’s accused products also exceeded the price of the Wi-Fi chips in those products. In another case decided several years earlier, a holder of two Wi-Fi SEPs won a 6% royalty on the price of Wi-Fi chips based on two Wi-Fi SEPs,³⁷ itself a staggering amount when one considers the universe of potential Wi-Fi SEPs. LSI, however, did not fare as well. Following the court’s entry of an injunction barring LSI from seeking to enjoin Realtek’s importation of its Wi-Fi chips,³⁸ a jury determined that the FRAND royalty rate for LSI’s two SEPs was only 0.19% of the selling price of Realtek’s Wi-Fi chips,³⁹ an amount 500 times smaller than LSI’s original royalty demand.

The potential impact of hold-up is illustrated by the action brought by Innovatio IP Ventures, a patent assertion entity, against “numerous coffee shops, hotels, restaurants, supermarkets, large retailers, transportation companies, and other commercial users of wireless internet technology.”⁴⁰ This prompted a declaratory judgment action against it by the manufacturers of the accused wireless devices. For its 19 asserted Wi-Fi SEPs, Innovatio proposed a 6% benchmark royalty rate measured against the value of the end product incorporating wireless functionality, as adjusted by a “feature factor” that purported to reflect the contribution of the wireless component to the end product. This methodology resulted in a proposed royalty of \$16 per unit for tablet computers, for example, and nearly \$5 per laptop computer.⁴¹ The court ultimately

³⁴ *Id.* at *265.

³⁵ 946 F. Supp. 2d at 1002.

³⁶ *Microsoft*, 2013 U.S. Dist. LEXIS 60233 at *144.

³⁷ *Symbol Technologies, Inc. v. Proxim, Inc.*, 2004 WL 1770290 (D. Del. 2004).

³⁸ 946 F. Supp. 2d at 1010.

³⁹ Jury Verdict Form, *Realtek Semiconductor Corp. v. LSI Corp.*, Case No. C-12-3451-RMW, Docket No. 324 (Feb. 26, 2014).

⁴⁰ *Innovatio*, 2013 WL 5593609 at *1.

⁴¹ *Id.* at *12.

established a FRAND rate of \$0.0956 per unit, a small fraction of the royalty demand.⁴² The court found that the 19 SEPs at issue “provide[d] significant value to the standard,” but nonetheless comprised only a small fraction of the most important SEPs reading on the IEEE 802.11 standard.⁴³

In both *Microsoft* and *Innovatio*, the courts relied on a hypothetical negotiation between the SEP holder and prospective licensee to determine the amount or range of a reasonable FRAND royalty. The hypothetical negotiation construct is frequently used in the context of patent infringement damages as a means of estimating a reasonable royalty that the patent holder and accused infringer would have agreed upon immediately before the infringement began.⁴⁴ In FRAND cases, the hypothetical negotiation is assumed to occur before the adoption of the standard, so that the FRAND royalty reflects the value of the technical contribution of the SEP to the standard rather than the value of the standard itself in the marketplace.

The results of the hypothetical negotiations conducted by the courts in *Microsoft* and *Innovatio* and the jury award based on a hypothetical negotiation in *Realtek* contrast with the outcome in another case, *Ericsson v. D-Link Systems*, which also involved litigation over the 802.11 Wi-Fi standard.⁴⁵ Ericsson’s royalty demand for five SEPs was \$0.50 per unit, a significant fraction of the \$2.50 selling price for chips implementing the standard.⁴⁶ A jury awarded Ericsson damages consistent with its \$0.50 per unit royalty demand, and the court approved Ericsson’s request for an ongoing royalty rate of \$0.15 per unit on future sales. One further notable aspect of *Ericsson* is that the defendants were producers of products such as PCs and routers that incorporated a wireless chip, rather than the chip manufacturers. The opinion indicates that Ericsson, at least initially, had refused to enter into licensing negotiations with wireless chip manufacturers.⁴⁷

It is notable that the standard implementers in the cases discussed above were large multinational corporations, with the resources to engage in protracted litigation. Less known are the financial settlements extracted by holders of FRAND-encumbered SEPs, which are subject to confidentiality agreements that shield them from the public eye. For example, before having to defend its royalty demands in a declaratory judgment action, *Innovatio* had sent 8,000 demand letters to businesses such as coffee shops and hotels that used Wi-Fi equipment.⁴⁸ The terms of its settlements with these businesses are not known. Nor are the terms of the confidential settlements of infringement cases brought by SEP holders typically known, although the SEP hold-

⁴² *Id.* at *44.

⁴³ *Id.* at *43.

⁴⁴ *Georgia-Pacific Corp. v. United States Plywood Corp.*, 318 F. Supp. 1116 (S.D.N.Y. 1970).

⁴⁵ *Ericsson Inc. v. D-Link Systems, Inc.*, 2013 WL 4046225 (E.D. Tex. Aug. 6, 2013).

⁴⁶ *See id.* at *20.

⁴⁷ *Id.* at *16.

⁴⁸ *See* Executive Office of the President, Patent Assertion and U.S. Innovation at 6 n.3 (June 2013), available at http://www.whitehouse.gov/sites/default/files/docs/patent_report.pdf.

er's law firm in one set of Wi-Fi cases claimed that settlements negotiated with standard implementers "will generate 'hundreds of millions of dollars.'"⁴⁹

The sheer size of the demands made by the SEP holders in the cases discussed above certainly supports the view that implementers of industry standards face a genuine risk of post-adoption patent hold-up. Particularly in the case of Wi-Fi patents, which were at issue in each of these cases, the demands are extraordinary not only because of the royalty stack that they imply but because each involved a small sliver of the universe of SEPs for a standard for which the "central elements" were based on publicly available technologies.

Criticism of Patent Hold-up Misses the Mark

The existence of a patent hold-up problem has been disputed by a number of commentators who generally espouse the views of SEP owners.⁵⁰ These authors contend that there is little empirical evidence to indicate that excessive royalty demands are inhibiting investments in standards-compliant technologies or slowing the adoption of standards. They argue that features of the current FRAND system make hold-up unlikely, and advocate for a narrow interpretation of the FRAND commitment that would allow SEP holders to pursue injunctive relief and set royalty rates without regard to the *ex ante* value of the technology. The section that follows offers a critical appraisal of these points.

a. Hold-up

Some critics have questioned whether hold-up is a legitimate concern, arguing that hold-up arises partially because of a lack of information, and that potential licensees will have the tools and knowledge to identify the SEP holders from whom a license is needed.⁵¹ Their theorem is that any patent hold-up should be foreseeable and, for that reason, avoidable. Put differently, if hold-up is foreseeable, it is not hold-up at all because the SEP holders' demands were part of the initial bargain struck between SEP holders and standard implementers. But the claim that hold-up is or should be foreseeable in the context of FRAND-encumbered SEPs is inapt. There is no evidence that any standard implementer signed up for a regime in which a holder of less than 1% of the SEPs on a single standard for which the key innovations came from the public domain must be paid a royalty in excess of the price of the semiconductor chip that implements

⁴⁹ *McKool Smith and WiLAN Resolve Patent Litigations Against World's Leading Technology Providers*, available at <http://www.mckoolsmith.com/news-pressreleases-130.html> (Feb. 22, 2011).

⁵⁰ See, e.g., Roger G. Brooks, *Patent "Hold-Up," Standards-Setting Organizations, and the FTC's Campaign Against Innovators*, 39 *AIPLA Q.J.* 435 (2011); Roger G. Brooks & Damien Geradin, *Interpreting and Enforcing the Voluntary FRAND Commitment*, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1645878&download=yes; Damien Geradin, Anne Layne-Farrar, and A. Jorge Padilla, *The Complements Problem with Standard Setting: Assessing the Evidence On Royalty Stacking*, (2008), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=949599&download=yes. All of the cited works acknowledge the financial support of Qualcomm, a leading SEP holder in mobile telephony.

⁵¹ Brooks, 39 *AIPLA Q.J.* at 443-46.

the standard. Indeed, testimony in the *Ericsson v. D-Link* case showed that developers of the 802.11 Wi-Fi standard declined to make a particular performance-enhancing feature mandatory because it increased the implementation cost by a mere two cents.⁵²

Because the primary function of a FRAND commitment is to ensure that technologies needed to implement a standard will be widely available on a reasonable basis, the only way that hold-up is foreseeable is to assume in advance that a SEP holder intends to breach its commitments. This requires standard implementers to assume that the entire standard-setting enterprise exists to facilitate post-contractual opportunism, when in fact SSOs have designed their processes to prevent such opportunism. Moreover, the phenomenon of SEP holders demanding outsized royalty payments, often accompanied by threats of injunctions, is relatively recent. Under these circumstances, it is difficult to see how standard implementers should have foreseen such conduct in connection with standards that were promulgated years ago.

Critics also claim that the “repeat player” nature of standard-setting can be relied upon to moderate royalty demands by SEP holders. Some have argued that the SEP holders will be dissuaded from seeking excessive royalties in part because the reputational effects of such conduct would, over time, create an incentive among other participants in standard-setting to exclude the SEP holder’s technologies from future standards.⁵³ But reputational concerns are unlikely to be an effective constraint where a SEP holder’s product business experiences a dramatic decline, and the SEP holder is no longer deterred from engaging in hold-up behavior because of the vulnerability of their own product businesses to reciprocal royalty claims. This appears to explain the behavior of Motorola and Ericsson, companies that shifted their focus in the SEP area to monetization of their SEP portfolios as their product businesses declined. Nor do reputational concerns matter where a SEP holder is a patent assertion entity, which does not participate in standard-setting and acquires its SEPs from their original owners after the latter made their FRAND commitment. Moreover, even a practicing entity with a robust products business could rationally conclude that the benefits of hold-up outweigh any reputational costs. This is particularly true because future standards typically incorporate SEPs on existing standards to maintain backward compatibility, which facilitates the collection of excessive royalties across multiple generations of standards over periods that may span as much as two decades.

b. Injunctive relief

The threat of an injunction is an extraordinarily powerful weapon when asserted by a SEP holder, as the potential licensee faces the prospect of its product being excluded from the market. As one federal court framed the issue, “[i]t would seem clear that a negotiation where one party ... must either come to an agreement or cease its sales ... fundamentally places that party at a disadvantage.”⁵⁴ Similarly, the European Commission has noted that “the threat of injunction, the seeking of an injunction or indeed the actual enforcement of an injunction granted against a

⁵² *Ericsson v. D-Link*, Trial Tr., June 12, 2013, pm session, at 18-20.

⁵³ Brooks, 39 AIPLA Q.J. at 459-61.

⁵⁴ *Microsoft Corp. v. Motorola Inc.*, 871 F. Supp. 2d 1089, 1103 (W.D. Wash. 2012), *aff’d*, 696 F.3d 872 (9th Cir. 2012).

good faith potential licensee, may significantly impede effective competition by, for example, forcing the potential licensee into agreeing to potentially onerous licensing terms which it would otherwise not have agreed to.”⁵⁵ As a result, a rational implementer faced with an injunction threat may well conclude that paying an unreasonable royalty is less risky than fending off infringement litigation.⁵⁶

The use of injunctive relief against willing licensees, or the threat of seeking such relief, is fundamentally incompatible with the FRAND promise. Injunctive relief is an extraordinary remedy that is available only where a patent holder would be “irreparabl[y]” harmed due to a lack of available monetary relief.”⁵⁷ By contrast, a SEP holder that makes a FRAND commitment agrees to license its SEPs to any standard implementer willing to pay a FRAND-compliant royalty, thereby acknowledging that monetary compensation constitutes adequate remuneration for its SEPs.⁵⁸ As Judge Posner has observed, “[b]y committing to license its patents on FRAND terms, [the SEP holder] committed to license ... to anyone willing to pay a FRAND royalty and thus implicitly acknowledged that a royalty is adequate compensation for a license to use that patent.”⁵⁹ In a similar vein, the Federal Circuit, on appeal of Judge Posner’s decision, agreed that “[a] patentee subject to FRAND commitments may have difficulty establishing irreparable harm,” a prerequisite for injunctive relief, and that FRAND commitments “strongly suggest that money damages are adequate to fully compensate [the SEP holder] for any infringement.”⁶⁰

Some authors have argued that the language of FRAND commitments “cannot be read to suggest abdication of injunctive relief.”⁶¹ But the plain meaning of the FRAND language used by leading SSOs requires that SEP holders grant a license to every willing licensee. For example, the bylaws of the U.S.-based IEEE, which is responsible for the development of the Wi-Fi standard for wireless networking, state that a FRAND commitment must provide “that a license

⁵⁵ *Google/Motorola Mobility* (Case No. COMP/M.6381) Commission Decision 2012/C 75/01 [2012] at § 107.

⁵⁶ Fiona Scott Morton and Carl Shapiro, *Strategic Patent Acquisitions* at 5-6 (2013), available at <http://faculty.haas.berkeley.edu/shapiro/pae.pdf> (concluding that a rational standard implementer would be willing to settle for more than three times the royalty level that the court deemed reasonable in *Microsoft v. Motorola* to avoid a mere 1.2% chance of losing in court.)

⁵⁷ *eBay Inc. v. MercExchange, LLC*, 547 U.S. 388, 391 (2006) (patent-infringement injunctions are unavailable unless “remedies available at law, such as monetary damages, are inadequate to compensate for [the plaintiff’s irreparable] injury”).

⁵⁸ *Microsoft*, 871 F. Supp. 2d at 1103.

⁵⁹ *Apple*, 869 F. Supp. 2d at 914.

⁶⁰ 2014 WL 1646435 at *35. The court cited with approval the joint policy position of the U.S. Department of Justice and Patent and Trademark Office that injunctive relief may be appropriate where an infringer unilaterally refuses a FRAND royalty or demonstrates through its conduct that it is unwilling to negotiate. *Id.* See U.S. Department of Justice and U.S. Patent & Trademark Office, *Policy Statement On Remedies For Standards-Essential Patents Subject To Voluntary F/RAND Commitments* 4 (January 8, 2013), available at <http://www.justice.gov/atr/public/guidelines/290994.pdf>.

⁶¹ Geradin, Layne-Farrar, and Padilla at 31.

for a compliant implementation of the standard will be made *available to an unrestricted number of applicants on a worldwide basis* ... under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination.”⁶² In analyzing the virtually identical FRAND commitment of the International Telecommunications Union (“ITU”), the U.S. Court of Appeals for the Ninth Circuit determined that “[t]his language admits of no limitations as to who or how many applicants could receive a license.”⁶³ Similarly, the Intellectual Property Rights (IPR) Policy of ETSI, which is responsible for the development of the 3G and 4G telecommunications standards, while framed in different language, also requires that FRAND commitments guarantee a license to every willing licensee. It requires “an irrevocable undertaking in writing” to grant irrevocable licenses on FRAND terms to “manufacture, including the right to make or have made customized components and sub-systems to the licensee’s own design,” “sell, lease, or otherwise dispose of equipment so manufactured,” “repair, use, or operate equipment,” and “use methods.”⁶⁴ By mandating a license for every potential application of a patent—from manufacture to sale to lease to use or repair—this policy contemplates that the FRAND commitment exclude no potential licensee that is ready to take a license on FRAND terms.

Given that injunctions are designed to provide a remedy where monetary compensation cannot, injunctions should be reserved for the limited circumstances in which monetary damages are an insufficient remedy for patent infringement.⁶⁵ If a standard implementer is either unwilling or unable to pay a judicially-determined FRAND royalty, or is outside the court’s jurisdiction so that monetary relief could not be enforced, monetary compensation may not be an adequate remedy, in which case an injunction should be available. Whenever the SEP holder is able to

⁶² IEEE Standards Board Bylaws § 6.2 (emphasis added), *available at* <http://standards.ieee.org/develop/policies/bylaws/sect6-7.html>. The International Telecommunications Union (“ITU”) requires a patent holder to be “prepared to grant” either a “Free of Charge license” or “a license to an unrestricted number of applicants on a worldwide, non-discriminatory basis and on reasonable terms and conditions to make, use and sell implementations” of the relevant standard. *See* Patent Statement and Licensing Decl. for ITU-T or ITU-R Recommendation, *available at* http://www.itu.int/dms_pub/itu-t/oth/04/04/T04040000020003PDFE.pdf; *see also* TIA/IPRSC 20JUNE2008 (June 20, 2008) (“‘RAND’ patent policies seek ... to make that patented technology available to *all* on ‘reasonable and non-discriminatory’ (i.e., RAND) terms and conditions.”), at 1 (emphasis added), *available at* http://www.tiaonline.org/standards/about/documents/TIA-IPR_20080620-003_TIA_OPEN_STANDARDS.pdf.

⁶³ *Microsoft*, 696 F.3d at 884.

⁶⁴ ETSI, *Intellectual Property Rights Policy* § 6.1 (Nov. 30, 2011), *available at* <http://www.etsi.org/WebSite/document/Legal/ETSI%20IPR%20Policy%20November%202011.pdf> (capitalization omitted); *see also* ETSI Guide on Intellectual Property Rights (IPRs) (Nov. 30, 2011) (“ETSI Guide on IPRs”), § 1.4, *available at* <http://www.etsi.org/WebSite/document/Legal/ETSI%20Guide%20on%20IPRs%20November%202011.pdf>.

⁶⁵ *See, e.g., Apple v. Motorola*, at *35; *see also Microsoft Corp. v. Motorola Inc.*, 871 F. Supp. 2d at 1103 (by seeking a “monetary royalty payment for the license of Motorola’s standard essential patents, Motorola implicitly admits that it may be made whole through monetary damages”); Evolving Marketplace Report, at 234-35 (a “prior RAND commitment can provide strong evidence that denial of the injunction and ongoing royalties will not irreparably harm the patentee”).

secure monetary compensation, however, the threat of injunctive relief serves no purpose other than to give the SEP holders leverage to extract royalties above the FRAND levels that they contractually agreed to accept.

c. *Ex Ante* Negotiation

As discussed above, courts have employed a hypothetical negotiation framework to measure FRAND royalties. This hypothetical negotiation is presumed to have occurred before the standard's adoption because "[t]he proper method of computing a FRAND royalty starts with what the cost to the licensee would have been of obtaining, just before the patented invention was declared essential to compliance with the industry standard, a license for the function performed by the patent. That cost would be a measure of the value of patent qua patent."⁶⁶ An *ex ante* negotiation framework preserves the benefits of pre-existing technology competition and ensures the royalty reflects the value of the intellectual property rather than the economic value of the standard itself.⁶⁷

Opponents of the *ex ante* approach argue that it fails to take into account that R&D costs have been invested by the SEP holder but not by a potential licensee at the time of the standard development.⁶⁸ They claim that a hypothetical *ex ante* negotiation vests the prospective licensee with its maximum negotiating leverage over the licensor.⁶⁹ According to this theory, placing the hypothetical negotiation before the standard's adoption skews the incentives of potential licensees and systematically disadvantages the interests of SEP holders. The concern is that if a potential licensee knows that its maximum potential liability for infringement is the amount of an *ex ante* license, it may resist taking a license and force the SEP holder to sue for infringement. Meanwhile, the theory goes, the SEP holders have already incurred the sunk costs of their technology development. This circumstance has been described as "hold-out" or "reverse hold-up." Opponents of the *ex ante* approach argue that the SEP holder should be able to extract higher royalties from licensees that delay taking a license or choose to litigate the validity and infringement of the patent.

The *ex ante* approach is correct because it accurately reflects the bargain that the SEP holder entered into prior to adoption of the standard. The argument that SEP holders should be able to take advantage of market conditions prevailing after a standard has been widely adopted seems to presume that every patent holder is entitled to a guaranteed return on its invention without regard to the existence of competing technologies. In the real marketplace, however, compa-

⁶⁶ *Apple*, 869 F. Supp. 2d at 913.

⁶⁷ Mark A. Lemley & Carl Shapiro, *A Simple Approach to Setting Reasonable Royalties for Standard-Essential Patents* (2013), at 11 ("[T]he reasonable royalty rate does *not* include the value attaching to the creation and adoption of the standard itself. To allow patentees to capture that value, which flows from the collective adoption decisions of the group rather than the underlying value of the technology chosen, would undermine the goals of the FRAND commitment.").

⁶⁸ See Brooks, 39 AIPLA Q.J. at 465.

⁶⁹ *Id.* at 465-66.

nies lose their sunk costs every day when their products succumb in competition to rival products that consumers prefer. The existence of sunk costs is therefore irrelevant to the analysis.

Nor should patent litigation by a potential licensee affect the royalty rate that the SEP holder is awarded. The risk of litigation in enforcing a patent “is not unique to standard-essential patents. Attempts to enforce any patent involve the risk that the alleged infringer will choose to contest some issue in court, forcing a patent holder to engage in expensive litigation.”⁷⁰ The reasonable royalty in ordinary patent litigation also is measured by an *ex ante* standard, albeit at a level to which the parties would have agreed immediately before infringement began if they believed the patent was valid and would be infringed absent a license.⁷¹ Moreover, in the specific case of SEPs, it is quite understandable why prospective licensees choose to litigate. A recent compilation of the litigation record of the three companies that have litigated the most SEPs (InterDigital, Motorola, and Samsung) reveals that only seven out of 58 SEPs litigated by these companies, or 12%, ultimately were judged to be valid and infringed.⁷² Faced with outsized royalty demands and an exceedingly low probability of infringement, a prospective licensee’s choice of litigation can hardly be characterized as reverse hold-up.

Just as significantly, this critique ignores the options that are available to patent holders at the time of the hypothetical *ex ante* negotiation. They have the full ability to refrain from making a FRAND commitment and avoid the constraints that it imposes should their patents find a commercial use.⁷³ But companies make FRAND commitments despite the constraints that these commitments impose because doing so enables them to influence the selection of technologies that standards incorporate and thereby gain a valuable guarantee that every standard implementer will need to license their patents. To take the Wi-Fi standard as an example, the Wi-Fi Alliance estimates that 1.1 billion Wi-Fi 802.11 devices were sold worldwide in 2011, and this number is expected to double by 2015.⁷⁴ To give a sense of the impact of such a guaranteed market of licensees, a royalty of just one tenth of a cent on a billion devices will generate \$1 million in revenues annually. It appears that the critics’ position is that SEP holders should be entitled to both the guarantee of a large market of locked-in standard implementers and a royalty rate reflecting the inability of locked-in implementers to switch to alternative technologies that existed prior to adoption of the standard. The view that royalty rates should be defined by the *ex post* actions of implementers, rather than with reference to the *ex ante* bargain entered into by the SEP holder, essentially amounts to a justification of post-contractual opportunism.

⁷⁰ *Innovatio*, 2013 WL 5593609 at *11.

⁷¹ *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1324-25 (Fed. Cir. 2009).

⁷² John Jurata, Jr. & David B. Smith, *Turning the Page: The Next Chapter of Disputes Involving Standard-Essential Patents*, at 5, *CPI Antitrust Chronicle* (Oct. 2013).

⁷³ *See Microsoft v. Motorola*, 696 F.3d at 885 (“Motorola could have withheld the [FRAND] promise at the price of having the ITU avoid its patents when setting standards, but chose not to.”).

⁷⁴ Press Release: Wi-Fi® Innovations and User Enthusiasm Propel Continued Sales Growth, Wi-Fi Alliance (10 January 2012), *available at* <http://www.wi-fi.org/media/press-releases/wi-fi%C2%AE-innovations-and-user-enthusiasm-propel-continued-sales-growth>.

Moreover, the “reverse hold-up” argument implies that SEP holders are being systematically undercompensated by FRAND royalties. If that were the case, one would expect to see the withdrawal of significant technology developers from participation in cooperative standard-setting. The voluntary nature of the FRAND commitment means that patent holders may dynamically evaluate the benefits and disadvantages of participating in standard-setting to maximize their overall return on their IP portfolio. At least to date, however, there is no evidence of such withdrawal.

Finally, the assumption that potential licensees will view infringement as a cost-free strategy seems not well-founded. A hold-out strategy by implementers would be imprudent because the standard implementer ultimately would both have to pay a reasonable royalty and incur the high costs of patent litigation if the SEP is proven to be valid and infringed (and outside the United States it would have to pay the winning plaintiff’s legal fees and costs as well).

d. Royalty Stacking

The problem of excessive royalty demands is exacerbated by the issue of royalty stacking. Royalty stacking results in higher aggregate royalties compared to the royalty burden that would be imposed by a single licensor that owned all of the licensed patents.⁷⁵ The potential impact of royalty stacking on contemporary high-tech products can hardly be overstated. For example, the court in *Microsoft* noted that 92 different entities had submitted letters of assurance to the IEEE with respect to licensing of 350 SEPs (and 30 patent applications) for 802.11 patents, and that 59 more companies had filed “blanket” letters of assurance for an unspecified number of additional 802.11 patents.⁷⁶ Thus, “[i]f each of these 92 entities sought royalties similar to Motorola’s request of 1.15% to 1.73% of the end-product price, the aggregate royalty to implement the 802.11 Standard, which is only one feature of the Xbox product, would exceed the total product price.”⁷⁷

Some commentators and one court have questioned the existence of royalty stacking. For example, Geradin, Layne-Farrar, and Padilla assert that there is “little evidence of systematic problems of royalty stacking within standard setting that are not already adequately dealt with through existing mechanisms, including cross licensing, patent pools, and repeat play reputation.”⁷⁸ In a similar vein, the district court in *Ericsson v. D-Link* characterized the royalty stacking problem as merely “theoretical.”⁷⁹ We disagree. The royalty stack on Wi-Fi chips from a mere four recent judicial decisions—two of which acknowledged royalty stacking as a real prob-

⁷⁵ Lemley & Shapiro, 85 TEX. L. REV. at 2015.

⁷⁶ *Microsoft*, 2013 U.S. Dist. LEXIS 60233 at *149.

⁷⁷ *Id.* at *213.

⁷⁸ Geradin, Layne-Farrar, and Padilla at 5.

⁷⁹ *Ericsson*, 2013 WL 4046225 at *18.

lem—demonstrates that the problem is quite serious and, indeed, has not been adequately addressed even by the courts that attempted to remedy the problem.⁸⁰

The decisions in *Microsoft*, *Innovatio*, *Ericsson*, and *Realtek* included royalty awards on 35 Wi-Fi SEPs. *Microsoft* involved 11 relatively insignificant Wi-Fi SEPs, *Innovatio* involved 19 Wi-Fi SEPs that provided significant value to the standard, *Ericsson* involved three SEPs as to which the court made no finding regarding significance, and *Realtek* involved two SEPs as to which the court made no finding regarding significance. All of these SEPs relate to a standard for which the fundamental technology, as Judge Robart found in *Microsoft*, was in the public domain.⁸¹ The universe of Wi-Fi SEPs, as stated earlier, is approximately 3,000 patents, so the patents at issue accounted for approximately 1.2% of all Wi-Fi SEPs. The royalties awarded by these four courts totaled \$0.283. The royalty stack implied by these four judgments, if all SEP holders were to obtain comparable royalties, is \$24.25, or nearly ten times more than the \$2.50 Wi-Fi chip price cited in the *Ericsson* decision and 24 times the price of the lowest-price Wi-Fi chip at issue in *Realtek*.⁸² This analysis actually understates the royalty stacking problem because evidence cited in the *Ericsson* opinion showed that only 17.5% of the features of a Wi-Fi chip “relate[] to” the standard.⁸³

It is true that cross-licensing would reduce the monetary royalty stack to some extent, but a company that enters into a cross license is providing value, which should not be disregarded in computing the royalty stack. And although it is true that patent pools could also reduce the royalty stack, because they are specifically designed to reduce the Cournot complements problem,⁸⁴ very few Wi-Fi SEPs are licensed through a patent pool, and the same is true for key mobile telephony SEPs. Critics are left then with the reputational argument, to which the royalty demands of the SEP holders in the four cases discussed offer a sound rebuttal. In short, the evidence refutes the critics’ claim that royalty stacking is nonexistent or merely a theoretical problem.

⁸⁰ For an analysis focusing on the potential royalty stack applicable to a complete product, rather than a single Wi-Fi chip, see Ann Armstrong, Joseph J. Mueller, and Timothy D. Syrett, *The Smartphone Royalty Stack: Surveying Royalty Demands for the Components Within Modern Smartphones* (2014), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2443848&download=yes. The authors estimate potential patent royalties on smartphones to be in excess of \$120 for a hypothetical \$400 product.

⁸¹ 2013 U.S. Dist. LEXIS 60233 at *144.

⁸² See *Ericsson*, 2013 WL 4046225 at *18 (citing US\$2.50 average selling price); David Long, *Jury returns RAND-royalty rate of 0.19 percent of WiFi chip sale price (Realtek v. LSI)*, available at <http://www.essentialpatentblog.com/2014/02/jury-returns-rand-royalty-rate-of-0-19-percent-of-wifi-chip-sale-price-realtek-v-lsi/> (estimating 0.19% royalty in *Realtek* case to equal 0.19 to 0.33 cents, which implies a selling price ranging from \$1.00 to \$1.74).

⁸³ 2013 WL 4046225 at *14.

⁸⁴ The Cournot complement problem relates to the situation whereby “multiple input owners each charge more than marginal cost for their input, thereby raising the price of the downstream product and reducing sales of that product.” Lemley & Shapiro, 95 TEX. L. REV. at 2013.

Conclusion

FRAND commitments fulfill an essential role in cooperative standard-setting by ensuring that the market power conferred on SEP holders by the adoption of standards will not be used to hold-up implementers for excessive royalties. Breaches of FRAND commitments, particularly when accompanied by threats of injunctions, risk harms including higher prices, reduced participation in standard-setting, and a decrease in innovation. An increasing number of reported cases indicate that these threats are real and provide empirical evidence refuting claims that hold-up is inconsequential or theoretical. As shown above, arguments disputing the existence of hold-up are inconsistent with the evidence and generally incompatible with the fundamental goals of standard-setting and the FRAND regime in promoting widespread adoption of standards by making necessary technologies available at reasonable costs.