APPORTIONMENT, FRAND ROYALTIES, AND COMPARABLE LICENSES AFTER *ERICSSON V. D-LINK*

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Standard-setting organizations ("SSOs") usually require that their members clarify whether they are willing to provide access to their technology that is essential to a standard under development on fair, reasonable, and nondiscriminatory ("FRAND") terms and conditions—or, in American parlance, reasonable and nondiscriminatory ("RAND") terms and conditions. After the patent holder has agreed to license its standard-essential patents ("SEPs") on FRAND terms, a licensor and a licensee negotiate the exact licensing terms for the use of the SEP portfolio. In the few cases in which parties cannot agree on the exact terms, they might ask a court or an arbitration tribunal to determine a FRAND royalty. The decision of the U.S. Court of Appeals for the Federal Circuit in Ericsson, Inc. v. D-Link Systems, Inc. *identifies important economic principles for determining a FRAND royalty for the use of SEPs. Ericsson is the owner of several patents essential to the 802.11(n) standard—the standard promulgated by the Institute of Electrical and Electronics Engineers ("IEEE") that is commonly known as Wi-Fi—and it committed to license those patents on RAND terms. When negotiations between Ericsson and several manufacturers of multicomponent devices that incorporated the Wi-Fi standard failed to result in a license, Ericsson sued in the U.S. District Court for the Eastern District of Texas and demanded a jury trial to determine the RAND royalty that the manufacturers should pay to use Ericsson's SEPs. Relying on evidence from comparable licenses—that is, licenses to use Ericsson's patents essential to the Wi-Fi standard that Ericsson had signed with third parties similarly situated to the defendants—the jury awarded damages of roughly $10 million to Ericsson. In reviewing the case on appeal, the Federal Circuit confirmed that royalties specified in comparable licenses provide accu-*

rate and reliable evidence of the value of a patented technology for calculating a FRAND royalty. The Federal Circuit rejected the defendants' argument that a chipset (rather than the mobile device) should represent the royalty base to calculate a FRAND royalty. (In simple terms, one typically calculates total damages by multiplying a royalty rate by a royalty base). The Federal Circuit also reiterated the fundamental principle that a party should support allegations about abstract conjectures, such as patent holdup and royalty stacking, with relevant evidence. Unsupported allegations about the SEP holder's supposedly opportunistic licensing practices should not influence the determination of a FRAND royalty. Finally, the Federal Circuit said that a FRAND royalty should not include the value that a technology acquires by virtue of its inclusion in a standard. Although the Federal Circuit was correct in reiterating that a FRAND royalty, like any other royalty for the use of a patented technology, should compensate the SEP holder for the incremental value of its patented technology, the Federal Circuit's decision should not be interpreted as excluding any of the standard's value from a FRAND royalty. To the contrary, when a patented technology creates part of the standard's value, only a FRAND royalty that includes part of that value will adequately compensate the SEP holder for its contribution.

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I.   INTRODUCTION

Regulators across the globe have recognized the benefits that standardization generates for consumers and the economy.[1] Standards promote "efficient resource allocation and production by facilitating interoperability among complementary products,"[2] and, as a result of these efficiencies, standards stimulate economies of scale and increased innovation.[3] Standardization is particularly important in the telecommunications industry, where innovators, service providers, and network owners must collaborate to deliver high-quality services to end users.[4] The evolution from 1G to 4G standards is compelling evidence that end users have

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1.   U.S. DEP'T OF JUSTICE & U.S. PATENT & TRADEMARK OFFICE, POLICY STATEMENT ON REMEDIES FOR STANDARDS-ESSENTIAL PATENTS SUBJECT TO VOLUNTARY F/RAND COMMITMENTS 2–3 (Jan. 8, 2013) [hereinafter DOJ & USPTO JOINT STATEMENT ON SEPS]; *The Annual Union Work Programme for European Standardisation*, § 1, at 2, COM (2013) 561 final (July 31, 2013), http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013DC0561&from=EN; JAPANESE INDUSTRIAL STANDARDS COMMITTEE, JAPAN'S STANDARDIZATION POLICY 2013, at 1 (2013), https://www.jisc.go.jp/policy/nenji/Japans_Standardization_Policy_2013.pdf.

2.   DOJ & USPTO JOINT STATEMENT ON SEPS, *supra* note 1, at 3.

3.   *See* Giovanni Dosi, *Sources, Procedures, and Microeconomic Effects of Innovation*, 26 J. ECON. LITERATURE 1120, 1153–54 (1988); Daniel F. Spulber, *Innovation Economics: The Interplay Among Technology Standards, Competitive Conduct, and Economic Performance*, 9 J. COMPETITION L. & ECON. 777 (2013); G.M. PETER SWANN, THE ECONOMICS OF STANDARDIZATION: AN UPDATE 9 (May 27, 2010), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32444/10-1135-economics-of-standardization-update.pdf.

4.   *See, e.g.*, SUSANNE K. SCHMIDT & RAYMUND WERLE, COORDINATING TECHNOLOGY: STUDIES IN THE INTERNATIONAL STANDARDIZATION OF TELECOMMUNICATIONS 4 (1998).

benefited from this collaboration. The 1G and 2G standards included basic technologies that enabled consumers to use voice and text message services on their mobile devices.[5] The 3G standards built on that technology to introduce data services for mobile devices, and the 4G standards added more advanced technologies to increase the speed and reliability of those data services.[6] Telecommunication standards thus enabled the evolution from mobile devices that merely enabled calls and texting to devices that provide fast and reliable access to mobile data.

With each succession of a new standard, heavy private investment is necessary to introduce new improvements in connectivity, security, and performance that consumers demand.[7] In Europe, market leaders hope to achieve a Digital Single Market, "where individuals and businesses can seamlessly access and exercise online activities" with "a high level of consumer and personal data protection. . . ."[8] To achieve this end, the European Commission has stated that "high-speed, secure and trustworthy infrastructures and content services" will be needed.[9] Attainment of such grand ambitions requires industry coordination, technical expertise, technology sharing, and risky investment in research and development. Standard-setting organizations ("SSOs")—which develop and promulgate industry standards—have recognized the need to fairly compensate companies that have invested in research and development and contribute their innovative technologies to standards. SSOs typically require their participants to clarify whether they are willing to license their technologies implemented in industry standards on fair, reasonable, and nondiscriminatory ("FRAND") terms and conditions—or, in American parlance, on reasonable and nondiscriminatory ("RAND") terms and conditions.[10] The purpose of a FRAND commitment is to ensure that implementers have access to the patented standard-essential technology and that holders of standard-essential patents ("SEPs") are adequately compensated for their contributions to the standard.[11]

After the patent holder has agreed to license its SEPs on FRAND terms, a licensor and a licensee negotiate the exact licensing terms for the use of the SEP portfolio. In the few cases when parties cannot agree on the exact licensing terms and conditions, the parties may ask a court or arbitral tribunal to determine a FRAND *royalty* for the use of SEPs. Courts, regulators, and competition authorities across the globe have

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5. QUALCOMM, THE EVOLUTION OF MOBILE TECHNOLOGIES 6 (2014), https://www.qualcomm. com/media/documents/files/the-evolution-of-mobile-technologies-1g-to-2g-to-3g-to-4g-lte.pdf.

6. *Id.*

7. *Id.* at 8.

8. *A Digital Single Market Strategy for Europe* § 1, at 3, COM (2015) 192 final (June 5, 2015), http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52015DC0192.

9. *Id.*

10. *See* Brandon D. Chan, *Antitrust Paternalism in the "Smartphone Wars"*, 2014 GLOBAL ANTITRUST REV. 1.

11. *See, e.g.,* J. Gregory Sidak, *A FRAND Contract's Third-Party Beneficiary*, 69 FLA. L. REV. (forthcoming 2017) (manuscript at 5, 14–15), https://www.criterioneconomics.com/a-frand-contracts-intended-third-party-beneficiary.html [hereinafter Sidak, *Third-Party Beneficiaries*].

faced this challenge, yet they have not adopted a generally accepted methodology to calculate a FRAND royalty.[12] The experience of the United States—a jurisdiction with a high number of cases that address the determination of a royalty for the use of FRAND-committed patents—can provide valuable guidance for adjudicators.

Judge James Robart of the U.S. District Court for the Western District of Washington rendered the first court-determined RAND royalty in his 2013 *Microsoft Corp. v. Motorola, Inc.* decision.[13] Other judges after Judge Robart have examined the question of how to determine the proper compensation for infringement of RAND-committed patents in *Innovatio IP Ventures*;[14] *Realtek Semiconductor Corp. v. LSI Corp.*;[15] *Ericsson Inc. v. D-Link Systems, Inc.*;[16] and *Commonwealth Scientific and Industrial Research Organisation v. Cisco Systems, Inc.* (*CSIRO v. Cisco Systems, Inc.*).[17] Academic commentary on methodologies to calculate a FRAND royalty has focused primarily on Judge Robart's decision in *Microsoft* and Judge James Holderman's decision in *Innovatio*.[18] Surprisingly, little commentary has addressed other decisions. This lack of intellectual engagement makes much of the earlier commentary outdated and unhelpful, for the reasoning of the Federal Circuit panel and of Chief Judge Leonard Davis of the Eastern District of Texas in *Ericsson v. D-Link* recognizes fundamental economic principles for the computation of a FRAND royalty beyond those discussed in both the previous district court decision and the Ninth Circuit's affirmance in *Microsoft*.[19] Chief Judge Davis' patent decisions, and the appeals from those decisions, are especially informative, as he has personally presided over 1,700 patent matters in the most active district court for patent litigation in the United States.[20] In this Article, I explain how the economic principles

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12.   J. Gregory Sidak, *The Meaning of FRAND, Part I: Royalties*, 9 J. COMPETITION L. & ECON. 931, 988–89, 1000, 1009, 1019–22 (2013) [hereinafter Sidak, *The Meaning of FRAND, Part I*].

13.   No. C10-1823JLR, 2013 WL 2111217 (W.D. Wash. Apr. 25, 2013) (Robart, J.). For the purposes of discussion in this article, I follow the usual convention of making no legal or economic distinction between FRAND and RAND royalties. By making this assumption for present purposes, I do not exclude the possibility that someone may eventually make a compelling argument for why "fair" is not a throwaway word.

14.   No. 2303, 2013 WL 5593609 (N.D. Ill. Oct. 3, 2013) (Holderman, J.).

15.   946 F. Supp. 2d 998 (N.D. Cal. 2013) (Whyte, J.).

16.   No. 6:10-CV-473, 2013 WL 4046225 (E.D. Tex. Aug. 6, 2013) (Davis, C.J.).

17.   No. 6:11-CV-343, 2014 WL 3805817 (E.D. Tex. July 23, 2014) (Davis, C.J.).

18.   *See, e.g.*, Steven M. Amundson, *Recent Decisions Provide Some Clarity on How Courts and Government Agencies Will Likely Resolve Issues Involving Standard-Essential Patents*, 13 CHI.-KENT J. INTELL. PROP. 91 (2013); Damien Geradin, *The Meaning of "Fair and Reasonable" in the Context of Third-Party Determination of FRAND Terms*, 21 GEO. MASON L. REV. 919 (2014); William H. Page, *Judging Monopolistic Pricing: F/RAND and Antitrust Injury*, 22 TEX. INTELL. PROP. L.J. 107 (2014).

19.   *Ericsson Inc.*, 2013 WL 4046225, at *13.

20.   *See Judge Leonard Davis, Eastern District of Texas*, U.S. DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS (Jan. 15, 2015), www.txed.uscourts.gov/cgi-bin/view_document.cgi?document=2388. Judge Davis stepped down as chief judge of the Eastern District of Texas in January 2015, in advance of his previously announced retirement from the bench in May 2015. *See* Casey Murphy, *Judge Davis Planning to Retire from the Bench in May*, TYLER MORNING TELEGRAPH (Tyler, Tex.) (Oct. 15, 2014), http://www.tylerpaper.com/TP-News+Local/206863/judge-davis-planning-to-retire-from-the-bench-in-may.

recognized in *Ericsson v. D-Link* will assist adjudicators who undertake to determine a FRAND royalty. Curiously, in July 2015, the U.S. Court of Appeals for the Ninth Circuit affirmed in full Judge Robart's opinion in *Microsoft v. Motorola*, ignoring the fundamental principles that the Federal Circuit underscored in *Ericsson v. D-Link*, thereby creating a circuit split concerning the principles for determining a FRAND royalty.[21]

In Part II, I analyze the methodology that Ericsson's expert witness on damages applied in *Ericsson v. D-Link* to calculate a FRAND royalty, as the jury relied on his testimony to determine the damages award. Ericsson's expert calculated a RAND royalty on the basis of information observed in comparable licenses that Ericsson signed with third parties for the use of Ericsson's patented technologies incorporated into the 802.11(n) standard—the standard promulgated by the Institute of Electrical and Electronics Engineers ("IEEE") that is commonly known as Wi-Fi. The defendants appealed the damages award, arguing that Ericsson's expert should have used the chipset (rather than the mobile device) as a royalty base to calculate Ericsson's RAND compensation. (In simple terms, one typically calculates total damages by multiplying a royalty rate by a royalty base). The defendants argued that Ericsson's expert violated the entire market value rule ("EMVR"), which specifies that unless the patents in suit drive the demand for the entire product, the jury's damage award should use the "smallest salable patent-practicing component" ("SSPPC")—the smallest component of the downstream product that practices the patent in suit—as a royalty base.[22] The defendants maintained that there was no evidence that Ericsson's SEPs drove the demand for the defendants' products and, consequently, that Ericsson's expert should not have relied on licenses that used the entire value of the product as the royalty base to calculate patent damages.[23]

In addition, the defendants argued that Chief Judge Davis improperly instructed the jury on how to calculate the RAND royalty. The defendants maintained that Chief Judge Davis failed to instruct the jury to account for the risk of patent holdup and royalty stacking when setting a RAND royalty.[24] The defendants also argued that Chief Judge Davis improperly instructed the jury to consider each of the fifteen *Georgia-Pacific* factors, which are routinely used in U.S. patent infringement cases to determine a reasonable royalty upon which the parties would have

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21. No. 14-3593, 2015 WL 4568613 (9th Cir. July 30, 2015); *see* J. Gregory Sidak, *9th Circ. Microsoft FRAND Ruling Ignores Ericsson*, LAW360 (Sept. 1, 2015, 10:21 AM), http://www.law360.com/articles/697175/9th-circ-microsoft-frand-ruling-ignores-ericsson [hereinafter Sidak, *9th Circ. Microsoft FRAND*].

22. Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1225–29 (Fed. Cir. 2014). The reason for using the SSPPC as the royalty base is that the jury "may be less equipped" to derive the right calculation if the jury were to use the entire product as the royalty base. *Id.* Under the same principle, for those cases where the patented technology is proven to drive the demand for the entire product, the royalty base should be the price of the entire downstream product.

23. *Id.*

24. *Id.* at 1236.

agreed in a hypothetical negotiation occurring just before the moment of first infringement.[25] The defendants maintained that many of the *Georgia-Pacific* factors were not relevant and should not have been considered by the jury in calculating Ericsson's RAND compensation.[26]

In reviewing the case on appeal, the Federal Circuit rejected several of the defendants' arguments. It found that Ericsson's damages expert did not violate the EMVR by relying on licenses that used the price of the entire product as the royalty base.[27] The Federal Circuit also found that Chief Judge Davis had no duty to instruct the jury to account for the risk of patent holdup and royalty stacking when determining a FRAND royalty, because no empirical evidence of those conjectures existed.[28] The Federal Circuit said, nonetheless, that Chief Judge Davis (1) failed to present to the jury the exact obligations arising from Ericsson's RAND commitment, (2) instructed the jury improperly to account for every *Georgia-Pacific* factor when setting a RAND royalty, and (3) failed to explain that a RAND royalty should not include any value that the patented technology gained by virtue of its inclusion in the standard.[29] Consequently, the Federal Circuit remanded the case for the jury to recalculate the damage award.[30]

In Part III, I explain that, by accepting the methodology that Ericsson's damages expert applied, the Federal Circuit confirmed the long-established economic principle that comparable licenses—that is, licenses signed in circumstances that are sufficiently comparable to the hypothetical license at issue in suit—reliably inform the value of a licensed technology. From an economic perspective, comparable licenses most accurately reveal the parties' common understanding of FRAND terms and conditions for the use of the licensed SEP portfolio. The Federal Circuit correctly observed that the SEP holder is entitled not to use the price of the smallest salable patent-practicing component as the royalty base when calculating the value of actual royalties negotiated in comparable licenses. This conclusion holds because comparable licenses inform the value of SEPs, even when those licenses use the price of the fully compliant product as the royalty base, and there is no evidence that the licensed SEPs drive the demand for the downstream product. I further explain why, contrary to the theoretical argument that some commentators make, comparable licenses are unlikely to include any increment of value attributable to patent holdup and royalty stacking. From an economic perspective, royalties observed in comparable licenses thus provide the most accurate basis for calculating a FRAND royalty.

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25. *Id.* at 1229 (discussing Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *mod. and aff'd*, 446 F.2d 295 (2d Cir. 1971), *cert. denied*, 404 U.S. 870 (1971)).

26. *Id.*

27. *Id.* at 1226.

28. *Id.* at 1235.

29. *Id.*

30. *Id.* at 1236–37.

In Part IV, I explain that the Federal Circuit correctly emphasized that abstract conjectures, such as the patent-holdup and the royalty-stacking conjectures, are relevant for computing a FRAND royalty only when their proponents can substantiate those conjectures with empirical evidence. The patent-holdup and royalty-stacking conjectures were first presented in 2007, and since then, scholars in economics and in law have exposed the flawed logic of the two conjectures. Supporters of the two conjectures fail to account for developments in the law that have significantly reduced, if not completely prevented, patent holdup and royalty stacking from occurring in practice since academics first published their conjectures. Furthermore, as of 2016—nine years since these theories were first presented—empirical evidence has contradicted the grim predictions made by the proponents of the patent-holdup and royalty-stacking conjectures. Even Mark Lemley, one of the major supporters of the holdup conjecture, has recognized that "we probably have the balance we need" in patent law and recommended that courts and legislators take "some time to digest [past court decisions] and take some time to look around where we are. . . ."[31] Consequently, by 2015, it is demonstrably unsound economic analysis to rely upon the patent-holdup or royalty-stacking conjectures in cases where the alleged infringer has failed to substantiate those conjectures with empirical evidence.[32] Vague allegations of a SEP holder's supposedly opportunistic licensing practices no longer may influence the determination of a FRAND royalty.

In Part V, I explain that the Federal Circuit correctly emphasized in *Ericsson v. D-Link* that the actual obligations arising from a FRAND commitment might differ greatly from one SSO to another. Nonetheless, Ericsson's damages calculation was based on comparable licenses that already internalized the market valuation of Ericsson's precise obligations to the IEEE and its third-party beneficiaries. The determined royalty, thus, inherently reflects the valuation of Ericsson's precise obligations arising from its commitment. Therefore, contrary to the Federal Circuit's conclusion, it seems doubtful that a more detailed instruction by Chief Judge Davis concerning the SEP holder's duties would have changed the RAND royalty that the jury awarded. In this respect, the Federal Circuit more plausibly would have found Chief Judge Davis' error to be harmless.

I further dispute the correctness of the Federal Circuit's direction on remand that Chief Judge Davis exclude certain *Georgia-Pacific* factors from jury instructions for computing a FRAND royalty for Ericsson's SEPs. I explain that the *Georgia-Pacific* framework is particularly unsuitable for calculating a royalty for FRAND-committed patents. If,

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31. Richard Lloyd, *Lemley: The Case for Congressional Patent Reform Is Far Weaker than It Was a Year Ago*, IAM (Oct. 10, 2014) [hereinafter Lloyd, *Interview with Lemley*], http://www.iam-media.com/blog/Detail.aspx?g=28572386-7cf9-4003-8513-12f3edb914a0.

32. Rote reliance on these conjectures is a glaring deficiency in the Ninth Circuit's affirmance in *Microsoft* that puts its analysis of FRAND royalties in conflict with the Federal Circuit's analysis. *See* Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024, 1043 (9th Cir. 2015).

however, a court nonetheless decides to apply that framework, the *Georgia-Pacific* factors should be considered in their entirety so that the jury comprehensively considers the factors that determine the proper magnitude of damages, as moderated by the SEP holder's FRAND commitment.[33] As in patent cases that do not involve SEPs, some *Georgia-Pacific* factors might be neutral and thus require no adjustment of a reasonable royalty. There is, nevertheless, no valid economic justification for the Federal Circuit's conclusion that a district court should instruct the jury to disregard specific *Georgia-Pacific* factors when determining a FRAND royalty.

In Part VI, I analyze the Federal Circuit's statement that a FRAND royalty should not include the value that the patented technology acquired by virtue of its implementation into the standard. I explain that one should not interpret the Federal Circuit's requirement to exclude from the FRAND royalty *any* of the value of the standard, as that result would be both arbitrary and nonsensical. Although the inclusion of a patented technology in a standard might increase that technology's value (because the achieved interoperability might increase the demand for the patented technology), the opposite effect can also occur. The inclusion of superior technologies might increase the value of the standard. The latter consideration is particularly relevant in the context of telecommunications standards, in which the earlier standards established the necessary level of interoperability (by suppressing diverse designs), and the value of the newer standard lies in its higher performance, which more closely depends on the value of the incorporated technologies. For example, the new technologies implemented in the 4G standards transmit data 12,000 times faster than the technologies implemented in the 2G standards.[34] The technologies that enable high-data transmission contribute to the superior value of the 4G standard. The increased value that the 4G standard has over the 2G standard is, however, less dependent on establishing interoperability (which the 2G standard already achieved) and more related to the value of the underlying technologies. When a technology covered by an SEP contributes to the value of the standard, only a FRAND royalty that includes part of the standard's value will properly compensate the SEP holder for the incremental value of its invention.

II. THE *ERICSSON V. D-LINK* DECISIONS

On September 14, 2010, Ericsson, Inc. and its parent company, Telefonaktiebolaget LM Ericsson, filed a complaint for patent infringement

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33. I explain how a court can reconcile the much-maligned *Georgia-Pacific* factors with rigorous economic reasoning in J. Gregory Sidak, *Bargaining Power and Patent Damages*, 19 STAN. TECH. L. REV. 1 (2015) [hereinafter Sidak, *Bargaining Power and Patent Damages*].

34. JULIO BEZERRA, ET AL., BOSTON CONSULTING GROUP, THE MOBILE REVOLUTION: HOW MOBILE TECHNOLOGIES DRIVE A TRILLION-DOLLAR IMPACT 9 (Jan. 15, 2015) [hereinafter BOSTON CONSULTING GROUP REPORT, THE MOBILE REVOLUTION], https://www.bcgperspectives.com/content/articles/telecommunications_technology_business_transformation_mobile_revolution/#chapter1.

in the Tyler Division of the U.S. District Court for the Eastern District of Texas.[35] In its complaint, Ericsson alleged that D-Link Systems, Inc., Netgear, Inc., Belkin International, Inc., Acer, Inc., and other manufacturers of electronic devices had infringed five of Ericsson's SEPs that are incorporated into the IEEE's Wi-Fi standard.[36] After negotiations between Ericsson and the defendant manufacturers failed to produce licenses, Ericsson petitioned the district court to determine the ongoing royalty that the defendants should pay to use the five Ericsson Wi-Fi SEPs at issue.[37]

At trial, Ericsson's expert witness on damages, John Bone, opined on what constituted a RAND royalty. He found that on multiple occasions, Ericsson had licensed its entire Wi-Fi SEP portfolio to third parties.[38] Mr. Bone relied on the royalties actually observed in those licenses to determine the licensing revenue that Ericsson generated from licensing its Wi-Fi SEP portfolio.[39] Because Ericsson asserted only five patents against the defendants, and not its entire Wi-Fi SEP portfolio, Mr. Bone apportioned the revenue observed in comparable licenses to calculate the value of the portfolio attributable to the five asserted patents.[40] In determining the damage award, the jury relied on Mr. Bone's testimony and awarded Ericsson a reasonable royalty of $0.15 per unit,[41] which amounted $10,125,000 in total damages across all defendants.[42]

In a post-trial motion, the defendants challenged the jury's damage award.[43] First, the defendants criticized Mr. Bone's methodology for calculating a RAND royalty. They argued that, by relying on licenses that use the value of the downstream product as the royalty base, Mr. Bone violated the EMVR.[44] The defendants argued that Mr. Bone's testimony was inadmissible as a matter of law[45] because Mr. Bone "fail[ed] to apportion his royalty base between accused features and non-accused features."[46] The defendants also argued that Mr. Bone violated the EMVR by incorrectly using the price of the end product as the royalty base and that his royalty base must, instead, be the value of the SSPPC.[47]

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35. Original Complaint for Patent Infringement at 1, Ericsson Inc. v. D-Link Sys., Inc., No. 6:10-CV-473, 2013 WL 4046225 (E.D. Tex. Aug. 6, 2013), 2010 WL 3694653.

36. *Id.* at 2–4, 9–10.

37. *Ericsson,*. 2013 WL 4046225, at *21.

38. *Id.* at *15.

39. *Id.*

40. *Id.* at *14–15.

41. *Id.* at *23.

42. *Id.* at *1 ("The jury . . . found damages of $435,000 for D-Link, $3,555,000 for Netgear, $1,170,000 for Acer/Gateway, $1,920,000 for Dell, $2,445,000 for Toshiba, and $600,000 for Belkin.").

43. *Id.* at *13.

44. *Id.*

45. Ericsson Inc. v. D-Link Corp., No. 6:10-CV-473, 2013 WL 2242444, at *2 (E.D. Tex. May 21, 2013).

46. *Id.*

47. *Id.*

Second, the defendants alleged that the damage award was inconsistent with the patent holder's RAND obligations.[48] The defendants argued that a proper methodology to calculate a RAND royalty "would necessarily account for the danger that royalty stacking would block or impede the 802.11 standard."[49] They maintained that one of "Ericsson's RAND obligations is to account for the impact of royalty stacking" and that Mr. Bone's methodology failed to account for that requirement in its calculation of a RAND royalty.[50] The defendants requested that Chief Judge Davis grant a new trial on damages.[51]

Chief Judge Davis rejected the defendants' criticisms of Mr. Bone's reliance on royalties observed in comparable licenses. Chief Judge Davis found that Ericsson's expert had not failed to apportion value between the patented and non-patented features of the accused product.[52] Moreover, he found that Mr. Bone had actually performed two levels of apportionment. First, Mr. Bone based his calculation of a reasonable royalty on the revenue that Ericsson generated from licensing its "802.11 portfolio."[53] Chief Judge Davis said that Ericsson's revenue was not attributable to the end products as a whole, but rather to the value of Ericsson's patents that are essential to the Wi-Fi standard.[54] He said that "the money paid under these licenses represents the market's valuation of the 802.11 contributions of Ericsson's patents."[55] Second, Chief Judge Davis found that Mr. Bone apportioned Ericsson's revenue to extract the value attributable to the patents that Ericsson had asserted in the litigation.[56] He emphasized that "[t]he end result of Mr. Bone's analysis is a royalty pool comprising money paid by third party licensees for the value of the asserted patents' contributions to the 802.11 standard."[57] Hence, Mr. Bone did not fail to apportion between the value of the patented technology and the value of non-patented features of the accused product.

Chief Judge Davis also said that the defendants' argument that Ericsson's damage testimony violated the EMVR "fail[ed] for many of the same reasons as Defendants' apportionment argument."[58] He emphasized that "Mr. Bone's revenue base is not the market value of the end products. Rather, it is the market value of the contribution of the asserted patents to the end products."[59] Chief Judge Davis further observed

48.   Ericsson Inc. v. D-Link Sys., Inc., No. 6:10-CV-473, 2013 WL 4046225, at *13, *16, *22 (E.D. Tex. Aug. 6, 2013).
49.   *Id.* at *18 (internal citation omitted).
50.   *Id.*
51.   *Id.* at *13, *19.
52.   *Id.* at *14.
53.   *Id.*
54.   *Id.* at *15.
55.   *Id.*
56.   *Id.* at 14.
57.   *Id.*
58.   *Id.*
59.   *Id.*

that Mr. Bone calculated a per-unit royalty, which "does not fluctuate with the price of the end product."[60] "Regardless of the ultimate sale price of the end product, the royalty rate remains constant."[61] Thus, Chief Judge Davis concluded that Mr. Bone did not violate the EMVR.[62]

Chief Judge Davis also rejected the defendants' argument about royalty stacking. He said that "[t]he best word to describe [d]efendants' royalty stacking argument is theoretical."[63] Chief Judge Davis observed that the "[d]efendants extensively cross-examined Mr. Bone regarding the impact of royalty stacking on standard-essential patents," and Chief Judge Davis found that, "given the opportunity to present evidence of an *actual* stack on 802.11n essential products, Defendants came up empty."[64] Chief Judge Davis consequently denied the defendants' motion for judgment as a matter of law.[65]

The defendants appealed Chief Judge Davis' decision, arguing in part that he erred by not excluding the testimony of Ericsson's damages expert that based the calculation of a RAND royalty on the challenged licenses.[66] The defendants said that because Mr. Bone did not prove that Ericsson's SEPs drove demand for the defendants' entire products, he incorrectly relied on comparable licenses that used the price of the entire product as the royalty base.[67] The defendants would have had Mr. Bone use the SSPPC as the royalty base to calculate Ericsson's RAND royalty.[68] The defendants also argued that Chief Judge Davis improperly instructed the jury about Ericsson's obligation to license its SEPs on RAND terms.[69] The defendants maintained that "enforcing RAND commitments is critical to preserving the benefits of standards and must be considered in any damages award."[70] They further argued that "the district court erred by refusing to instruct the jury to consider patent hold-up and royalty stacking" in the context of SEPs,[71] and they contended that "the district court reversibly erred by giving the jury the customary *Georgia-Pacific* factors because many of those either are not applicable, or may be misleading, in the RAND context," and should consequently not be considered when determining a RAND royalty.[72]

The Federal Circuit rejected the defendants' criticisms concerning Ericsson's reliance on comparable licenses,[73] finding that Ericsson's dam-

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60. *Id.*
61. *Id.*
62. *Id.*
63. *Id.* at *18.
64. *Id.* (emphasis in original).
65. *Id.*
66. Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1225 (Fed. Cir. 2014).
67. *Id*. at 1213; Ericsson Inc. v. D-Link Sys., Inc., No. 610-CV-473, 2013 WL 4046225, at *15 (E.D. Tex. Aug. 6, 2013).
68. *Ericsson*, 2013 WL 4046225, at *14.
69. *Ericsson*, 773 F.3d at 1229.
70. *Id.*
71. *Id.*
72. *Id.*
73. *Id.* at 1236–37.

ages expert did not violate either the requirement to apportion patent damages or the EMVR.[74] The Federal Circuit thus concluded "that the district court properly admitted evidence of the licenses to which D-Link objects. . . ."[75] The Federal Circuit also said that Chief Judge Davis did not abuse his discretion by refusing to instruct the jury about the risk of patent holdup and royalty stacking, emphasizing that reference to theoretical conjectures in jury instructions needs to be supported by empirical evidence.[76]

Nonetheless, the Federal Circuit found that Chief Judge Davis "committed legal error in [his] jury instruction."[77] The Federal Circuit said that Chief Judge Davis erred by: (1) failing to instruct the jury adequately regarding Ericsson's actual RAND commitment; (2) failing to instruct the jury that any royalty for the patented technology must be apportioned from the value of the standard as a whole; and (3) failing to instruct the jury that the RAND royalty rate must be based on the value of the invention, not any value added by the standardization of that invention—while instructing the jury to consider irrelevant *Georgia-Pacific* factors.[78]

The Federal Circuit found that the erroneous jury instructions collectively constituted prejudicial error, and it therefore remanded the case to the district court to recalculate damages.[79]

III. THE PROBATIVE VALUE OF COMPARABLE LICENSES FOR DETERMINING A FRAND ROYALTY

The district court and Federal Circuit opinions in *Ericsson v. D-Link* confirm that it is a reliable methodology to use comparable licenses to calculate a FRAND royalty. Royalties are one element of the terms and conditions defined in a license agreement. Royalties negotiated in real-world transactions accurately reveal the prices that the parties to those licenses consider to be fair, reasonable, and nondiscriminatory. In the context of multicomponent products, market-disciplined royalties inform how market players have disaggregated the value of the licensed technology from the value of noninfringing components. Royalties from comparable licenses thus enable the adjudicator to relate the FRAND royalty to the incremental value of the patented technology and to avoid speculation that could distort the determination of a FRAND royalty. Because sophisticated implementers know of the existence of the SEP holder's FRAND commitment and of their ability (as third-party beneficiaries) to enforce the duties arising from that commitment in court, it is highly improbable that the comparable licenses that those sophisticated

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74. *Id.* at 1226.
75. *Id.*
76. *Id.* at 1232.
77. *Id.* at 1235.
78. *Id.*
79. *Id.*

implementers have negotiated to use SEPs include any patent-holdup value.

A. Calculating a FRAND Royalty from Comparable Licenses

The Federal Circuit has defined comparable licenses to be licenses that are "sufficiently comparable to the hypothetical licenses at issue in suit."[80] The Federal Circuit clarified that, in determining the comparability of a license, it does not suffice to allege "a loose or vague comparability between different technologies or licenses."[81] Licenses that have "no relationship to the claimed invention" or no "discernible link to the claimed technology" are not sufficiently comparable.[82] When licenses, however, are sufficiently comparable to the hypothetical licenses—for example, because they determine the conditions for the use of the exact patent in suit—they are "highly probative as to what constitutes a reasonable royalty for those patent rights because such actual licenses most clearly reflect the economic value of the patented technology in the marketplace."[83] As a result, economic experts have consistently relied on comparable license agreements when computing patent damages.[84]

In *Ericsson v. D-Link*, Ericsson's expert witness on damages relied on comparable licenses to calculate the RAND royalty that D-Link owed Ericsson.[85] The methodology of calculating a FRAND or RAND royalty on the basis of information from comparable licenses, endorsed by Chief Judge Davis,[86] thus differs from the methodology that Judge James Robart applied in *Microsoft v. Motorola*.[87] Judge Robart said that "license agreements where the parties clearly understood the RAND obligation" are relevant for the determination of a RAND royalty for SEPs, but because he found that none of the presented licenses were sufficiently comparable, he used royalties for patent pools as a starting point from which to extrapolate a (higher) RAND royalty.[88]

The methodology in *Ericsson v. D-Link* also differed from the so-called "Top Down" methodology that Judge James Holderman used in *Innovatio IP Ventures,* again because of the absence of comparable

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80. VirnetX, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1330 (Fed. Cir. 2014) (quoting Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1325 (Fed. Cir. 2009)).
81. *Id.* (quoting LaserDynamics, Inc. v. Quanta Computer, Inc., 694 F.3d 51, 79 (Fed. Cir. 2012)).
82. ResQNet.com, Inc., v. Lansa, Inc., 594 F.3d 860, 870 (Fed. Cir. 2010).
83. *LaserDynamics*, 694 F.3d at 79.
84. *See, e.g.*, Michael J. Chapman, *Using Settlement Licenses in Reasonable Royalty Determinations*, 49 IDEA 313, 336 (2009); Thomas F. Cotter, *Four Principles for Calculating Reasonable Royalties in Patent Infringement Litigation*, 27 SANTA CLARA COMPUTER & HIGH TECH. L.J. 725, 734–35 (2011); John C. Jarosz & Michael J. Chapman, *The Hypothetical Negotiation and Reasonable Royalty Damages: The Tail Wagging the Dog*, 16 STAN. TECH. L. REV. 769, 819 (2013).
85. Ericsson Inc. v. D-Link Sys., Inc., No. 6:10-CV-473, 2013 WL 4046225, at *16–18 (E.D. Tex. Aug. 6, 2013).
86. *Id.*
87. *Id.* at *25.
88. Microsoft Corp. v. Motorola, Inc., No. C10-1823JLR, 2013 WL 2111217, at *82 (W.D. Wash. Apr. 25, 2013) (Robart, J.).

agreements.[89] Judge Holderman found that Innovatio licensed the patents in suit to Broadcom, and he said that "that transaction should provide the most appropriate comparable license for determining the value" of the patents in suit, as the license covered "exactly these patents."[90] Nonetheless, Judge Holderman said that neither party presented "an effective means of isolating the value of a license for the twenty-three patents from the rest of the transaction."[91] He concluded that one could not "ascertain the value of the Broadcom-Innovatio license sufficiently to use the transaction . . . as a comparable for determining a RAND rate."[92] Instead, the court relied on the testimony of the rebuttal damage expert, who calculated a RAND royalty by first identifying the average profit that a chipmaker earns on the sale of each chip that practices the standard, and then multiplying that profit by an estimate of the SEP holder's contribution to the value of the standard.[93]

In *CSIRO v. Cisco*, Chief Judge Davis also determined a royalty for a RAND-committed patent essential to the IEEE 802.11 Wi-Fi standard without relying on any comparable licenses.[94] Unlike Judge Robart and Judge Holderman, Judge Davis did not articulate any particular methodology for calculating a RAND royalty in that case. Rather, in defining the bargaining range, Judge Davis found that, during negotiations, Cisco had informally suggested $0.90 per unit as a possible royalty for the '069 patent, and he used that rate as a lower bound on a reasonable royalty.[95] To determine the upper bound on the bargaining range, Judge Davis relied on the $1.90 per unit royalty that CSIRO presented in its public Rate Care license offer.[96] Judge Davis also emphasized that the patent holder did not offer to license its patent in suit on RAND terms for all the iterations of the 802.11 standard that Cisco's infringing products implemented.[97] In addition, he found that the standard-compliant infringing products that the patent holder *had* committed to license to Cisco on RAND terms represented "an incredibly small percentage of the total products at issue" and "would have a *de minimis* impact on the overall royalty."[98] Judge Davis consequently said that any RAND obligation tied to

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89. *In re* Innovatio IP Ventures, LLC Patent Litig., MDL No. 2303, 2013 WL 5593609, at *18 (N.D. Ill. Oct. 3, 2013) (Holderman, J.).

90. *Id.* at *30.

91. *Id.*

92. *Id.* at *31.

93. *Id.* at *37–38. In *Innovatio*, the expert witness advocating the "Top Down" method, Dr. Gregory Leonard, started the calculation of a RAND royalty with the average price of a Wi-Fi chip, which Judge Holderman determined to be the smallest salable patent-practicing component in the downstream end-user product implementing the Wi-Fi standard. On the basis of that price, Dr. Leonard calculated the average profit that a chipmaker earns on the sale of each chip. He then multiplied the profit margin and the price of the chip by his estimate of the share that Innovatio's SEPs contributed to the value of the Wi-Fi standard. *Id.*

94. No. 6:11-CV-343, 2014 WL 3805817, at *11 (E.D. Tex. July 23, 2014).

95. *Id.* at *12.

96. *Id.*

97. *Id.* at *4 ("The evidence shows that CSIRO made no RAND commitment to the IEEE or its members regarding 802.11 g or later revisions to the 802.11 standard.").

98. *Id.* at *12.

CSIRO's patent in suit "does not change the calculation of the damages awarded," which he determined by applying the *Georgia-Pacific* factors.[99] He noted that, "[a]lthough other courts have made specific adjustments to the *Georgia-Pacific* factors to take a RAND commitment into account, specific adjustments . . . are not necessary here."[100] Thus, it is more appropriate to characterize Judge Davis' damages calculation in *CSIRO v. Cisco* as that of a reasonable royalty rather than a RAND royalty.

Therefore, although both Judge Robart and Judge Holderman recognized that comparable licenses would provide a valid methodology to determine RAND compensation for the infringement of SEPs, they adopted a different methodology because of the absence of sufficiently comparable licensing agreements. From an economic perspective, however, the methodology applied in *Ericsson v. D-Link* (which relied on evidence from comparable licenses) provides a more accurate and reliable methodology to calculate a RAND royalty than the methodologies that Judge Robart and Judge Holderman applied because it relies on empirical observations and thereby reduces the risk of error relative to more speculative methods for calculating damages.

I have explained in my previous writings why the methodologies applied in *Microsoft v. Motorola* and *Innovatio* are susceptible to error.[101] First, the royalties from a patent pool may provide an inadequate benchmark to calculate a FRAND royalty if the pool's participants have a business model that significantly differs from the SEP holder's business model.[102] For example, companies that are active in the downstream market might prefer to recover their investment in research and development through the services offered on a standard-compliant product, such as an app for on-demand video streaming offered on a smartphone, rather than through licensing fees. By shifting their revenue source downstream, these companies might be willing to accept far lower rates than SEP holders who are not active in the downstream market would. It would be inappropriate, however, to use those royalties to calculate a FRAND royalty for an SEP holder that could never monetize its invention in the downstream market.

Patent pools are also not useful benchmarks for determining a FRAND royalty because they often reward contributors on the basis of the number of contributed patents, rather than the patents' relative value. Patent pools assume that all patents have the same value.[103] That assumption, however, is incorrect. Economists are skeptical that all patents essential to a standard have the same value. This skepticism is based on a lack of empirical evidence (as of May 2016) to support the notion that all

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99. *Id.* at *14.
100. *Id.* at *12.
101. *See, e.g.*, Sidak, *The Meaning of FRAND, Part I, supra* note 12, at 968, 1012, 1054.
102. *Id.* at 977–98.
103. *Id.* at 1052–54.

patents essential to a standard have equal value.[104] Because patent pools do not differentiate between more valuable and less valuable patents, patent pools tend to attract less-valuable patents and might thus become a "market for lemons."[105] Furthermore, calculating a FRAND royalty based on royalties from patent pools could also stimulate opportunism on the side of companies that are predominantly users of SEPs and that own only a minor share of SEPs. Those companies could form a patent pool with the intention of creating a low reference point with which to calculate a FRAND royalty. Information from patent pools is, therefore, poorly suited to measuring a FRAND royalty.

Similarly, the "Top-Down" approach is an unreliable methodology to compute a FRAND royalty. The Top-Down methodology requires identification of two variables—the average profit that a chip manufacturer earns on the sale of each chip and the average value that the SEPs contribute to the standard used in the chip.[106] The estimation required for the second variable essential to this analysis is reminiscent of the punch line to the old joke about how the economist, stranded on a desert island with no tools, proposes to open a can of food that washes ashore: "First, assume a can opener."[107] Plainly, the value of the SEP holder's contribution to the chipset is not directly observable. To pretend that it is, is to assume the existence of a can opener—it is to assume the answer to the pivotal question that the court seeks to answer. Consequently, the reliability of the final FRAND royalty estimated using the Top-Down approach depends on how rigorously one determines the SEP portfolio's contribution to the chip. Furthermore, as a matter of law within the United States, the Top-Down approach might no longer be a reliable and admissible methodology for calculating a FRAND royalty after the Federal Circuit, in an opinion by Judge Richard Taranto in *Aqua Shield v. Inter Pool Cover Team*, ruled in December 2014 that the infringer's profit earned during the infringement does not cap the patent holder's reasonable royalty.[108]

In contrast to these two unreliable methods for computing a FRAND royalty, calculating a FRAND royalty on the basis of comparable licenses reduces the risk of legal or economic error. From an economic perspective, comparable licenses reveal what the licensor and licensee

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104. *See, e.g.*, Sidak, *The Meaning of FRAND, Part I*, *supra* note 12, at 1050 ("[N]o empirical evidence indicates that it is more probable than not that all SEPs in a standard are of equal valu[e]."); David J. Teece et al., *SDO IP Policies in Dynamic Industries: A Submission in Connection with the October 2012 National Academy of Sciences Symposium on RAND Patent Policies*, Submission to the ITU Patent Roundtable 19 (Oct. 10, 2012) ("[T]here is no reason to believe that the value of different patents (or portfolios of patents) is proportional to the number of patents in the portfolio, even for 'essential' patents.").

105. *See* George A. Akerlof, *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488, 488 (1970).

106. *In re* Innovatio IP Ventures, LLC Patent Litig., MDL No. 2303, 2013 WL 5593609, at *38 (N.D. Ill. Oct. 3, 2013) (Holderman, J.).

107. *See, e.g.*, KENNETH E. BOULDING, ECONOMICS AS A SCIENCE 101 (McGraw-Hill 1970).

108. 774 F.3d 766, 772 (Fed. Cir. 2014).

consider to be fair compensation for the use of the patented technology. First, principles of economics teach that a voluntary license agreement is, by definition, mutually welfare enhancing.[109] The agreed-upon royalty necessarily ensures that both parties expected to be better situated as a result of the license than in its absence. Otherwise, the parties would never have agreed to the license. The royalties, which are directly observable in agreements with similarly situated licensees and determine the conditions for the use of the *same* technology, will most accurately depict the price that a licensee would willingly pay for that technology. An agreed-upon royalty specified in a voluntary licensing agreement can inform what "it would have been worth to the defendant, as it saw things at the time, to obtain the authority to use the patented technology, considering the benefits it would expect to receive from using the technology and the alternatives it might have pursued."[110] Assuming that courts and damage experts have accounted for essential economic differences between the circumstances surrounding comparable licenses and the circumstances surrounding the litigation in question,[111] observing data from real-world licenses obviates speculative lines of economic analysis and, consequently, reduces the risk of errors.[112]

Royalties upon which the parties agreed in comparable licenses (and the other terms specified in the agreement) might be particularly probative in the context of FRAND-committed patents. A royalty is "fair" and "reasonable" if both parties voluntarily agree to it. As I explain in Part III.A, a rational licensee would not willfully agree to pay a royalty rate that exceeds what the licensee believes to be the value that the licensee would derive from the SEPs.[113] Furthermore, the SEP holder typically licenses its SEPs to multiple licensees on a repeated basis. Calculating FRAND compensation based on royalties observed in compara-

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109. *See, e.g.*, ROBERT S. PINDYCK & DANIEL L. RUBINFELD, MICROECONOMICS 584 (Prentice Hall 6th ed. 2005); JOSEPH E. STIGLITZ, ECONOMICS 54–55 (W.W. Norton & Co. 1st ed. 1993) (explaining that, if one of the parties to an agreement expected to be worse off, that party would not enter into the agreement).

110. *See* Carnegie Mellon Univ. v. Marvell Tech. Grp., Ltd., 807 F.3d 1283, 1304 (Fed. Cir. 2015) (citing AstraZeneca AB v. Apotex Corp., 782 F.3d 1324, 1334–35 (Fed. Cir. 2015)).

111. *See id.* (citations omitted).

112. *Cf.* Milton Friedman, *The Methodology of Positive Economics*, in ESSAYS IN POSITIVE ECONOMICS 3, 8 (Univ. of Chicago Press 1953) ("Viewed as a body of substantive hypotheses, theory is to be judged by its predictive power for the class of phenomena which it is intended to 'explain.' Only factual evidence can show whether it is 'right' or 'wrong' or, better, tentatively 'accepted' as valid or 'rejected.'").

113. *See, e.g.*, STIGLITZ, *supra* note 109, at 54–55. This analysis assumes that the bargaining range is positive—that is, that the licensee's maximum willingness to pay exceeds the patent holder's minimum willingness to accept. When the bargaining range is negative—that is, when the licensee's maximum willingness to pay is below the patent holder's minimum willingness to accept—a reasonable royalty can exceed the infringer's profitability, even though the licensee's maximum willingness to pay is bounded by the licensee's expected profitability from the patent in suit. *See* Sidak, *Bargaining Power and Patent Damages*, *supra* note 33, at 28; Sidak, *The Meaning of FRAND, Part I*, *supra* note 12, at 938–39; *see also* Aqua Shield v. Inter Pool Cover Team, 774 F.3d 766, 771–72 (Fed. Cir. 2014) (noting that a reasonable royalty is not necessarily bounded by the infringer's profitability during the infringement).

ble licenses can thus assist the determination of a nondiscriminatory royalty.

U.S. courts have recognized the probative value of comparable licenses for the calculation of patent damages. The Federal Circuit has long recognized that observing royalties determined in comparable licenses is generally a reliable methodology to calculate patent damages.[114] In the 2014 decision in *Apple, Inc. v. Motorola, Inc.*, the Federal Circuit confirmed that the same principle applies when calculating damages for the infringement of FRAND-committed patents, by stating that "using sufficiently comparable licenses is a generally reliable method of estimating the value of a patent."[115] The Federal Circuit emphasized that the ability to analyze data from real-world licenses "removes the need to guess at the terms" to which parties would agree in a hypothetical negotiation.[116] It further said that calculating a FRAND royalty on the basis of comparable licenses "is generally reliable because the royalty that a similarly-situated party pays inherently accounts for market conditions at the time of the hypothetical negotiation, including a number of factors that are difficult to value, such as the cost of available, non-infringing alternatives."[117] The Federal Circuit confirmed this approach in *Ericsson v. D-Link*, by reiterating the general principle that observing royalties determined in comparable licenses is a reliable methodology for determining a FRAND royalty rate.[118]

B.   *Apportionment Analysis and Standard-Essential Patents*

In *Ericsson v. D-Link*, the Federal Circuit clarified that an expert economic witness does not violate the legal requirement to apportion patent damages, nor the evidentiary principle of the EMVR, by basing his calculation of a FRAND royalty on comparable licenses that use the value of the downstream product as the royalty base. In addressing D-Link's criticism that Ericsson's damage expert violated the EMVR, the Federal Circuit rejected the argument that the chipset represents the proper royalty base for the calculation of a FRAND royalty.[119] The Federal Circuit clarified that the purpose of the EMVR is to help the jury properly apportion damages solely to the incremental value of the patented invention.[120] The EMVR, however, is not an economic concept that rational firms consider when negotiating the terms of a license. To the contrary, real-world licenses (concerning SEPs for smartphones, for example) typ-

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114.   *See, e.g.*, ActiveVideo Networks, Inc. v. Verizon Comm., Inc., 694 F.3d 1312, 1333 (Fed. Cir. 2012); Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1325 (Fed. Cir. 2009).

115.   757 F.3d 1286, 1325 (Fed. Cir. 2014) (citing *ActiveVideo*, 694 F.3d at 1333; *Lucent*, 580 F.3d at 1325), *overruled on other grounds* by Williamson v. Citrix Online, LLC, 792 F.3d 1339 (Fed. Cir. 2015).

116.   Monsanto Co. v. McFarling, 488 F.3d 973, 978–79 (Fed. Cir. 2007).

117.   *Apple*, 757 F.3d at 1326 (citing LaserDynamics, Inc. v. Quanta Computer, Inc., 694 F.3d 51, 79 (Fed. Cir. 2012)).

118.   773 F.3d 1201, 1227–28 (Fed. Cir. 2014).

119.   *Id.* at 1225–27.

120.   *Id.* at 1226.

ically do not comport with the EMVR. The Federal Circuit correctly emphasized that the EMVR does not reduce the probative value of real-world licenses for the computation of a FRAND royalty. The Federal Circuit emphasized that a jury can determine FRAND compensation on the basis of royalties observed in comparable licenses, even if those licenses use the value of the downstream product as the royalty base, as those royalties reveal what the licensor and licensee actually consider to be fair compensation for the use of the licensed technology.

1. Economic Methodologies to Apportion the Value of a SEP Portfolio

The Supreme Court has long held that a "patentee . . . must in every case give evidence tending to separate or apportion the defendant's profits and the patentee's damages between the patented feature and the unpatented features. . . ."[121] When a patented technology forms merely one part of a multicomponent product, the "expert witness" on damages must use a methodology that will distinguish the value that is attributable to the patented invention from the value that is attributable to the product's noninfringing components.[122] Because SEPs are typically implemented in complex products that include many patented and nonpatented components, apportionment is particularly relevant for products that implement a standard.

Various methodologies enable one to disaggregate the value of the patented technology from the value of noninfringing components of a complex product. First, one can estimate the patented technology's value by applying a royalty rate to the price of the final product.[123] Such a royalty rate should reflect the value that the licensed technology contributes to the final product and should remove the value attributable to noninfringing technologies. For example, an economist may apply a royalty rate of three percent to the price of a mobile device that incorporates the SEP holder's technology if evidence suggests that three percent of the price of the mobile device is attributable to that SEP. Apportionment by multiplying a royalty rate by the price of the end-product is particularly appropriate when the interaction between patented and noninfringing components of the multicomponent product create complementarity effects and network effects that do not exist when one uses each component individually.[124] In such circumstances, the consumer fully realizes the value of the patent only at the level of the entire product and not in any

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121. Garretson v. Clark, 111 U.S. 120, 121 (1884); *see also* Keystone Mfg. Co. v. Adams, 151 U.S. 139, 148 (1894); City of Elizabeth v. Am. Nicholson Pavement Co., 97 U.S. 126, 138–39 (1877).

122. Ericsson, 773 F.3d at 1226 (citing VirnetX, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1326 (Fed. Cir. 2014)).

123. *Id.*

124. *See, e.g.*, J. Gregory Sidak, *The Proper Royalty Base for Patent Damages*, 10 J. COMPETITION L. & ECON. 989, 994 (2014) [hereinafter Sidak, *Proper Royalty Base*]; J. Gregory Sidak, *The Value of a Standard Versus the Value of Standardization*, 68 BAYLOR L. REV. 59 (2016) [hereinafter Sidak, *Standard Versus Standardization*].

smaller unit. Therefore, a percentage of the entire price of the final product best approximates the incremental value of the patented technology.

As a second methodology, an economist may apportion the value of the patented technology by applying a (higher) royalty rate to the smaller royalty base corresponding to the price of the SSPPC. For example, an economist could apply a royalty rate of thirty percent to the price of the baseband processor chip that instantiates the patent holder's technology. This methodology would be appropriate when the patented technology's interaction with other technologies does *not* create complementarity effects or network effects, and its value is fully materialized in a smaller unit within the multicomponent product.[125] A further caveat is that, if widespread infringement by rival manufacturers has artificially suppressed the price of the SSPPC below the competitive price that would be obtained in a market without such infringement, one should increase the royalty rate by a compensating amount.[126]

As a third methodology, an economist may analyze comparable licenses covering the relevant technology to determine the value that market participants have attributed to the technology. The royalties specified in comparable licenses provide direct information about how the market has disaggregated the value of the licensed technology from the value of the noninfringing components of the complex product. As Chief Judge Davis observed in *Ericsson v. D-Link*, "the licensees would not have paid value for the portion of the standard not covered by [licensed] patents."[127] The royalty paid under these licenses represents the market's valuation of the contribution that the portfolio of SEPs has made to the standard,[128] excluding any value attributable to the noninfringing components.[129]

Regardless of the particular apportionment method that an economist uses, the ultimate goal of any apportionment analysis is to estimate a damages award that compensates the patent holder for all of the value of the patented technology, but none of the value of noninfringing components that are incorporated in the same product.[130] It bears emphasis

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125.   *See, e.g.*, Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc., No. 6:11-CV-343, 2014 WL 3805817, at *11 (E.D. Tex. July 23, 2014) (Davis, C.J.) ("Finally, the primary problem with Cisco's damages model is the fact that it bases royalties on chip prices. CSIRO did not invent a wireless chip. . . . The benefit of the patent lies in the idea, not in the small amount of silicon that happens to be where that idea is physically implemented."); *see also Ericsson*, 773 F.3d at 1226.

126.   Sidak, *Proper Royalty Base*, *supra* note 124, at 1019–20 (citing *Commonwealth Sci.*, 2014 WL 3805817, at *11).

127.   No. 6:10-CV-473, 2013 WL 4046225, at *15 (E.D. Tex. Aug. 6, 2013).

128.   *Id.*

129.   Mark Lemley and Carl Shapiro argue that a royalty upon which a willing licensor and a willing licensee agree in a voluntary license transaction implicitly accounts for the probability that the licensor and the licensee ascribe to the patented technology's being valid, enforceable, and infringed absent the negotiated license. *See* Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, J. ECON. PERSP. 75, 75–76 (Spring 2005).

130.   Ericsson, 773 F.3d at 1226 (citing VirnetX, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1326 (Fed. Cir. 2014)).

that, if perfect information were available, each of the three apportionment methodologies discussed above (that is: (1) applying a royalty rate to the entire value of the product, (2) applying a higher royalty rate to the SSPPC, or (3) observing royalties in comparable license agreements) would lead to the same estimate of damages. Put differently, if applied correctly, each apportionment methodology should yield an arithmetically equivalent result.

2. How Does the EMVR Affect the Use of Information from Comparable Licenses?

For several years, the Federal Circuit had expressed skepticism about apportioning a patented technology's value by applying a lesser royalty rate to the entire value of the downstream product rather than a greater royalty to the value of the SSPPC.[131] The Federal Circuit cautioned that, although one could derive an appropriate royalty by using the entire market value of the downstream product as the royalty base, presenting a jury with the large profits and revenue derived from sales of the downstream product might bias the jury's damages award upward.[132] The Federal Circuit explained that the jury "may be less equipped to understand the extent to which the royalty rate" requires adjustment to reflect the true incremental value of the patented technology.[133] The Federal Circuit consequently developed for jury trials an evidentiary principle—the EMVR—that supports the use of the downstream product as the royalty base only when "the patented feature drives the demand for an entire multicomponent product."[134] Conversely, when in a jury trial there was no evidence that the patented feature drove demand for the entire product, the Federal Circuit favored apportionment using the SSPPC as the royalty base.[135] Apportionment through the use of the SSPPC would, in the Federal Circuit's view, prevent skewing the jury's damages award.

The Federal Circuit's skepticism about apportionment through a non-discounted royalty base is idiosyncratic to American patent litigation, in which the patent holder has the right under the Seventh Amendment to demand that a jury determine patent damages.[136] Clearly, the concern that a non-discounted royalty base might "'skew the damages horizon for the jury'"[137] does not apply when a judge or an arbitral tri-

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131. *See, e.g.*, LaserDynamics, Inc. v. Quanta Computer, Inc., 694 F.3d 51, 61 (Fed. Cir. 2012); Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1320 (Fed. Cir. 2011).

132. *See, e.g.*, *Uniloc*, 632 F.3d at 1320; *VirnetX*, 767 F.3d at 1333.

133. *Ericsson*, 773 F.3d at 1227.

134. *LaserDynamics*, 694 F.3d at 67.

135. *Id.* at 67–68; *see also* Cornell Univ. v. Hewlett-Packard Co., 609 F. Supp. 2d 279, 283, 286–87 (N.D.N.Y. 2009); *VirnetX*, 767 F.3d at 1329.

136. U.S. CONST., amend. VII. For a discussion of the patent holder's right to a jury trial on damages in the United States, see Kimberly A. Moore, *Judges, Juries, and Patent Cases—An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365 (2000).

137. *VirnetX*, 767 F.3d at 1327 (quoting *Uniloc*, 632 F.3d at 1320).

bunal determines damages. A methodology that involves large numbers is unlikely to mislead experienced judges and arbitrators. Consequently, there is little danger of skewing the judgment of a judge or an arbitrator by using the value of the downstream product as the royalty base for calculating patent damages.

Even in jury trials, however, the application of the EMVR is controversial. The Federal Circuit has not substantiated in an intellectually rigorous manner its claim that the EMVR might bias a jury.[138] (By comparison, if an expert witness on damages made the same claim of jury bias without any empirical support, the opposing party would challenge that portion of his testimony as inadmissible in a *Daubert* motion).[139] Further, strict application of the EMVR could create a discrepancy between the royalties negotiated in real-world licenses and those that a court determines pursuant to a hypothetical negotiation.[140] In particular, when the Federal Circuit's preference for a disaggregated royalty base contradicts licensing practices in the real world, strict interpretation of the EMVR would turn the hypothetical negotiation into a bargain that never would have occurred, thereby causing it to be far removed from the negotiation that the parties would have undertaken in practice.[141] Again, by comparison, an expert witness whose testimony so departed from the facts of the real world would find his testimony stricken in a *Daubert* hearing.[142] In addition, using the SSPPC as the royalty base would fail to account for the complementarity effects and network effects that an SEP produces, thereby undercompensating the SEP holder for the incremental value of its invention.[143]

In *Ericsson v. D-Link*, the defendant referred to the EMVR to support its argument that Ericsson's RAND compensation should be calculated by using the price of a Wi-Fi chip as the royalty base.[144] The Federal Circuit, however, rejected the argument.[145] The Federal Circuit explained that the purpose of the EMVR is to help the jury properly apportion patent damages in cases in which it is not clear that a patented technology adds significant value to the end product.[146] It emphasized, nonetheless, that the EMVR does not preclude an economic expert from using information from real-world licenses that use the value of the downstream product as the royalty base, even if there is no evidence that the patented feature drives demand for the downstream product.[147] The Federal Cir-

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138. *See* Sidak, *Proper Royalty Base*, *supra* note 124, at 991.

139. Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579 (1993).

140. Sidak, *Proper Royalty Base*, *supra* note 124, at 991.

141. *Id.*

142. *See VirnetX*, 767 F.3d at 1332 (ruling inadmissible an expert's use of the Nash bargaining solution to determine damages for patent infringement without first "sufficiently establishing that the premises of the theorem actually apply to the facts of the case at hand.").

143. Sidak, *Proper Royalty Base*, *supra* note 124, at 994.

144. No. 6:10-CV-473, 2013 WL 2242444, at *2 (E.D. Tex. May 21, 2013).

145. Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1226 (Fed. Cir. 2014).

146. *Id.*

147. *Id.*

cuit clarified that an expert may apply different methodologies to ensure that the reasonable-royalty award properly reflects the incremental value that the SEP adds to the downstream product.[148] Analysis of data from comparable licenses may provide a valid apportionment methodology.[149]

The Federal Circuit confirmed that basic principle in *CSIRO v. Cisco Systems, Inc*. At trial, Chief Judge Davis rejected both parties' damages models and adopted his own to determine the damages award for patent infringement.[150] On appeal, Cisco challenged the district court's damages award for, among other things, "not beginning its damages analysis with the wireless chip, which it found to be the smallest salable patent-practicing unit."[151] The Federal Circuit, however, rejected Cisco's criticism. The Federal Circuit emphasized that Chief Judge Davis properly began his damages calculation by analyzing the royalties that the parties had proposed in a negotiation for the patent in suit before litigation commenced so as to define the boundaries of the bargaining range.[152] The Federal Circuit added that, by relying on those royalties, "the district court's analysis already built in apportionment . . . [T]he parties negotiated over the value of the asserted patent, and no more."[153] The Federal Circuit emphasized that the proposal that "all damages models . . . [should] begin with the smallest salable patent-practicing unit . . . is untenable."[154]

The Federal Circuit's decision is economically sound and eliminates much of the unfortunate confusion that previously existed in the case law concerning the proper royalty base for patent damages. As the Federal Circuit observed, real-world licenses typically do not comport with the EMVR.[155] Parties to a license often use the value of the downstream product as the royalty base even if there is no evidence that the licensed technology drives consumer demand for the entire device. The EMVR is a legal principle, not a decision-making heuristic that rational firms and individuals use in real-world transactions. Thus, it would be nonsensical to assert that a license executed through private bilateral negotiation must adhere to the EMVR for the royalty that resulted from that negotiation to qualify as admissible evidence of a SEP's value. An evidentiary principle that the Federal Circuit developed to assist a jury's computation of patent damages cannot reduce the probative value of comparable license agreements transacted in the real world.

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148. *Id.*
149. Ericsson Inc. v. D-Link Sys., Inc., No. 6:10-CV-473, 2013 WL 4046225, at *14–15 (E.D. Tex. Aug. 6, 2013) (Davis, C.J.).
150. Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc., 809 F.3d 1295, 1299 (Fed. Cir. 2015).
151. *Id.* at 1301.
152. *Id.* at 1003–04.
153. *Id.* at 1303 (quoting Ericsson, Inc. v. D-Link Sys., Inc. 773 F.3d 1201, 1226 (Fed. Cir. 2014)).
154. *Id.* at 1003–04.
155. *Ericsson*, 773 F.3d at 1228.

The Federal Circuit astutely observed that rendering real-world licenses inadmissible through the EMVR would make it impossible for a patentee to use market-based evidence in patent-infringement cases.[156] Such a rule would limit the use of the most reliable information about the value of an SEP. By clarifying that the EMVR does not limit the probative value of comparable licenses, the Federal Circuit prevented situations in which legal rules could create a discrepancy between the reasonable royalties determined in real-world licenses and the (hypothetically) reasonable royalties determined in court. The Federal Circuit's decision thus comports with the general principle that court-determined damages calculations should aim to reflect the outcomes of real-world, bilateral negotiations.[157]

In sum, the Federal Circuit correctly concluded that an expert economic witness who calculates a FRAND royalty based on licenses that use the value of the downstream product as the royalty base does not violate either the legal requirement of apportionment or the EMVR.

C.   Do Comparable Licenses Include Patent-Holdup Value?

A separate question that may arise when basing a calculation of a FRAND royalty on comparable licenses is whether the royalties specified in those licenses include any holdup value. Some companies that are frequent defendants in patent-infringement litigation argue that courts should require SEP holders to prove that comparable licenses do not include any holdup value.[158] They reason that, "[g]iven the increased pricing power of an SEP patentee, . . . licenses extracted by that patentee after adoption of its patent into a standard may reflect the patentee's holdup power."[159] Those companies also allege that "standardization by its nature increases the potential for lock-in and hold-up."[160] They consequently argue that, when calculating a FRAND royalty, a court "should consider only licenses executed before the patent was adopted into the standard; post-adoption licenses generally should be excluded, unless the patentee proves that they clearly evidence a RAND amount. . . ."[161] It is, however, economically unsound to assume that sophisticated technology companies would consistently agree on royalties that include holdup value.

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156.   *Id.*
157.   *See* Lucent Techs., Inc. v. Gateway, Inc. 580 F.3d 1301, 1324–25 (Fed. Cir. 2009) (citing Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *mod. and aff'd*, 446 F.2d 295 (2d Cir. 1971), *cert. denied*, 404 U.S. 870 (1971)); Rite-Hite Corp. v. Kelley Co., 56 F.3d 1538, 1554 n.13 (Fed. Cir. 1995); Radio Steel & Mfg. Co. v. MTD Prods., Inc., 788 F.2d 1554, 1557 (Fed. Cir. 1986).
158.   *Ericsson*, 2013 WL 4046225, at *17.
159.   Brief for as Amici Curiae Cisco Sys. Inc., Aruba Networks, Inc., Hewlett-Packard Co., Ruckus Wireless, Inc., Safeway Inc., and SAS Inst. Inc. Supporting of Appellants and in Support of Reversal With Respect to Damages at 18 [hereinafter Cisco Brief], Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201 (Fed. Cir. 2014).
160.   *Id.* at 16.
161.   *Id.* at 19–20.

First, a potential licensee is typically aware of the SEP holder's obligation to license its SEPs on FRAND terms. As Chief Judge Davis observed in *Ericsson v. D-Link*, the SEP holder's FRAND obligation is "public knowledge," and the SEP holder's "letters of assurance to the [SSO] are publicly available, so any potential licensee would be able to determine whether [the SEP holder] had RAND obligations."[162] Chief Judge Davis also found that "previous licensees [of the plaintiff's SEPs] were sophisticated parties," likely aware of the SEP holder's duty to license its SEPs under FRAND terms.[163] A potential licensee that is aware of the SEP holder's duty to license under FRAND terms is unlikely to accept a royalty that exceeds the FRAND range.

Second, if a potential licensee believes that an SEP holder's offer exceeds the FRAND range, the licensee can enforce the SEP holder's FRAND commitment through litigation. Courts in the United States have recognized that an SEP holder's commitment to license its SEPs on FRAND terms constitutes a binding contract with the SSO,[164] and that manufacturers of standard-compliant goods, as third-party beneficiaries, can enforce those contracts.[165] A potential licensee can thus protect itself from an SEP holder's opportunistic behavior by filing a breach-of-contract lawsuit. In *Microsoft v. Motorola*, for example, Microsoft filed a breach-of-contract lawsuit against Motorola, alleging that Motorola made an offer for its SEPs that exceeded the RAND range, therefore, violating Motorola's RAND commitment.[166] Put differently, "when negotiating under the shelter of a judicially enforceable RAND commitment, sophisticated licensees cannot be held up or forced to accept non-RAND terms."[167] Thus, the licensee's awareness of the SEP holder's FRAND commitment and the licensee's ability to in court enforce the SEP holder's obligation to license its SEPs on FRAND terms reduces, if not entirely eliminates the risk that the licensee would consistently agree to pay royalties that exceeded the FRAND range.

The argument that a licensee would agree to a royalty that includes patent-holdup value because courts have only recently provided a more accurate definition of a FRAND royalty is similarly unsound. The argument assumes that the market participants mimic the courts' interpretations of what constitutes a FRAND royalty. To the contrary, it is the court's interpretation that aims to mimic the outcome of real-world

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162. *Ericsson*, 2013 WL 4046225, at *17.

163. *Id.*

164. *See, e.g.*, Realtek Semiconductor Corp. v. LSI Corp., 946 F. Supp. 2d 998, 1005 (N.D. Cal. 2013) ("There is no dispute . . . that defendants entered into a binding contract with the IEEE to license their declared standard-essential patents . . . on RAND terms."); *see also* Microsoft Corp. v. Motorola, Inc., 696 F.3d 872, 878 (9th Cir. 2012).

165. *Realtek*, 946 F. Supp. 2d at 1005 (citing *Microsoft*, 696 F.3d at 884); *see* Sidak, *Third-Party Beneficiaries*, *supra* note 11.

166. *Microsoft*, 696 F.3d at 878.

167. Brief for Qualcomm Inc. as Amicus Curiae. Supporting Affirmance on RAND Issues at 18, [hereinafter Qualcomm Brief], Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201 (Fed. Cir. 2014) (emphasis omitted).

transactions. The interpretation of a FRAND commitment rests on fundamental economic principles that guide voluntary market transactions among participants. Those same principles drive the determination of the price for all goods and services in an economy: supply and demand. Before the courts revealed their interpretations of the FRAND commitment, there were numerous privately negotiated, mutually beneficial license agreements executed between willing licensors and willing licen-licensees. Those successfully negotiated licenses presumably achieved the goals of the FRAND commitment—that is, to enable the implementer to use the SEP holder's standard-essential technology for purposes of fully practicing the standard, all while providing the SEP holder compensation for the value of its patented technology to recover its investment and to encourage its continuous innovation. In other words, market participants determined FRAND royalties even when courts had not yet developed an accurate legal methodology that would enable the court to rigorously mimic the outcome of real-world transactions. It is thus nonsensical to argue that royalties upon which parties voluntarily agreed as part of the terms and conditions in comparable licenses cannot inform what constitutes a FRAND royalty because, at the time that parties negotiated those licenses, courts had not clarified the precise meaning of a FRAND royalty.

In sum, it is implausible to assume that an entire industry would consistently agree on royalties that include holdup value. In contrast, licenses executed in real-world transactions *inherently* reflect what both the SEP holder and the licensee consider to be a FRAND royalty. Economic reasoning does not support the assumption that voluntary licenses into which parties entered after the standard's adoption include patent-holdup value.

IV. SHOULD COURTS REQUIRE EMPIRICAL EVIDENCE OF PATENT HOLDUP AND ROYALTY STACKING?

In *Ericsson v. D-Link*, the Federal Circuit clarified that the theoretical conjectures of patent holdup and royalty stacking are relevant to the jury's calculation of a FRAND royalty only when empirical evidence substantiates such conjectures.[168] That legal conclusion has a sound economic basis. There is significant disagreement in the scholarly literature on the plausibility of the patent-holdup and royalty-stacking conjectures. Critics emphasize that the two conjectures contain errors of economic reasoning.[169] The two conjectures also fail to account for the legal developments that have occurred since academics first made the two conjectures. Those developments have significantly reduced the possibility that an SEP holder can engage in an opportunistic licensing practice (assuming, for sake of argument, that the SEP holder had an incentive to do so).

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168. *Ericsson*, 773 F.3d at 1233–34.
169. Sidak, *9th Circ. Microsoft FRAND*, *supra* note 21.

Furthermore, empirical evidence contradicts the predictions of the patent-holdup and royalty-stacking conjectures.[170] Rather, several cases suggest that reverse holdup—when implementers use SEPs without compensation, in an attempt to force the SEP holder to accept a lower royalty, perhaps even below the FRAND range—is the more widespread behavior.

The Federal Circuit's decision to limit jury instructions on patent holdup and royalty stacking comports with Rule 702 of the Federal Rules of Evidence and the Supreme Court's principle that an economic expert may base a computation of damages on an abstract theory only when the theory is sufficiently tied to the specific facts of the case. Other courts and administrative bodies have followed the Federal Circuit's approach by similarly refusing to rely on theoretical allegations about opportunistic behavior.[171] Rather, other courts and administrative bodies have examined the specific facts of the case. For example, the U.S. International Trade Commission ("ITC") required that references to patent holdup be

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170. *See, e.g.*, Apple Inc. v. Motorola, Inc., 757 F.3d 1286, 1333 (Fed. Cir. 2014) (Rader, C.J., dissenting in part); Einer Elhauge, *Do Patent Holdup and Royalty Stacking Lead to Systematically Excessive Royalties?*, 4 J. COMPETITION L. & ECON. 535 (2008); Alexander Galetovic et al., *An Empirical Examination of Patent Holdup*, 11 J. COMPETITION L. & ECON. 549 (Sept. 2015) [hereinafter Galetovic et al., *Empirical Examination*]; Damien Geradin et al., *The Complements Problem Within Standard Setting: Assessing the Evidence on Royalty Stacking*, 14 B.U. J. SCI. & TECH. L. 144 (2008); Alexander Galetovic et al., *Patent Holdup: Do Patent Holders Holdup Innovation?* 19 (Hoover Inst. Working Grp. on Intellectual Prop., Innovation & Prosperity, Stanford Univ., Working Paper No. 14011, 2014) [hereinafter Galetovic et al., *Patent Holdup*]; Letter from J. Gregory Sidak, Chairman, Criterion Economics, on Comments on the Anti-Monopoly Guidelines on the Abuse of Intellectual Property Rights to the National Development and Reform Commission (Jan. 18, 2016), https://www.criterion economics.com/docs/sidak-comments-china-anti-monopoly-guidelines-ipr-abuse.pdf; Letter from J. Gregory Sidak, Chairman, Criterion Economics, on Comments on the Guidelines for the Use of Intellectual Property Under the Antimonopoly Act (Draft) to Japan Fair Trade Commission (July 28, 2015), https://www.criterioneconomics.com/docs/sidak-frand-injunctions-japan-fair-trade-commission. pdf [hereinafter Sidak, Letter to Japan Fair Trade Commission]; Letter from J. Gregory Sidak, Chairman, Criterion Economics, on Comments on the Updated Draft Version of the Intellectual Property Enforcement Guidelines to Canadian Competition Bureau (July 28, 2015), https://www.criterion economics.com/docs/sidak-canadian-competition-bureau-draft-ip-enforcement-guidelines-ipegs.pdf [hereinafter Sidak, Letter to Canadian Competition Bureau]; Reply of J. Gregory Sidak, Chairman, Criterion Economics, to the Written Submission of Chairwoman Edith Ramirez of the Federal Trade Commission on the Public Interest, U.S. ITC Inv. No. 337-TA-613 (Remand) (July 20, 2015), https:// www.criterioneconomics.com/sidak-response-to-ftc-chairwoman-edith-ramirez-itc-337-ta-613.html [hereinafter Sidak, Reply to Chairwoman Ramirez]; J. Gregory Sidak, Comments on the Revised Draft Amendments to the Patent Law, State Legislative Affairs Officeo f the People's Republic of China (Dec. 29, 2015), https://www.criterioneconomics.com/comments-revised-draft-amendments-to-patent-law-china.html [hereinafter Sidak, Letter to the PRC]; J. Gregory Sidak, Memorandum on Standard-Essential Patents, Indian Ministry of Commerce and Industry, Department of Industrial Policy and Promotion (Mar. 30, 2016), https://www.criterioneconomics.com/standard-essential-patents-indian-ministry-commerce-industry.html [hereinafter Sidak, Memorandum to Indian Ministry].

171. *See, e.g.*, *Apple*, 757 F.3d at 1333 (Rader, C.J., dissenting in part); Elhauge, *supra* note 170; Galetovic et al., *Empirical Examination*, *supra* note 170; Geradin, *supra* note 170; Galetovic et al., *Patent Holdup*, *supra* note 170, at 19; Sidak, Letter to Japan Fair Trade Commission, *supra* note 170; Sidak, Letter to Canadian Competition Bureau, *supra* note 170; Sidak, Reply to Chairwoman Ramirez, *supra* note 170; Sidak, Letter to the PRC, *supra* note 170; Sidak, Memorandum to Indian Ministry *supra* 170.

supported by empirical evidence.[172] In July 2015, the Court of Justice of the European Union ("CJEU") similarly emphasized that an infringer of a FRAND-committed patent cannot avoid an injunction by merely stating that the demanded royalty exceeds the FRAND range.[173] Those decisions embrace the correct principle that any reference to a possible existence of opportunistic behavior, undertaken by either the SEP holder or the infringer, should be supported by empirical evidence.

A. Are Patent Holdup and Royalty Stacking Likely to Arise in Practice?

In *Ericsson v. D-Link*, the Federal Circuit upheld Chief Judge Davis' reasoning not to instruct the jury about the theoretical risk of patent holdup and royalty stacking because no empirical evidence existed that patent holdup or royalty stacking had ever occurred.[174] Chief Judge Davis found that, "given the opportunity to present evidence of an *actual* stack[,] . . . [the] Defendants came up empty."[175] Observing that "[a]ll of [the] Defendants' concerns about royalty stacking were just that—concerns,"[176] Chief Judge Davis declined to instruct the jury that there existed any risk of royalty stacking.[177] The Federal Circuit upheld Chief Judge Davis' decision and emphasized that, "[i]n deciding whether to instruct the jury on patent hold-up and royalty stacking[,] . . . the district court must consider the evidence on the record before it."[178] The Federal Circuit said that "[t]he district court need not instruct the jury on hold-up or stacking unless the accused infringer presents actual evidence of hold-up or stacking" in the case at issue.[179] In light of the criticisms that the patent-holdup and royalty-stacking conjectures have engendered as matter of economic theory, Chief Judge Davis properly declined to instruct the jury about conjectures concerning patent holdup and royalty stacking.

1. Are the Royalty-Stacking and Patent-Holdup Conjectures Sound at the Level of Economic Theory?

Two seminal articles from 2007 introduced the patent-holdup and royalty-stacking conjectures and associated them most closely with economists Carl Shapiro and Joseph Farrell of Berkeley and lawyer Mark

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172. *See, e.g.*, Certain 3G Mobile Handsets and Components Thereof at 30, USITC Inv. No. 377-TA-613 (Apr. 27, 2015) (Initial Determination) [hereinafter USITC Inv. No. 377-TA-613 Initial Determination].

173. Case C-170/13, Huawei Tech. Co. v. ZTE Corp., ¶ 44 (July 17, 2015), http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1437080250973&uri=CELEX:62013CJ0170.

174. USITC Inv. No. 377-TA-163 Initial Determination, *supra* note 172; Ericsson Inc. v. D-Link Sys., Inc., 6:10-CV-473, 2013 WL 4046225, at *18 (E.D. Tex. Aug. 6, 2013).

175. *Ericsson*, 2013 WL 4046225, at *18 (emphasis in original).

176. *Id.* at *26.

177. *Id.* at *18.

178. Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1234 (Fed. Cir. 2014).

179. *Id.*

Lemley of Stanford.[180] The patent-holdup conjecture posits that, when a potential licensee has made a sunk investment in the implementation of an industry standard and becomes locked into the use of SEPs, a given SEP holder could demand from the potential licensee a royalty exceeding the value of the SEP holder's technology.[181] Lemley and Shapiro argued that an SEP holder's use of (or even threat to use) an injunction would exacerbate the risk of patent holdup. In their view, an SEP holder's mere threat to exclude a licensee's products from the market, even if only for a limited period of time, could enable the SEP holder to extract licensing fees from the licensee that exceeded the SEP's genuine economic value.[182] Lemley and Shapiro also predicted that the sum of all royalties that each SEP holder demands might impose an excessive royalty burden on the licensee—which they call the royalty stack—and limit the licensee's ability to commercialize its product.[183]

Since 2007, scholars in both economics and law have exposed the flawed logic of the patent-holdup and royalty-stacking conjectures.[184] Scholars have shown that the patent-holdup conjecture fails to account for economic circumstances that restrict the SEP holder's incentive and ability to demand exploitative licensing terms.[185] For example, the common practice of cross licensing among members of an SSO confers on the licensee countervailing power that constrains the SEP holder's licensing behavior. When an SEP holder needs to obtain a cross license from the licensee, the SEP holder is unlikely to demand excessive royalties, for such an action would threaten the SEP holder's desired access to the licensee's SEP portfolio.[186] The patent-holdup conjecture, therefore, misconstrues the SEP holder's economic incentives to seek exploitative licensing conditions from the licensee.

Economic and legal scholars also dispute the proposition, associated with the patent-holdup conjecture, that an SEP holder would use an injunction to extort excessive royalty rates from a potential licensee.[187]

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180. Joseph Farrell et al., *Standard Setting, Patents and Hold-Up*, 74 ANTITRUST L.J. 603 (2007); Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991 (2007).

181. *See* Farrell, *supra* note 180, at 612–13.

182. Lemley & Shapiro, *supra* note 180, at 1992–93.

183. *Id.* at 1993–94.

184. For early refutations on theoretical grounds, see Vincenzo Denicolò et al., *Revisiting Injunctive Relief: Interpreting* eBay *in High-Tech Industries with Non-Practicing Patent Holders*, 4 J. COMPETITION L. & ECON. 571 (2008); John M. Golden, *"Patent Trolls" and Patent Remedies*, 85 TEX. L. REV. 2111 (2007); J. Gregory Sidak, *Holdup, Royalty Stacking, and the Presumption of Injunctive Relief for Patent Infringement: A Reply to Lemley and Shapiro*, 92 MINN. L. REV. 714 (2008) [hereinafter Sidak, *A Reply to Lemley and Shapiro*].

185. *See* Sidak, *A Reply to Lemley and Shapiro*, *supra* note 184, at 735.

186. *See* Peter Camesasca et al., *Injunctions for Standard-Essential Patents: Justice Is Not Blind*, 9 J. COMPETITION L. & ECON. 285, 287 (2013).

187. *See, e.g.*, Douglas H. Ginsburg et al., *Enjoining Injunctions: The Case Against Antitrust Liability for Standard Essential Patent Holders Who Seek Injunctions*, 14 ANTITRUST SOURCE, no. 1, Oct. 2014, at 1; James Ratliff & Daniel L. Rubinfeld, *The Use and Threat of Injunctions in the RAND Context*, 9 J. COMPETITION L. & ECON. 1, 20–21 (2013); Bo Vesterdorf, *Antitrust Enforcement and Civil Rights: SEPs and FRAND Commitments*, 8 COMPETITION POL'Y INT'L 1, 8 (2014); Joshua D. Wright

Contrary to the implication of the proponents of the patent-holdup conjecture, a SEP holder's request for an injunction may serve a legitimate purpose. Judge Douglas Ginsburg of the U.S. Court of Appeals for the D.C. Circuit and former Commissioner Joshua D. Wright of the Federal Trade Commission ("FTC") observe that an injunction is often a necessary tool with which a SEP holder can force an unwilling licensee to participate in productive license negotiations.[188]

In addition, the patent-holdup conjecture rests in a static framework that disregards the repeated transactions between the SEP holder and licensees. Such a framework seriously exaggerates the plausibility of patent holdup. SEP holders and licensees of telecommunications standards, for example, repeatedly interact. Put differently, "[t]he dynamic and evolving nature of standards gives participants in SSOs a number of opportunities to 'punish' companies that have previously set what are considered to be excessive royalties."[189] The Lemley-Shapiro economic model, however, one of the two founding models of the patent-holdup conjecture—incorrectly assumes that SEP licensing is a one-shot game, which distorts the model's outcomes by predicting royalties that are too high.[190] The patent-holdup conjecture also disregards the innovative nature of the industry. Entrants and breakthrough technologies continually displace market participants and old technologies. For example, David Teece and Edward Sherry observe that, when the pace of technological change in a market is rapid, the lock-in effect[191]—a necessary precondition to holdup—erodes. When the implementer is not locked into using a particular SEP, the SEP holder cannot engage in patent holdup and cannot obtain exploitative licensing terms.[192] The dynamic nature of the mobile device industry reduces the risk of patent-holdup.

In sum, both economists and lawyers have demonstrated at the level of *a priori* reasoning that multiple errors invalidate the patent-holdup conjecture. Those scholars emphasize that the patent-holdup conjecture fails to account for important legal and economic constraints on the SEP holder's licensing behavior, and that the conjecture relies on incorrect and unrealistic assumptions. Consequently, the patent-holdup conjecture overstates the risk of an SEP holder's opportunism and the likelihood that the SEP holder will be overcompensated for the value of its invention.

& Douglas H. Ginsburg, *Whither Symmetry? Antitrust Analysis of Intellectual Property Rights at the FTC and DOJ*, 9 COMPETITION POL'Y INT'L 41, 44–45 (2013).

188.   Ginsburg et al., *supra* note 187; Wright & Ginsburg, *supra* note 187.

189.   Damien Geradin & Miguel Rato, *Can Standard-Setting Lead to Exploitative Abuse? A Dissonant View on Patent Hold-Up, Royalty Stacking and the Meaning of FRAND*, 3 EUR. COMPETITION J. 101, 148 (2007).

190.   *See* Elhauge, *supra* note 170, at 547.

191.   David J. Teece & Edward F. Sherry, *Standards Setting and Antitrust*, 87 MINN. L. REV. 1913, 1941 (2003).

192.   *Id.* at 1983.

2. *Do the Patent-Holdup and Royalty-Stacking Conjectures Account for Recent Changes in Legal Constraints?*

The patent-holdup and royalty-stacking conjectures are frozen in time. Their authors have failed to account for the legal developments since publishing their articles in 2007 and which have occurred, have significantly reduced, if not completely eliminated, the risk of opportunism by the SEP holder. In 2006, the Supreme Court limited the potential for patent holdup by virtue of its decision in *eBay Inc. v. MercExchange, L.L.C.*, which specified the criteria that a patent holder must meet to obtain an injunction in federal court.[193] To obtain an injunction against a patent infringer in the United States, a patent holder must prove:

> (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.[194]

Before *eBay*, U.S. courts often granted injunctions in any patent-infringement case upon a finding of validity and infringement of the patents in suit. The *eBay* decision restricted the patent holder's ability to obtain an injunction, particularly if the patent holder was an entity that did not practice its patents.[195]

Since *eBay*, U.S. courts have been reluctant to issue injunctions against infringers of FRAND-committed SEPs, including against SEP holders that practice their patents and thus compete in the downstream market. For example, in *Apple v. Motorola*, the Federal Circuit denied Motorola an injunction on the grounds that it had not shown that Apple's infringement of Motorola's SEPs had caused irreparable harm.[196] Similarly, in *Microsoft v. Motorola*, the district court ruled that Motorola was not entitled to an injunction because it could not prove that monetary damages would not suffice to compensate it for the harm that the infringement had caused.[197] In sum, it is extremely difficult for an SEP holder to enjoin an infringer. Consequently, a request for an injunction would not scare a potential licensee into paying exorbitant licensing fees.[198]

Recent developments have also significantly limited the SEP holder's ability to obtain an exclusion order—an order issued by the ITC that bars importation of infringing products into the United States.[199] In 2013,

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193. 547 U.S. 388, 391 (2006).
194. *Id.*
195. *Id.* at 393.
196. 757 F.3d 1286, 1332 (Fed. Cir. 2014).
197. 871 F. Supp. 2d 1089, 1103 (W.D. Wash. 2012) (Robart, J.).
198. Camesasca et al., *supra* note 186, at 287–88; *see also* J. Gregory Sidak, *The Meaning of FRAND, Part II: Injunctions*, 11 J. COMPETITION L. & ECON. 201, 234 (2015) [hereinafter Sidak, *The Meaning of FRAND, Part II*].
199. *See, e.g.*, Colleen V. Chien & Mark A. Lemley, *Patent Holdup, the ITC, and the Public Interest*, 98 CORNELL L. REV. 1, 4–5 (2012).

President Obama vetoed the exclusion order that the ITC issued against Apple's infringing products on the grounds that the exclusion order would not serve the public interest.[200] That same year, the Northern District of California issued a preliminary injunction preventing the enforcement of an ITC exclusion order in *Realtek v. LSI*, finding that the SEP holders, LSI and Agere Systems L.L.C., had not made a FRAND licensing offer before seeking the exclusion order.[201] Both of those developments decrease the likelihood that an SEP holder could obtain and enforce an exclusion order against an infringer of a FRAND-committed patent. Consequently, it is questionable whether an SEP holder could use exclusion as a credible threat to hold up the licensee.

Further, as explained in Part III.C, the licensee's ability to request judicial review of the offered licensing terms decreases—if not eliminates—the likelihood of patent holdup.[202]

In addition, antitrust authorities across the globe are increasingly scrutinizing the licensing practices of SEP holders. For example, in 2013, the FTC issued consent orders against Google and Robert Bosch GmbH, in which those companies agreed to seek injunctive relief against licensees only under specific circumstances.[203] The FTC found that Bosch's conduct of seeking injunctions against willing licensees of its SEPs "tended to impair competition" in the market in which the licensees operated.[204] Similarly, in a nonbinding opinion, the Advocate General of the Court of Justice of the European Union stated that a SEP holder's request for an injunction could be considered an abuse of a dominant position in violation of Article 102 of the Treaty on the Functioning of the European Union.[205] In Japan, the Grand Panel of the Intellectual Property High Court held that seeking an injunction based on a FRAND-committed patent is an abuse of rights unless exceptional circumstances exist.[206] SEP holders also face scrutiny on competition law grounds in China, India, and South Korea.[207] The risk of facing antitrust scrutiny thus

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200. Letter from Michael B.G. Froman, Exec. Office of the President, to The Honorable Irving A. Williamson, Chairman, USITC (Aug. 3, 2013).

201. 946 F. Supp. 2d 998, 1001, 1006, 1008 (N.D. Cal. 2013).

202. *See* Dennis W. Carlton & Allan L. Shampine, *Identifying Benchmarks for Applying Non-Discrimination in FRAND*, 10 COMPETITION POL'Y INT'L 1, 5 (2014); Ratliff & Rubinfeld, *supra* note 187, at 19–20.

203. Decision and Order at 7–8, *In re* Motorola Mobility LLC, No. C-4410 (F.T.C. July 23, 2013); Decision and Order at 14, *In re* Robert Bosch GmbH, No. C-4377 (F.T.C. Apr. 24, 2013).

204. Statement of the Federal Trade Commission, Robert Bosch GmbH, FTC File No. 121-0081 (Apr. 24, 2013), http://www.ftc.gov/sites/default/files/documents/cases/2013/04/121126boschcommission statement.pdf.

205. Opinion of Advocate General Wathelet ¶ 74, Case C-170/13, Huawei Tech. Co. v. ZTE Corp. (Nov. 20, 2014) (European Union), http://curia.europa.eu/juris/document/document.jsf?doc id=159827&mode=req&pageIndex=1&dir=&occ=first&part=1&text=&doclang=EN&cid=674621.

206. Japan: IP High Court Rules in *Apple v. Samsung* FRAND Case, MANAGING INTELL. PROP. (Sept. 1, 2014), http://www.managingip.com/Article/3375734/Latest-News-Magazine/Japan-IP-High Court-rules-in-Apple-v-Samsung-FRAND-case.html.

207. Guangdong Gaoyuan Shenjie Huawei Gongsi yu Meiguo IDC Gongsi Lanyong Shichang Diwei Longduan Jiufen An [广东高院审结华为公司与美国IDC公司滥用市场地位垄断纠纷案] (Guangdong High Court's Decision on Abuse of Market Power in Huawei v. IDC Case) (Nov. 1,

diminishes the likelihood that a SEP holder would even attempt to engage in opportunistic licensing of its SEPs.

In a 2014 interview, even Lemley acknowledged that changes in the legal system had decreased the risk of opportunism by patent holders. He said "a lot of the things that people were focused on as problems that required solutions from Congress . . . are in the process of being fixed by the courts."[208] Lemley observed that "*Ebay* [sic] dealt with the injunction question, *Seagate* dealt with the willfulness question, we made it easier to file declaratory judgments," and thus reduced the need to reform the Patent Act.[209] He added that several factors, such as the "increased willingness of courts to grant attorneys fees against plaintiffs if their cases are weak and the fact that it's now a lot cheaper to go to the patent office and get IPR or covered business method review," implied that "a lot of the business model that was driving the growth in litigation which involved suing everybody in the industry with this very broad, general patent is just less attractive than it used to be."[210] Lemley observed that "people are making the decision not to file those suits in the first place."[211] He concluded that "we probably have the balance we need" in the enforcement of patent rights and recommended "some time to digest what we've got and take some time to look around where we are . . . ."[212]

In sum, the patent-holdup and royalty-stacking conjectures rest on outdated assumptions regarding the ability and incentives of SEP holders to engage in opportunistic licensing practices. Legal developments have decreased the availability of injunctions and exclusion orders to SEP holders, thereby limiting the risk that an SEP holder could or would use those legal remedies as a credible threat to hold up potential licensees. SEP holders also face an increased risk of antitrust liability for engaging in opportunistic licensing conduct. Those legal developments invalidate the assumptions on which the patent-holdup and royalty-stacking conjec-

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2013) (China), http://www.gdcourts.gov.cn/ecdomain/framework/gdcourt/monehcpnabjcbboekklboa fjdjkbjamc/cohhkcfaabjdbboekklboafjdjkbjamc/cohhkcfaabjdbboekklboafjdjkbjamc.do?isfloat=1&disp_template=pchlilmiaebdbboeljehjhk jkkgjbjie&fileid=20131101104516982014&moduleIDPage=cohhkcfaabjdbboekklboafjdjkbjamc&siteI DPage=gdcourt&infoChecked=0&keyword=&dateFrom=&dateTo=; Intex Tech. Ltd. v. Telefonaktiebolaget LM Ericsson, Case No. 76/2013, ¶ 6, Competition Comm'n of India (Jan. 16, 2014) (India); Hyunjoo Jin & Se Young Lee, *South Korea Antitrust Body Investigating Qualcomm (Update)*, RE/CODE (Feb. 12, 2015, 8:40 AM), http://recode.net/2015/02/12/south-korea-antitrust-body-investigat ing-qualcomm-update/; Noel Randewich & Matthew Miller, *Qualcomm to Pay $975 Million to Resolve China Antitrust Dispute*, REUTERS (Feb. 9, 2015, 6:27 PM), http://www.reuters.com/article/2015/02/09/ us-china-qualcomm-idUSKBN0LD2EL20150209; J. Gregory Sidak, *FRAND in India: The Delhi High Court's Emerging Jurisprudence on Royalties for Standard-Essential Patents*, 10 J. INTELL. PROP. L. & PRAC. 609, 609 (2015), https://www.criterioneconomics.com/docs/frand-in-india-royalties-for-standard-essential-patents.pdf [hereinafter Sidak, *FRAND in India*].

    208. Lloyd, *Interview with Lemley*, *supra* note 31.

    209. *Id.*

    210. Richard Lloyd, *Alice Decision a Big Reason for Sharp Fall in US Patent Litigation, Says Mark Lemley*, IAM BLOG (Oct. 9, 2014) [hereinafter Lloyd, *Alice Decision*], http://www.iam-media.com/Blog/Detail.aspx?g=dadf4dce-0f75-45dc-9339-dacb0f7bb465.

    211. *Id.*

    212. Lloyd, *Interview with Lemley*, *supra* note 31.

tures stand, and thus they invalidate the plausibility of both conjectures on *a priori* grounds.

3.   The Absence of Empirical Evidence of Patent Holdup and Royalty Stacking

Apart from being implausible on *a priori* grounds, the patent-holdup and royalty-stacking conjectures lack empirical substantiation. The empirical evidence from industries that rely on SEPs contradicts the dystopian predictions that follow from the patent-holdup and royalty-stacking conjectures. Nine years after the publication of their seminal articles positing the patent-holdup and royalty-stacking conjectures,[213] Shapiro, Farrell, and Lemley still have no empirical evidence that either patent holdup or royalty stacking occurs in practice, let alone that it occurs with such frequency and severity as to be a serious public policy concern.[214]

An economic expert could analyze several variables to determine whether patent holdup or royalty stacking has occurred in a specific industry or in a specific case. For example, the Federal Circuit suggested in *Ericsson v. D-Link* that an economic expert could evaluate whether the SEP holder "started requesting higher royalty rates after the adoption of the . . . standard,"[215] or the expert could "present any evidence of actual . . . royalty stacking."[216] Shapiro and Farrell (and their co-authors) suggest that implementers could pass excessive royalties on to consumers and thus increase prices for standard-compliant products.[217] An economic expert could thus analyze whether the prices for standard-compliant products have increased over the period in which a licensee alleges patent holdup. Similarly, if prices were to remain the same, despite the presence of patent holdup and royalty stacking, then one would expect to observe a decrease in the quality of standard-compliant goods. The larger the royalties that a licensee pays to SEP holders, the smaller the margins that the licensee can invest in the product's quality. Thus, if patent holdup and royalty stacking did pervade an industry, Shapiro and Farrell would predict that one would observe little innovation.[218] In addition, Shapiro and Farrell hypothesize that patent holdup and royalty stacking could increase barriers to entry in a market and harm the standardization

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213.   *See generally* Farrell et al., *supra* note 180; Lemley & Shapiro, *supra* note 180.

214.   *See generally* Farrell et al., *supra* note 180; Lemley & Shapiro, *supra* note 180.

215.   773 F.3d 1201, 1234 (Fed. Cir. 2014).

216.   *Id.* (emphasis omitted).

217.   *See, e.g.*, Farrell et al., *supra* note 180, at 608 ("[S]tandards hold-up is also a public policy concern because downstream consumers are harmed when excessive royalties are passed on to them.").

218.   Lemley & Shapiro, *supra* note 180, at 2015–16 ("Furthermore . . . the combined royalty burden associated with royalty stacking may make it unprofitable for the downstream firm to conduct the R&D and incur the other costs necessary to develop the product in question.").

process.[219] In their view, "those who will implement the standard . . . do not want . . . to be forced by concerns about hold-up to eschew the best technology just because it is patented, or to attempt difficult and perhaps inefficient *ex ante* negotiation."[220] Therefore, an economic expert could empirically test whether the market exhibits barriers to entry and whether cases of patent holdup and royalty stacking had harmed the standardization process.

Legal and economic scholars who have empirically analyzed sectors that use SEPs most frequently have found no evidence of patent holdup or royalty stacking. For example, in 2008, Damien Geradin, Anne Layne-Farrar, and Jorge Padilla found "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."[221] Likewise, Alexander Galetovic, Stephen Haber, and Ross Levine wrote in 2014 that "over long periods SEP industries tend to show better performance [in terms of quality-adjusted price decreases] than most other industries" such that "[t]here is no evidence in favor of the patent holdup conjecture."[222] Further, they find that, "[a]lthough reform advocates point to patent-intensive SEP industries as most prone to patent holdup, it is in these industries [where] innovation seems fastest."[223] In 2014, Kirti Gupta and Mark Snyder of Qualcomm examined the litigation activity of the twenty smartphone manufacturers most active in the United States from 2000 to 2012.[224] Of the 2,746 cases filed in the U.S. District Courts between 2001 and 2013, only 111 cases were patent cases or FRAND contract cases related to smartphones and no injunctions were granted for any patent that was determined to be an SEP.[225] These findings contradict the prediction that Shapiro, Farrell, Lemley, and others made about an SEP holder's incentive and ability to hold up potential licensees and extract opportunistic licensing terms.

Moreover, if the predictions of the patent-holdup conjecture were correct, one would expect the SEP holder's conduct to harm consumers by leading to more expensive smartphones or smartphones of a lower

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219. *See, e.g.*, Farrell et al., *supra* note 180, at 608; *see also In re* Innovatio IP Ventures, LLC Patent Litig., No. 11 C 9308, 2013 WL 5593609, at *8 (N.D. Ill. Oct. 3, 2013) ("Dr. Leonard testified that hold-up is of significant concern, because it can jeopardize adoption of the standard, harm consumers, and even harm other holders of standard-essential patents. . . ."); Joseph Farrell & Timothy Simcoe, *Choosing the Rules for Consensus Standardization*, 43 RAND J. ECON. 235, 249–50 (2012).

220. Farrell et al., *supra* note 180, at 608.

221. Geradin et al., *supra* note 170, at 149, 154–63.

222. Galetovic et al., *Patent Holdup*, *supra* note 170, at 19.

223. *Id.* at 28.

224. Kirti Gupta & Mark Snyder, *Smartphone Litigation and Standard Essential Patents* 4 (Hoover Inst. Working Grp. on Intell. Prop., Innovation, and Prosperity, Stan. U. Working Paper Series No. 14006, 2014).

225. *Id.*

quality. A study conducted by Boston Consulting Group, however, reports that "[u]ser costs have plummeted."[226] The study found:

> The average mobile subscriber cost per megabyte decreased 99 per cent between 2005 and 2013.[227] Smartphones are now available for as little as $40.[228] Mobile network infrastructure costs have also fallen dramatically, while performance has soared—a 95 percent cost reduction (per megabyte transmitted) from second generation (2G) networks to third generation (3G) networks, and a further 67 percent drop from 3G to fourth generation (4G) networks.[229] Mobile data-transmission speeds have skyrocketed: 4G networks offer 12,000 times faster data-transmission speeds than 2G networks.[230] Consumer adoption of 3G and 4G standards has outpaced that of all other technologies, growing to nearly 3 billion connections in less than 15 years, and projected to exceed 8 billion connections by 2020.[231]

Those empirical findings are inconsistent with the predictions of the patent-holdup and royalty-stacking conjectures.

B.   The Legal Requirement to Tie Economic Theories to the Facts of the Case

Rule 702 of the Federal Rules of Evidence requires an expert's testimony to "reliably appl[y] the principles and methods to the facts of the case."[232] If that requirement is not fulfilled, the testimony of an expert is inadmissible because it would not "help the trier of fact to understand the evidence or to determine a fact in issue."[233] The Supreme Court said in *Daubert* that expert testimony that "does not relate to any issue in the case is not relevant and, ergo, non-helpful," and should thus be excluded.[234] U.S. courts have consequently excluded economic expert testimony based on abstract theories that did not sufficiently relate to the specific facts of the case.[235]

As explained in Part II, the defendants in *Ericsson v. D-Link* argued before Chief Judge Davis that the determined damage award was inconsistent with Ericsson's FRAND obligation because, first, Ericsson's damages expert failed to account for the risk of royalty stacking when calculating a FRAND royalty and, second, because Chief Judge Davis failed to instruct the jury to account for that risk. Although the Federal Circuit did not rule on the admissibility of the expert's testimony, it

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226.   BOSTON CONSULTING GROUP REPORT, THE MOBILE REVOLUTION, *supra* note 34, at 3.

227.   *Id.* at 9.

228.   *Id.*

229.   *Id.*

230.   *Id.*

231.   *Id.*

232.   FED. R. EVID. 702(d).

233.   *Id.* 702(a).

234.   Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 591 (1993).

235.   *See, e.g.*, VirnetX, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1334 (Fed. Cir. 2014); Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1315 (Fed. Cir. 2011).

agreed with Chief Judge Davis that, "[a]bsent evidence that Ericsson used its SEPs to demand higher royalties from standard-compliant companies, we see no error in the district court's refusal to instruct the jury on patent hold-up . . . ."[236] The Federal Circuit's decision implicitly recognized that a damage expert may rely on an abstract conjecture, such as patent holdup or royalty stacking, only when empirical evidence supports the conclusion that the abstract conjecture is sufficiently tied to the specific fact of the case. The Federal Circuit's opinion in *Ericsson v. D-Link* thus comports with Rule 702, and with the principle that abstract theories should motivate damages computations only when those theories relate to the specific facts of the case.[237] The Federal Circuit's opinion also recognizes a broader principle: that a party may not invoke abstract conjectures prejudicial to the adverse party unless empirical evidence supports those conjectures.

In 2014, for example, the Federal Circuit in *VirnetX, Inc. v. Cisco Systems, Inc.* rejected an economic expert's use of the Nash bargaining solution to calculate damages because the expert failed to establish that Nash's theoretical framework was sufficiently tied to the facts of the case.[238] VirnetX's damages expert, Roy Weinstein, relied on the Nash bargaining solution to opine on how the patent holder and the potential licensee would divide the incremental profit attributable to the patented technology.[239] The Nash bargaining solution suggests that the two would split the incremental profit equally; that is, each party would retain fifty percent of the incremental profit.[240] Mr. Weinstein then modified the fifty-fifty split by considering the relative bargaining positions of the patent holder and the potential licensee.[241] The Federal Circuit rejected Mr. Weinstein's use of the Nash bargaining solution because he did not "sufficiently establish[] that the premises of the theorem actually apply to the facts of the case at hand."[242] The Federal Circuit said that an economic expert must prove that the theorem's premises fit the particular facts of the case.[243] In the absence of such evidence, the Federal Circuit deemed use of the Nash bargaining solution an unreliable methodology for determining patent damages.[244]

Like the attempted use of the Nash bargaining solution in *VirnetX v. Cisco*, claims of patent holdup and royalty stacking can reliably influ-

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236. Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1234 (Fed. Cir. 2014).

237. *See, e.g.*, *VirnetX*, 767 F.3d at 1334; *Uniloc USA, Inc.*, 632 F.3d at 1315; *see also Daubert*, 509 U.S. at 591.

238. *VirnetX*, 767 F.3d at 1332.

239. *Id.* at 1331.

240. *Id.* at 1325.

241. *Id.*

242. *Id.* at 1332.

243. *Id.*

244. *Id.* at 1334. In a subsequent case, Magistrate Judge Paul Grewal excluded Mr. Weinstein's damages estimate on the grounds that Mr. Weinstein "fail[ed] to tie the [Nash bargaining solution] to the specifics of [the] case." Order Granting-In-Part Motion to Exclude Testimony at *7, Good Tech. Corp. v. MobileIron, Inc., No. 5:12-CV-05826-PSG, 2015 WL 4090431 (N.D. Cal. July 5, 2015), ECF No. 436.

ence the determination of a FRAND royalty only when they are tied to the specific facts of the case. Like the Nash bargaining solution, the patent holdup and royalty stacking conjectures make "too crude a generalization about a vastly more complicated world."[245] Those conjectures simplistically assume that every SEP holder will act opportunistically merely because it owns SEPs. As I explain in Part IV.A, however, the two conjectures fail to consider other factors that make a SEP holder less likely to engage in opportunistic licensing practices. In the absence of empirical evidence that patent holdup and royalty stacking have occurred in the specific case, there is no justification to credit those conjectures in the computation of a FRAND royalty.[246] The Federal Circuit's decision to limit jury instructions about patent holdup and royalty stacking to cases in which the party has substantiated its theoretical conjectures with empirical evidence thus comports with the court's evidentiary principles regarding the use of abstract theories to calculate damages.

Although the Federal Rules of Evidence obviously do not apply outside the United States (unless by virtue of a choice-of-law provision in a contract), the power of this reasoning from *VirnetX v. Cisco* and *Ericsson v. D-Link* can still shed light on how a judge in another country or a tribunal in an international commercial arbitration should evaluate abstract conjectures when calculating a FRAND royalty. Abstract theories can assist the adjudicator's decision only when they relate to the specific facts of the case. Empirical evidence informs the court or tribunal on the question of whether the abstract theory is relevant to the specific facts of the case. When there is no evidence that an abstract theory applies to the specific facts of the case, that theory cannot assist the adjudicator in answering the legal question before it. Put differently, the patent holdup and royalty stacking conjectures can assist the adjudicator's determination of a FRAND royalty only when it is evident that patent-holdup and royalty stacking have occurred in a specific case. When no such evidence exists, reference to the risk of patent holdup and royalty stacking by a party or its expert cannot assist the adjudicator's decision.

Courts have found that the use of such a pejorative term could confuse and unduly prejudice a jury against the patent holder.[247] Reference to patent holdup and royalty stacking could prejudice the jury against SEP holders by conveying an inappropriate impression that every SEP

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245. *VirnetX*, 767 F.3d at 1332 (analogizing use of the Nash bargaining solution to the earlier use of the "'25 percent rule of thumb' in determining a reasonable royalty rate in a hypothetical negotiation," which the Federal Circuit rejected on *Daubert* grounds). *See* Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292 (Fed. Cir. 2011).

246. *See, e.g.*, Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc., 809. F.3d 1295, 1302 (Fed. Cir. 2015) ("[A]bstract recitations of royalty stacking theory, and qualitative testimony that an invention is valuable—without being anchored to a quantitative market valuation—are insufficiently reliable.").

247. *See, e.g.*, Order Granting in Part and Denying in Part Apple's Second *Daubert* Motion to Exclude Testimony of Michael J. Danksy, Denying Apply's Motion *in Limine* No. 5 as Moot, and Granting Joint Proposed Stipulation on Damages-Related Issues at 2, GPNE Corp. v. Apple Inc., No. 5:12-CV-02885-LHK, 2014 WL 3870256 (N.D. Cal. Aug. 6, 2014), ECF No. 319.

holder will act opportunistically when licensing its SEPs. As explained in Part IV.A, there is no valid justification to assume that an SEP holder will engage in an opportunistic licensing practice. To the contrary, an SEP holder's more likely incentive is *not* to engage in opportunism. Standardization is a long-term collaboration among repeat players. If an SEP holder would behave opportunistically, participants in the standardization process could exclude its technology from the next generation of the standard, if not also later releases of the current standard. Thus, the SEP holder has an incentive to collaborate with other participants, rather than to act opportunistically. In the absence of empirical evidence, reference to the risk of patent holdup and royalty stacking would prejudice the jury against the SEP holder and confuse the jury regarding the proper award of damages.

C. Exclusion Orders and Evidence of Patent Holdup

In April 2015, Administrative Law Judge Theodore Essex similarly found that unsubstantiated claims about the risk of patent-holdup were insufficient to avoid an exclusion order.[248] Section 337 of the Tariff Act of 1930 provides that:

> the ITC shall direct that the articles concerned . . . . [w]ill be excluded from entry in the United States, unless, after considering the effect of such exclusion upon the public health and welfare, competitive conditions in the United States economy, the production of like or direct competitive articles in the United States, and United States consumers, it finds that such articles should not be excluded from entry.[249]

InterDigital sought an exclusion order against Nokia's and Microsoft Mobile's infringing products.[250] Judge Essex observed that, although Nokia and Microsoft Mobile maintained that an exclusion order against their products would harm the public interest, Nokia and Microsoft Mobile did "not address the public interest factors in the statute,"[251] but instead presented "a new public interest" related to the risk of hold up.[252]

Referring to the Federal Circuit's decision in *Ericsson v. D-Link*, Judge Essex emphasized that the infringer bears the burden to provide evidence of patent holdup.[253] He found that Nokia and Microsoft Mobile "fail[ed] to carry that burden."[254] Judge Essex observed that Dr. Allan Shampine, the economic witness for Nokia and Microsoft Mobile, said

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248. Sidak, *9th Circ. Microsoft FRAND*, *supra* note 21.
249. USITC Inv. No. 377-TA-613 Initial Determination, *supra* note 172, at 29 (quoting Tariff Act of 1930 § 337, 19 U.S.C. § 1337 (2006)).
250. *Id.* at 7.
251. *Id.* at 30.
252. *Id.*
253. *Id.* at 43–44.
254. *Id.* at 44.

that holdup "was a grave concern."[255] Dr. Shampine admitted, however, that "he did not reach the conclusion that [InterDigital] . . . had violated a FRAND commitment in this case" and engaged in patent holdup.[256] Dr. Shampine also said "that he was not aware of any lawsuit, bankruptcy hearing or complaint to a standard-setting organization where a party alleged that they were forced to sign a non-FRAND agreement-. . . ."[257] When asked to cite at least one example of holdup resulting in a non-FRAND contract, Dr. Shampine admitted that "[w]e do not have a solid example of that occurring yet."[258]

Judge Essex further observed that John Jarosz—the second economic witness for Nokia and Microsoft Mobile—failed to provide any evidence of patent holdup. Mr. Jarosz stated that "he was offering no opinion [on whether] . . . [InterDigital's] offers to [the respondents] . . . were unfair or unreasonable, but . . . he consider[ed] information in assessing the holdup and reverse holdup hypotheses."[259] Judge Essex noted that Mr. Jarosz's analysis "only considered the offers between the parties, and he did not consider the industries['] licensing practices. . . ."[260] Judge Essex also observed that, if Mr. Jarosz "has no reference point as to what the FRAND rate is, nor any reference for how the licensing industry conducts negotiations and researches FRAND contracts, he cannot reasonably assess the current negotiations" and determine whether InterDigital's offer violated its FRAND obligation.[261] Judge Essex emphasized that Mr. Jarosz ultimately admitted that, although there is "substantial concern in writing to suggest there's evidence of holdup," he did not "recall seeing a document that says in a certain setting there was patent holdup."[262] Judge Essex thus concluded that Nokia and Microsoft Mobile failed to provide any evidence that InterDigital engaged in patent holdup.[263]

Judge Essex's initial determination adheres to the Federal Circuit's decision in *Ericsson v. D-Link*. Judge Essex emphasized that "[t]he public policy issue must not be used in place of the law, nor should a party be allowed to shift the burden of persuasion in the name of public policy."[264] He reiterated that "[w]e need not be stampeded into abandoning the rule of law, or burden of proof simply because the respondents shout 'FRAND.'"[265] Judge Essex also addressed the symmetric risk of reverse

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255. *Id.* at 44–45.
256. *Id.* at 44.
257. *Id.* at 45.
258. *Id.* (internal citations omitted).
259. *Id.*
260. *Id.* at 46.
261. *Id.*
262. *Id.*
263. *Id.* at 30.
264. *Id.* at 39.
265. *Id.* at 40.

holdup,[266] observing that by using an SEP before obtaining the license, an implementer "puts pressure on the IPR owner to settle, as the owner is not compensated during a period of exploitation of the IP by the unlicensed parties."[267] Judge Essex explained that, by shifting the risk to the SEP holder, an implementer can force an SEP holder to accept a royalty rate that is "in the lower range of FRAND, or perhaps even lower than a reasonable FRAND rate."[268]

Judge Essex's decision comports with Ambassador Michael Froman's recommendations to the ITC in 2013.[269] The Ambassador expressed concern over patent holdup *and* reverse patent holdup, but he did not imply that either was more likely to arise in practice. Rather, Ambassador Froman emphasized that the ITC's decision whether to issue an exclusion order should depend on the specific circumstances of the case, and he urged the ITC to "seek proactively to have the parties develop a comprehensive factual record related to these issues . . . including . . . the presence or absence of patent hold-up or reverse hold-up."[270]

D. The Approach Adopted in Other Jurisdictions

The Federal Circuit's decision comports with the approach that courts in other jurisdictions have adopted when assessing the licensing conduct of the SEP holder and the licensee. In *Huawei Technologies Co. v. ZTE Corp.*, the Court of Justice of the European Union (CJEU) ruled on the question of whether an SEP holder has the right to request an injunction against an implementer.[271] Addressing this question from the perspective of EU competition law, the CJEU found that an SEP holder does not abuse its dominant position by requesting an injunction against the implementer when two conditions are met: (1) the SEP holder has extended in writing a FRAND licensing offer to the implementer; and (2) the implementer keeps using the SEPs and has not promptly replied to the offer, or has engaged in delaying tactics.[272] The CJEU emphasized the general principles that a patent holder—including a holder of a FRAND-committed SEP—"may not be deprived of the right to have re-

266. Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof at 113–14, Inv. No. 337-TA-868, USITC Pub. 2929 (June 13, 2014) (Initial Determination on Violation of Section 337 and Recommended Determination on Remedy and Bond) [hereinafter USITC Inv. No. 337-TA-868 Initial Determination].

267. *Id.*

268. *Id.* at 114; *see also* J. Gregory Sidak, *International Trade Commission Exclusion Orders for the Infringement of Standard-Essential Patents*, 26 CORNELL J.L. & PUB. POL'Y (forthcoming 2016); J. Gregory Sidak, *Using the Economic Theory of Investment to Prove Whether a Domestic Industry Exists in a Section 337 Patent Infringement Investigation Before the U.S. International Trade Commission*, 51 WAKE FOREST L. REV. (forthcoming 2016).

269. Letter from Michael B.G. Froman, Ambassador, Exec. Office of the President, to the Honorable Irving A. Williamson, Chairman, USITC (Aug. 3, 2013).

270. *Id.* at 3; *see also* Sidak, Reply to Chairwoman Ramirez, *supra* note 170.

271. Case C-170/13, Huawei Tech. Co. v. ZTE Corp., 62013CJ0170, EUR-Lex CELEX, ¶ 44 (July 16, 2015), http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1437080250973&uri=CELEX:62013CJ0170.

272. *Id.* ¶ 71.

course to legal proceedings to ensure effective enforcement of his exclusive rights, and that, in principle, the user of those rights, if he is not the proprietor, is required to obtain a license prior to any use."[273] The CJEU found that a FRAND commitment does not alter those basic principles, as long as the SEP holder complies with its FRAND commitment by notifying the potential licensee of its infringement and offering a FRAND license. Although the CJEU only briefly mentioned the risk of patent-holdup and reverse holdup,[274] it reiterated the need to reconcile allegations of an abusive injunction with "the specific legal and factual circumstances in the case."[275]

Similarly, in March 2015, the High Court of Delhi granted an injunction against an infringer of a FRAND-committed patent, finding that the infringer was avoiding a FRAND agreement and was thus considered "unwilling."[276] The court also found that the infringer initiated a procedure in front of the Competition Commission of India solely "to prolong litigation by avoiding the royalty."[277] The High Court of Delhi did not rely on abstract allegations of excessive prices (or holdup), but rather examined the parties' conduct during the negotiation process. Hence, like the Federal Circuit, the CJEU and the High Court of Delhi declined to credit theoretical allegations of excessive royalty demands by SEP holders that lacked any accompanying empirical substantiation.[278]

V. CAN INCOMPLETE JURY INSTRUCTIONS ON THE PATENT HOLDER'S FRAND COMMITMENT AFFECT A DAMAGES AWARD THAT RESTS ON ANALYSIS OF COMPARABLE LICENSES?

The Federal Circuit remanded the determination of the damage award in *Ericsson v. D-Link* on the rationale that Chief Judge Davis incorrectly instructed the jury on how to compute a RAND royalty. The Federal Circuit criticized Chief Judge Davis for failing to instruct the jury about the actual duties arising from Ericsson's RAND commitment and for instructing the jury to consider every *Georgia-Pacific* factor.[279] This aspect of the Federal Circuit's decision in *Ericsson v. D-Link* is not persuasive. Economic analysis shows that because a RAND royalty was calculated on the basis of comparable license agreements that tacitly account for those variables, different jury instructions would be unlikely to

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273. *Id.* ¶ 58.
274. *Id.* ¶ 38.
275. *Id.* ¶¶ 53–56.
276. Telefonaktiebolaget LM Ericsson v. Intex Techs., Ltd., (2014) 1045 CS(OS) 1, 239 (2015) (India), (Delhi H.C.) ¶ 136, http://indiankanoon.org/doc/74163100/.
277. *Id.* ¶ 137.
278. *See* Sidak, *FRAND in India*, *supra* note 207.
279. Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1235 (Fed. Cir. 2014).

produce a different damage award.[280] The Federal Circuit should have recognized Chief Judge Davis' error to be harmless.

A. Jury Instructions Concerning the SEP Holder's FRAND Commitment

The Federal Circuit criticized Chief Judge Davis for failing to instruct the jury on the SEP holder's precise RAND commitment. The Federal Circuit said that because the actual obligations arising from a FRAND commitment may vary across different SSOs, a jury would require precise instructions about the SEP holder's obligations: "Rather than instruct the jury to consider 'Ericsson's obligation to license its technology on RAND terms,' the trial court should have instructed the jury about Ericsson's *actual* RAND promises."[281] Some *amici curiae* supported the Federal Circuit's criticisms, arguing that the failure to instruct the jury on the exact commitments arising from a FRAND commitment could "improperly award damages based on the value of the standard."[282] The Federal Circuit's criticism of Chief Judge Davis' jury instructions, however, is only partially correct. Although the Federal Circuit correctly observed that the FRAND commitment given to different SSOs may trigger different obligations (and consequently warrant the adjudication of a different FRAND royalty), the exact analysis of the SEP holder's obligations becomes less relevant when the FRAND royalty is calculated based on comparable licenses. Licenses from real-world transactions—relating to the same standard of a given SSO—inherently reflect the market valuation of the existing commitments, and thus obviate the adjudicator's accounting separately for the value of those commitments.

The Federal Circuit has correctly observed that the *actual* obligations arising from a FRAND commitment can vary across SSOs. The SEP holder's exact duties depend on the bylaws of the specific SSO to which the SEP holder contributed its technologies. For example, in February 2015, the IEEE adopted revolutionary changes to its bylaws that impose, prospectively, stricter obligations on SEP holders that choose to accept the new IEEE policy over the bylaws of the other major SSOs.[283] One of the IEEE's bylaw amendments says that the royalty for patents

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280. Aaron R. Fahrenkrog et al., *SEPs Don't Need a Different Reasonable Royalty Analysis,* LAW360 (Mar. 24, 2015), http://www.law360.com/articles/632742/seps-don-t-need-a-different-reasonable-royalty-analysis.

281. *Ericsson*, 773 F.3d at 1231 (emphasis in original) (internal citation omitted).

282. *See, e.g.*, Brief for Microsoft Corp. as Amicus Curiae Supporting of Appellants at 17 [hereinafter Microsoft Brief], Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201 (Fed. Cir. 2014).

283. For the revised bylaws of the IEEE, see INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC., IEEE-SA STANDARDS BOARD BYLAWS (2015), https://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf. For an analysis of the implications of these bylaw amendments, see Letter from J. Gregory Sidak, Chairman, Criterion Economics, to the Honorable Renata B. Hesse, Deputy Assistant Attorney General, Antitrust Division, U.S. Dep't of Justice (Jan. 28, 2015), http://www.criterioneconomics.com/docs/proposed_ieee_bylaw_amendments_affecting_frand_licensing_of_seps.pdf; J. Gregory Sidak, *The Antitrust Division's Devaluation of Standard-Essential Patents*, 104 GEO. L.J. ONLINE 48, 49 (2015).

implemented in the IEEE's standards should be measured against "[t]he value that the functionality [of the SEP] contributes to the value of the relevant functionality" of the SSPPC.[284] Typically, SSOs have not dictated to the SEP holder the royalty base that it must use.[285] In fact, most royalties for SEPs for mobile devices are denominated as a percentage of the value of a downstream product (such as a handset or tablet).[286] Even the IEEE's bylaws did not limit an SEP holder's freedom in this respect until February 2015.[287] Therefore, there might be significant differences between the SEP holder's FRAND obligations when the licensed technologies are essential to the IEEE's standards versus the standards of a different SSO. In this respect, the Federal Circuit—perhaps anticipating the IEEE's ratification of its then-proposed bylaw amendments concerning FRAND licensing—was correct to require that Chief Judge Davis inform the jury of Ericsson's *actual* RAND commitment.

Nevertheless, licenses negotiated in real-world transactions typically account for the SEP holder's precise obligation arising from the FRAND commitment given to a specific SSO. From an economic perspective, royalty rates upon which parties agreed in real-world licenses intrinsically include *all* market considerations known to the parties at the time of the negotiation, including the precise obligations arising from a FRAND commitment.[288] As Chief Judge Davis observed, the parties to the licensing agreements are generally "sophisticated parties, making it likely they would have been aware of . . . RAND obligations during the negotiations."[289] The parties are also familiar with the precise obligations that arise from each SSO's specific FRAND commitment, and they account for those obligations when negotiating the royalty compensation. Consequently, the royalties upon which the parties agree in comparable licenses already reflect the parties' informed valuation of the SEP holder's obligations arising from the actual FRAND commitment relevant to the case.

Given the specific facts of *Ericsson v. D-Link*, Chief Judge Davis' failure to instruct the jury about Ericsson's "actual" RAND commitment

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284. INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC., Draft 39 IEEE Standards Board Bylaws § 6.1, at 2 (2014) [hereinafter IEEE Draft 39 IEEE Standards Board Bylaws], http://grouper.ieee.org/groups/pp-dialog/drafts_comments/SBBylaws_100614_redline_current.pdf.

285. EUROPEAN TELECOMMUNICATIONS STANDARDS INSTITUTION, Annex 6: ETSI Intellectual Property Rights Policy, ETSI Rules of Procedure (Nov. 19, 2014), http://www.etsi.org/images/files/IPR/etsi-ipr-policy.pdf. This annex does not require parties to choose a particular royalty base.

286. Press Release, Nortel, Nortel Strengthens the Case for Deployment of LTE by Publishing Competitive Patent Royalty Rates (May 5, 2008), http://www.marketwired.com/press-release/nortel-strengthens-case-deployment-lte-publishing-competitive-patent-royalty-rates-nyse-nt-851829.htm;
Press Release, ZTE, The Licensing Policy on LTE Essential Patents of ZTE (Dec. 22, 2008).

287. IEEE-SA STANDARDS BOARD BYLAWS, *supra* note 283.

288. *See* Armen A. Alchian, *Uncertainty, Evolution, and Economic Theory*, 58 J. POL. ECON. 211, 213–14 (1950). Alchian explained that the norms and strategies that emerge in an industry are those that best suit the business environment. These industry norms tacitly incorporate myriad variables too extensive and complex to be captured fully by any human being or computer model. *Id.* at 212.

289. Ericsson Inc. v. D-Link Sys., Inc., No. 6:10-CV-00473, 2013 WL 4046225, at *17 (E.D. Tex. Aug. 6, 2013).

would unlikely affect the jury's damages award. Chief Judge Davis concluded "there was substantial evidence that the prior licenses were negotiated within" Ericsson's RAND commitment.[290] The royalties determined in those real-world licenses, therefore, already accounted for the SEP holder's "actual" FRAND obligation, and instructing the jury on the particulars of that obligation, although relevant, would be additional information unlikely to change the damages award.

In sum, calculating a FRAND royalty based on comparable licenses for the same standard of a given SSO obviates the adjudicator's performing an economic evaluation of the SEP holder's precise duties arising from its FRAND commitment to that SSO. Although such duties vary across SSOs, comparable license agreements already reflect the parties' consideration, thus, those agreements already indicate the market's valuation of those duties.

B.   Should a Court Exclude Certain Georgia-Pacific Factors When Calculating a FRAND Royalty?

When calculating a reasonable royalty in patent infringement cases, U.S. courts typically consider the *Georgia-Pacific* factors—a set of fifteen factors that "provide a reasoned economic framework for a 'hypothetical negotiation . . . [which] attempts to ascertain the royalty upon which the parties would have agreed had they successfully negotiated an agreement just before infringement began.'"[291] The Federal Circuit in *Ericsson v. D-Link* clarified that, although courts have not "described the *Georgia-Pacific* factors as a talisman for royalty rate calculations,"[292] damages experts often rely on this methodology when calculating patent damages.

Nonetheless, the Federal Circuit in *Ericsson v. D-Link* criticized Chief Judge Davis for instructing the jury to consider all fifteen *Georgia-Pacific* factors when calculating Ericsson's patent damages.[293] The Federal Circuit said that, in cases involving FRAND-committed SEPs, "many of the *Georgia-Pacific* factors simply are not relevant; many are even contrary to RAND principles,"[294] and it concluded that Chief Judge Davis erred by instructing the jury to account for factors that are irrelevant for computing a RAND royalty.[295] Some *amici curiae* (including Microsoft) supported the Federal Circuit's conclusion,[296] arguing that the jury's consideration of certain *Georgia-Pacific* factors would result in the

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290.   *Id.*
291.   Whitserve, LLC v. Computer Packages, Inc., 694 F.3d 10, 27 (Fed. Cir. 2012) (quoting Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1324 (Fed. Cir. 2009)); *see also* Sidak, *Bargaining Power and Patent Damages*, *supra* note 33.
292.   Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1230 (Fed. Cir. 2014).
293.   *Id.* at 1231.
294.   *Id.* at 1230.
295.   *Id.* at 1231.
296.   *See, e.g.*, Corrected Brief for American Antitrust Institute as Amicus Curiae Supporting Neither Party at 12 [hereinafter AAI Brief], Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201 (Fed. Cir. 2014); *see also* Microsoft Brief, *supra* note 282, at 2, 15.

inclusion of holdup value in the final damages award.[297] Several factors, however, that the Federal Circuit considered irrelevant are, to the contrary, actually highly relevant and should be considered when calculating a FRAND royalty. Although in specific circumstances some factors might be neutral to the determination of a FRAND royalty, there is no valid economic justification to have a blanket exclusion of specific *Georgia-Pacific* factors from the analysis.

I have previously questioned whether the *Georgia-Pacific* factors are a suitable framework for setting, in general, a reasonable royalty and, more specifically, for identifying a FRAND royalty for SEPs.[298] In general, the *Georgia-Pacific* factors give the jury the arduous task of evaluating fifteen factors with no guidance on the relative weight that it should assign to each of those factors.[299] The factors are neither mutually exclusive nor exhaustive for determining a reasonable royalty.[300] When applied to the determination of a FRAND royalty, the *Georgia-Pacific* framework presents two additional challenges. First, a FRAND commitment is a private contract, hence, the SEP holder effectively bargains away its right to receive a reasonable royalty determined by using the public law's default framework for setting patent royalties—the *Georgia-Pacific* factors.[301] Second, the *Georgia-Pacific* factors apply to a royalty dispute whose facts resemble those of a tort claim. The parties to a FRAND dispute, however, do not at all resemble parties in a typical tort dispute. The parties to a FRAND dispute are most often members of an SSO that have a long history of contracting with one another and expect to do so again in the future. Those parties form mutual expectations about a framework for measuring harm in the event of a breach of contract far before the *Georgia-Pacific* framework's hypothetical date of first infringement.[302] Those two differences between FRAND-committed SEPs and patents that are unrelated to standard setting reduce the suitability of the *Georgia-Pacific* framework for determining a FRAND royalty for the use of an SEP. When a court decides, however, to instruct the jury on the *Georgia-Pacific* factors to set a FRAND royalty for an SEP, economic principles counsel the court to undertake an examination more prob-

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297. *See, e.g.*, AAI Brief, *supra* note 296, at 3–4; Non-Confidential Reply Brief for Intervenor-Appellant Intel and Defendants-Appellants Acer, Gateway, Netgear, D-Link, and Toshiba at 29, Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201 (Fed. Cir. 2014) [hereinafter Intel Brief].

298. Sidak, *The Meaning of FRAND, Part I*, *supra* note 12, at 968–71.

299. *Id.* at 968–69. For similar criticisms by Judge Richard Posner and former Chief Judge Randall Rader, see David A. Haas et al., *An Interview of Judge Richard A. Posner on Patent Litigation*, STOUT RISIUS ROSS (July 10, 2013), http://www.srr.com/article/interview-judge-richard-posner-patent-litigation ("[C]ould a judge or jury . . . play with 15 factors and come up with an objective measure of anything?"); David A. Haas et al., *View from the Federal Circuit: An Interview with Chief Judge Randall R. Rader*, STOUT RISIUS ROSS (July 9, 2012), http://www.srr.com/article/view-federal-circuit-interview-chief-judge-randall-r-rader (the *Georgia-Pacific* factors are "just a laundry list of various things to be considered" and "were never meant to be a test or a formula for resolving damages issues."); *see also* Sidak, *Bargaining Power and Patent Damages*, *supra* note 33, at 2–4.

300. Sidak, *The Meaning of FRAND, Part I*, *supra* note 12, at 968.

301. *Id.* at 969–70.

302. *Id.* at 971.

ing than what the Federal Circuit expressed in *Ericsson v. D-Link* before instructing the jury to consider the *Georgia-Pacific* framework piecemeal.

1. Georgia-Pacific *Factors 4 and 5*

Georgia-Pacific factors 4 and 5 relate to an SEP holder's licensing policy. The Federal Circuit said in *Ericsson v. D-Link* that *Georgia-Pacific* factor 4 does not apply to SEPs or may be misleading for determining a FRAND royalty.[303] That factor instructs the finder of fact to consider the "licensor's established policy and marketing program to maintain his patent monopoly."[304] The Federal Circuit said that, because of its RAND commitment, Ericsson cannot have a policy to maintain a monopoly, and thus, the determination of a RAND royalty should not consider *Georgia-Pacific* factor 4.[305] Similarly, the Federal Circuit said that *Georgia-Pacific* factor 5, which considers "'[t]he commercial relationship between the licensor and the licensee,'" was irrelevant because Ericsson must license at a nondiscriminatory rate.[306]

That analysis, however, is incomplete on economic grounds. Contrary to the Federal Circuit's reasoning in *Ericsson v. D-Link*, factors 4 and 5 of *Georgia-Pacific* are both relevant to calculating a FRAND royalty. When evaluating *Georgia-Pacific* factor 4, economists generally recommend an upward adjustment to a reasonable royalty if the patent holder uses its patented technology on an exclusive basis.[307] A SEP holder that has made a FRAND commitment, however, has declared that it will make its patented technology accessible to all willing licensees.[308] Consequently, the holder of a FRAND-committed SEP cannot have a policy to "maintain [its] patent monopoly."[309] Therefore, from an economic perspective—contrary to the Federal Circuit's reasoning in *Ericsson v. D-Link*—*Georgia-Pacific* factor 4 plainly *is* relevant for calculating a FRAND royalty. Factor 4 would suggest a downward adjustment to the FRAND royalty, or at least would be neutral to the calculation of a reasonable royalty (in the sense that it would counsel the jury not to increase a reasonable royalty, holding all other factors constant).

Similarly, the economic reasoning underlying *Georgia-Pacific* factor 5 is that, in a hypothetical negotiation, the patent holder would generally require a higher reasonable royalty to license its patent to a competitor than to a licensee that is not a competitor. *Georgia-Pacific* factor 5 thus supports an upward adjustment to a reasonable royalty when the patent

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303. 773 F.3d 1201, 1230 (Fed. Cir. 2014).
304. Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *mod. and aff'd*, 446 F.2d 295 (2d Cir. 1971), *cert. denied*, 404 U.S. 870 (1971).
305. *Ericsson*, 773 F.3d at 1230.
306. *Id.* at 1230–31 (alteration in original) (quoting *Georgia-Pacific*, 318 F. Supp. at 1120).
307. *See* Sidak, *The Meaning of FRAND, Part I*, *supra* note 12, at 942.
308. *See* Sidak, *The Meaning of FRAND, Part II*, *supra* note 198, at 206.
309. *Georgia-Pacific*, 318 F. Supp. at 1120.

holder competes with its licensee in the downstream market. When applied to FRAND-committed patents, *Georgia-Pacific* factor 5 would be neutral to the calculation of a reasonable royalty if the SEP holder does not practice its own patent and, therefore, does not compete with its licensees. Certainly, in that situation there would be no upward adjustment of a reasonable royalty unless the SEP holder could show some other opportunity cost of licensing its SEP to the implementer in question.

Suppose instead that a SEP holder competes in the market for the downstream product. It is questionable whether the SEP holder can charge a competitor a higher royalty than it charges a non-competitor. One could argue that, by making a FRAND commitment, the SEP holder agrees to refrain from charging a higher royalty to the competitor because the FRAND commitment prevents discrimination between competitors and non-competitors. Analysis of real-world licenses reveals, however, an additional reason why SEP holders that are also manufacturers of downstream products generally do not charge higher royalties to licensees that are competitors.[310] An SEP holder that manufactures smartphones will almost certainly need to license its competitor's patents. Consequently, the SEP holder and its licensee will typically agree to a cross license, whereby the SEP holder and the licensee each grant a license to its portfolio of standard-essential patents (and perhaps implementation patents as well). Because a cross license specifies a *net* royalty payment (to be paid by the party that is the net recipient of rights to use licensed technology in the transaction), the agreed-upon royalty amount is less than the royalty that a one-way license for the same patents would specify.

The following analogy explains the concept of a net royalty. Consider an automobile owner who is replacing his old BMW 328i with a new Toyota Camry. The car dealer allows the customer to trade in his used BMW and receive a credit or "trade-in allowance" (equal to the value of the used BMW) toward the price of the new Camry. The better the condition of the used BMW, the higher the credit that the dealer will grant the customer. The net price of the new Camry (after the used car trade in) is analogous to the net royalty payment between the parties to a cross-license agreement. The net royalty payment is always less than the one-way royalty that the SEP holder would charge to a licensee that has no patent portfolio to cross-license. In short, the need to enter into a cross license would prevent the SEP holder from charging higher royalties to licensees that compete with the SEP holder in the downstream market for standard-compliant goods.[311]

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310. Sidak, *The Meaning of FRAND, Part I*, *supra* note 12, at 962.

311. For further analysis on the similarities between cross-licensing portfolios of SEPs and transacting for automobiles, see J. Gregory Sidak, *How Licensing a Portfolio of Standard-Essential Patents Is Like Buying a Car*, WORLD INTELL. PROP. ORG. MAG., June 2015, at 10, https://www.criterion economics.com/docs/licensing-standard-essential-patents-is-like-buying-a-car.html.

Thus, giving the jury a detailed explanation of how SEP holders license their technology to competitors in the real world—that is, an explanation of cross-licensing and net royalty payments—is important. Such an explanation is a more nuanced way to ensure an accurate award of a FRAND royalty than is the blanket assertion that *Georgia-Pacific* factor 5 is irrelevant and that the court should instruct the jury to ignore it.

2.   Georgia-Pacific *Factors 8, 9, and 10*

Georgia-Pacific factors 8, 9, and 10 largely relate to the manufacturing and use of downstream products that include the patented technology. The Federal Circuit said in *Ericsson v. D-Link* that the jury should not consider *Georgia-Pacific* factors 8, 9, and 10 when determining a FRAND royalty for SEPs.[312] Those factors consider the current popularity of the product made under the patent (factor 8),[313] the advantages of the patented technology over old modes that "had been used for working out similar results"[314] (factor 9), and the commercial embodiment of the license and benefits to consumers of the patent holder's product that implements the patented technology (factor 10).[315]

The Federal Circuit said in *Ericsson v. D-Link* that *Georgia-Pacific* factor 8 is irrelevant for the computation of a FRAND royalty because an SEP's popularity is likely to be inflated as a result of the SEP's implementation into the standard.[316] Therefore, the Federal Circuit reasoned that considering *Georgia-Pacific* factor 8 in calculating a FRAND royalty for SEPs is likely to allow the SEP holder to capture the value of the standard rather than only the value of the patented technology.[317] The Federal Circuit similarly said that considering *Georgia-Pacific* factor 9 in the computation of a FRAND royalty would skew the award in favor of SEP holders.[318] The court reasoned that, even if an SEP is not an improvement over prior art and a potential licensee believes that the patented technology has no advantages over the old modes, it is still essential to practice a technology, and potential licensees would have no choice but to use the SEP in the standard.[319] Finally, the Federal Circuit said that *Georgia-Pacific* factor 10 is irrelevant because, regardless of an SEP's commercial embodiment or manner of production, a licensee that needs to practice a standard will have no choice but to license the SEP.[320] Some commentators agree with the Federal Circuit's conclusion that the "*Georgia-Pacific* factors . . . are not an appropriate basis . . . to determine

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312.   773 F.3d 1201, 1231 (Fed. Cir. 2014).
313.   *Georgia-Pacific*, 318 F. Supp. at 1120.
314.   *Id.*; *see also Ericsson*, 773 F.3d at 1231.
315.   *Ericsson*, 773 F.3d at 1231.
316.   *Id.*
317.   *Id.*
318.   *Id.*
319.   *Id.*
320.   *Id.*

damages for infringement of a standard-essential patent encumbered by a RAND commitment"[321] because, by failing to distinguish between the "competitive value of the patent and its holdup value," the *Georgia-Pacific* factors supposedly do not address a fundamental purpose of a FRAND commitment.[322] Those commentators also argue that the *Georgia-Pacific* factors are inadequate for calculating a FRAND royalty for SEPs because the bilateral negotiation framework contemplated by the *Georgia-Pacific* factors supposedly does not prevent royalty stacking.[323]

Contrary to these arguments, economic analysis of *Georgia-Pacific* factors 8, 9, and 10 shows that those factors *are* relevant for determining a FRAND royalty. As explained in Part V, standards have different values, and different SEP portfolios contribute in unique ways to the value of the standard. *Georgia-Pacific* factors 8, 9, and 10 instruct the jury to consider those differences and evaluate the SEP portfolio's contribution to the standard. A jury's consideration of those factors when calculating a FRAND royalty would not result in a damages award that includes holdup value in the damages award. Rather, proper consideration of those factors ensures that the jury-determined FRAND royalty most closely approximates the incremental value that the patent portfolio contributes to the standard.

3.   Georgia-Pacific *Factor 15*

Finally, the Ninth Circuit and some commentators[324] have reasoned that *Georgia-Pacific* factor 15—which considers the hypothetical negotiation between the SEP holder and the infringer at the moment of first infringement[325]—should be modified in FRAND settings. Specifically, the Ninth Circuit observed in *Microsoft v. Motorola* that "Microsoft[] [argued] that Motorola's breach was ongoing."[326] Therefore, the Ninth Circuit reasoned it was reasonable for the district court to use the present-day value of Motorola's SEPs as a factor in calculating the RAND rate and range for use in the breach of contract proceeding.[327] Other commentators have argued that one should modify factor 15 to account for the risk of royalty stacking that licensees of SEPs would face.[328]

Those commentators argue, for example, that a properly instructed jury would have recognized that a royalty of $0.05 per patent cannot be assessed where, as in Ericsson's dispute, there are hundreds (likely thou-

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321.   AAI Brief, *supra* note 296, at 2.
322.   *Id.* at 14.
323.   *Id.* at 16–17.
324.   Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024, 1050 (9th Cir. 2015).
325.   I have previously explained the modifications that are necessary to make to *Georgia-Pacific* factor 15 when applying it to a hypothetical negotiation between a willing SEP holder and a willing implementer to set a FRAND royalty. *See* Sidak, *The Meaning of FRAND, Part I*, *supra* note 12, at 983.
326.   *Microsoft*, 795 F.3d at 1050.
327.   *Id*.
328.   Intel Brief, *supra* note 297, at 28.

sands) of patents purportedly essential to the Wi-Fi standard, and the Wi-Fi chip embodying the standard sells for an average of only about $2.50.[329] Those commentators thus argued that the determination of a FRAND royalty should consider the risk of a royalty stack—that is, it should ensure that the royalty is not excessive in light of the total royalty burden that an implementer of a standard would shoulder. They also argue that the court should not require evidence that royalty stacking has occurred in the specific case.[330] In their view, imposing such a requirement would lead to a "rush to the courts," in which SEP holders would rush to obtain a license before the stack becomes too high.[331] Those commentators argue that courts should address the issue of royalty stacking immediately, with or without supporting evidence, because by the time a party proves royalty stacking, there would be "no mechanism to adjust all of the already-adjudicated or already-agreed royalties later determined to be too high in the aggregate."[332]

These arguments however, fail, because the underlying conjecture about royalty stacking is invalid for at least four reasons. First, calculating the total royalty burden by simply aggregating the royalty for each individual patent is an incorrect and misleading methodology. SEPs are not licensed individually, but rather as part of a patent portfolio. When a standard reads on a thousand SEPs held by a single company, the implementer will not need to obtain a thousand licenses from that SEP holder. Instead, the implementer will need to execute only a single license granting access to the SEP holder's entire portfolio. For example, two of the largest holders of SEPs for mobile telecommunications, Ericsson and Nokia, each have thousands of SEPs in their portfolios.[333] Therefore, the number of licenses that an implementer would actually need to obtain to practice a given standard is significantly lower (by orders of magnitude) than the total number of patents essential to that standard.

Second, some economic research has implied that the value of the patents included in a patent portfolio is skewed. The distribution value of SEPs is also likely to be skewed, albeit less skewed than implementation patents. That is, although standards often include a large number of SEPs, a minority of the SEPs held by a given firm could easily account for the majority of the value of that firm's portfolio. Licensees pay a high royalty to license the valuable SEPs from each portfolio, but the marginal price of each additional SEP falls toward zero as the SEPs become less valuable. That is, the implementer's cost of accessing the most important patents in a patent portfolio will generally cover nearly the entire cost of the patent portfolio. It is, therefore, incorrect to assume, for example, that a royalty of $0.15 per unit for only three of the thousands of Erics-

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329.   *Id.* at 27–28.
330.   *Id.* at 30 n.11.
331.   *Id.* at 28.
332.   Cisco Brief, *supra* note 159, at 25.
333.   *See, e.g.,* Mark Schankerman, *How Valuable Is Patent Protection? Estimates by Technology Field*, 29 RAND J. Econ. 77 (1998).

son's SEPs is necessarily prohibitively high and carries concerns of royalty stacking because those SEPs might drive much of the value of Ericsson's SEP portfolio.

Third, the royalty-stacking conjecture contradicts basic principles of price theory. Supply and demand for a product determine its price. The intersection of the demand curve and the supply curve is the competitive market price.[334] The royalty-stacking argument suggests, however, that the profit made by a product's user should determine that product's price. That argument is analogous to a restaurant operator saying that its landlord should lower rent payments to a level that, after considering the operator's income minus the operator's expenses (such as labor, marketing, and supplies), still leaves room for the operator to make a profit. The royalty-stacking conjecture is a plea by implementers to subject intellectual property to rent control. Applying such an assumption to the hypothetical negotiation heightens the risk that the SEP holder would not be adequately compensated because basing the value of an input on the profit margins of the output's producer does not reveal anything about the input's incremental value. The output's producer—for example, the restaurant operator—could be inefficient, which would result in low profit margins and thus lower the value of the input, even if, in reality, the input is highly valuable.

Fourth, the royalty-stacking conjecture also contradicts economic principles that the Federal Circuit recognized in late 2014 in *Aqua Shield v. Inter Pool Cover Team*.[335] In the Federal Circuit's opinion in *Aqua Shield*, Judge Richard Taranto clarified that it is incorrect to treat the profits that the defendant earned from infringing sales as a royalty cap.[336] Characterizing the licensee's profits as a royalty cap would turn the hypothetical negotiation into "a backward-looking inquiry into what turned out to have happened."[337] It would require a court to determine what profit the licensee made and then calculate a reasonable royalty based on that determination. This approach, however, is not representative of a real-world licensing negotiation, which is necessarily an *ex ante* negotiation, whereas determining a royalty based on a licensee's profits involves *ex post* determinations, which may be artificially modified. The Federal Circuit explained:

> An especially inefficient infringer—*e.g.*, one operating with needlessly high costs, wasteful practices, or poor management—is not entitled to an especially low royalty rate simply because that is all it can afford to pay without forfeiting or unduly limiting its profit if it uses the patented technology rather than alternatives.[338]

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334. *See, e.g.*, DENNIS CARLTON & JEFFREY M. PERLOFF, MODERN INDUSTRIAL ORGANIZATION 61 (Addison-Wesley 4th ed. 2005).
335. 774 F.3d 766 (Fed. Cir. 2014).
336. *Id.* at 772.
337. *Id.*
338. *Id.* at 771.

Considering the licensee's profit as a royalty cap would, therefore, drive a wedge between the royalties negotiated in real-world licensing agreements and hypothetically determined royalties awarded in court.

4. Summation

The *Georgia-Pacific* framework is particularly unsuitable for calculating a reasonable royalty for FRAND-committed patents. If a court does, however, decide to apply it, the *Georgia-Pacific* framework should be considered in its entirety so that the jury can comprehensively consider the factors that determine a reasonable royalty. As in patent cases that do not concern SEPs, some *Georgia-Pacific* factors might be neutral and thus indicate no adjustment of a reasonable royalty. There is, however, no valid economic justification to exclude specific *Georgia-Pacific* factors from jury instructions.

VI. SHOULD A FRAND ROYALTY EXCLUDE ANY AND ALL VALUE ATTRIBUTABLE TO THE STANDARD?

The Federal Circuit said in *Ericsson v. D-Link* that a FRAND royalty "must be premised on the value of the patented feature, not any value added by the standard's adoption of the patented technology."[339] Although the Federal Circuit was correct to reiterate that a FRAND royalty (like any other royalty for the use of a patented technology) should compensate the SEP holder for the incremental value of its patented technology, the Federal Circuit's decision should not be interpreted to exclude from a FRAND royalty *any* of the standard's value. When the invention covered by the SEPs contributes to the standard's value, only a FRAND royalty that includes part of that value will properly compensate the SEP holder for the incremental value of its invention.

A. Suppression of Design Diversity and the Value of a Standard

When calculating a FRAND royalty, it is important to distinguish the value of standardization from the value of a standard. Standardization is the agreement among market participants to adhere to a specific standard.[340] The agreement to use a common standard increases interoperability and can have procompetitive effects. Competing and complementary products that practice the same standard create complementarity effects and network effects. Standardization can also reduce or eliminate duplicative research and development expenses that can cause inefficient levels of investment. A standard allows the SSO's members to

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339. 773 F.3d 1201, 1232 (Fed. Cir. 2014); *see also* Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc., 809 F.3d 1295, 1304 (Fed. Cir. 2015).

340. *See* J. Gregory Sidak, *The Value of a Standard Versus the Value of Standardization*, 68 BAYLOR L. REV. 59 (2016), https://www.criterioneconomics.com/the-value-of-a-standard-versus-the-value-of-standardization.html.

internalize the surplus that a standard generates, which creates incentives for SSO members to participate in collective standard setting.

Many benefits of standardization, however, are not unique to SSOs. Bilateral and multilateral contracts can generate similar degrees of interoperability and thus generate benefits comparable to those that collective standard settings generate. Those benefits arise when market participants agree to use the same standard—whether through bilateral concontracts or through standard setting. Yet, for bilateral contracting to generate the same level of benefits that an SSO generates, firms would need to enter into hundreds, if not thousands, of private agreements with other firms. Thus, the advantage of standard setting over bilateral contracting is that standard setting can significantly reduce the transaction costs necessary to achieve the benefits of a standardized technology. One can thus view the value of standardization through an SSO as the reduction in the transaction costs necessary to achieve a level of increased interoperability, compared with the transaction costs that private agreements would require to achieve the same level of interoperability. Put differently, the value of standardization is not necessarily the value of interoperability, which private agreements can match. Rather, the value of standardization is the incremental reduction in transaction costs associated with collectively generating the benefits of standardization through an SSO.

Standardization (or interoperability) creates most of the value of some, but not all, standards. For example, the value of standardized electrical outlets primarily derives from standardization—that is, from the agreement between market participants to use the same design rather than a diversity of designs. Whether electrical outlets have one particular design or another does not significantly affect the value of the standard. The value of using a common outlet standard is mainly attributable to the market's decision to suppress design diversity and use the same standard—that is, the value flows from interoperability. In other cases, however, interoperability is only one function of the standard, and the particular technologies that form a standard significantly increase the standard's value. Consequently, the value of the standard in those cases is not only attributable entirely to standardization itself (the suppression of design diversity), but also to the distinct quality of the technologies that form the chosen standard. By analogy, it is useful for international business transactions or governmental documents to use a common language, but the benefits from this form of interoperability cannot explain why one language tends to dominate others as the chosen standard. The rhetoric about "the value of standardization" that one encounters in the legal disputes and policy debates over FRAND royalties does not make this crucial distinction.

An example can clarify the difference between the value of interoperability and the value of the standard. Consider the difference between two telecommunications standards: the 2G mobile technologies standard

and the 4G mobile technologies standard. Both standards support the same types of products or services: mobile devices and mobile communications. The value of the 4G standard, however, plainly exceeds the value of the 2G standard (in the sense that nearly all consumers would prefer 4G service to 2G service if offered each at the same price). The 4G standard includes more valuable technologies that offer users new services that the 2G standard cannot support. The 4G standard does not derive its primary value from standardization (that is, the suppression of design diversity). Earlier standards, such as 2G, had already generated much of the value of standardization and had already provided users the desired level of interoperability. The value of the 4G standard derives principally from the innovative contributions of the technologies that form the 4G standard and from the complementarity effects that those technologies generate when used together. Therefore, the value of the 4G standard exceeds the value generated from simply establishing interoperability by suppressing design diversity. The adoption of 2G is akin to agreeing upon an international language for business and governmental affairs; the value of the 4G standard over the value of the 2G standard is akin to the difference between using English as that standard language and using Italian.[341]

When awarding FRAND royalties, courts must differentiate between standards whose value derives primarily from standardization (the suppression of design diversity) and standards whose value derives primarily from the included technologies and the complementarity effects and network effects that those technologies generate when interacting with other components of the standard.

B.   Who Should Receive the Value of a Standard?

The Federal Circuit said in *Ericsson v. D-Link* that the 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."[342] The Federal Circuit emphasized that a royalty "must be premised on the value of the patented feature, not any value added by the standard's adoption of the patented technology."[343] The Federal Circuit said that "[t]hese steps are necessary to ensure that the royalty award is based on the incremental value that the patented *invention* adds to the product" and is not based on any value that the standardization of that technology adds to the product.[344]

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341.   One can similarly analogize to choice of law. Parties to a contract agree to standardize interpretation of their contract under the law of specified jurisdiction. But that act of standardization by itself does not explain why the chosen law is more often that of Delaware or New York, rather than Alaska or Mississippi.

342.   *Ericsson*, 773 F.3d at 1233.

343.   *Id.* at 1232.

344.   *Id.* (emphasis in original).

When determining the incremental value of an SEP or an SEP portfolio, the distinction between the value of interoperability and the value of the standard becomes fundamental. Consider the example of technologies implemented in the 1G or 2G standards, which likely benefited from the increased interoperability achieved through standardization. Awarding those technologies any of the value of standardization would contradict the Federal Circuit's instruction in *Ericsson v. D-Link*. In the above example of the 4G standard, however, the inclusion of new technologies in the 4G standard did not necessarily increase the value of standardization. Rather, the opposite is more likely: the inclusion of new technologies in the standard increased the value of that standard. (The proponents of holdup implicitly but incorrectly have the direction of causation reversed.) Customers who value only interoperability, and not the underlying technologies, do not need to switch from 2G to 4G because the earlier standard already offered the necessary interoperability. If customers prefer 4G over 2G, that preference derives from some factor other than mere interoperability. Those customers likely value the more advanced services that the underlying technologies included in the 4G standard offer. The 4G standard would be less valuable if it did not include the most advanced technological solutions embodied in the SEPs.

When a technology greatly increases the value of the standard, the incremental value of the SEP necessarily includes some of the value from standardization. If the SEP holder cannot capture *any* of the value from standardization that its technology creates for the standard, it will have a dampened incentive to continue contributing its best technologies to SSOs. In the long run, the quality of technologies contributed to a future standard—and the expected value of that new standard—would decrease. The SEP holder's decision to contribute its technologies to a standard depends on the compensation that an SEP holder expects to obtain from such a contribution, compared with the SEP holder's alternative option to monetize its invention outside the standard. Even without artificial restrictions on royalties, the presence of positive externalities from the inclusion of one's technology in a standard would lead an economist to predict a suboptimal level of investment in standardization. Excluding any portion of the value of the standard from a reasonable royalty will exacerbate this problem. If the SEP holder expects not to be compensated fully for its contributions, it will not commit its most valuable technologies to the standard. It will instead commercialize those technologies independently. The quality of standards will decrease, and licensees will need to negotiate separate contracts for the more valuable technologies that inventors choose to commercialize as implementation patents. To maintain high-quality standards, FRAND royalties must be large enough not only to encourage participation in standard setting, but also to encourage SEP holders to offer their most valuable technologies to the standard.

SSOs have long recognized the need to compensate SEP holders fairly for their contributions to the standard.[345] U.S. courts have made similar observations. The Federal Circuit said in *Ericsson v. D-Link* that its decision "does not suggest that all SEPs make up only a small part of the technology in the standard. Indeed, if a patentee can show that his invention makes up 'the entire value of the' standard, an apportionment instruction probably would not be appropriate."[346] The Federal Circuit reiterated that the SEP holder should be compensated "for the approximate incremental benefit derived from his invention."[347] In *Microsoft v. Motorola*, Judge James Robart similarly said that determining a RAND royalty for Motorola's SEPs "necessarily requires considering the importance and contribution of the patent to the standard."[348] He added that a reasonable royalty would "consider the contribution of the patent to the technical capabilities of the standard and also the contribution of those relevant technological capabilities to the implementer and the implementer's products."[349] Judge Holderman took the same position in *Innovatio*, saying that "a court should consider the importance of the patent portfolio to the standard, considering both the proportion of all patents essential to the standard that are in the portfolio, and also the technical contribution of the patent portfolio as a whole to the standard."[350]

Furthermore, the suggestion by some that an SEP holder should not receive any portion of the value from standardization contradicts the traditional economic analysis of vertical production processes. Typically, when a downstream market becomes more competitive, the expected profit to upstream firms will increase. In collective standard setting, SEP holders, particularly those that do not manufacture standard-compliant products, take specific actions that promote a more competitive downstream market. Those actions reduce costs for manufacturers of standard-compliant products and facilitate entry in the downstream market. In a traditional vertical setting, the "value of standardization" will partially accrue to SEP holders by increasing demand for the upstream product, which creates an incentive for innovators to participate in future standard setting. Standardization can benefit the SEP holder by increasing competition in the downstream market, which will increase the quantity demanded of the SEP holder's patents at any price. This increase in quantity demanded results from standardization, and one can consider increased downstream competition as part of the value of the standard.

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345. *See, e.g.*, EUROPEAN TELECOMMUNICATIONS STANDARDS INSTITUTION, *supra* note 285, § 3.2 ("IPR holders whether members of ETSI and their AFFILIATES or third parties, should be adequately and fairly rewarded for the use of their IPRs in the implementation of STANDARDS and TECHNICAL SPECIFICATIONS.").

346. *Ericsson*, 773 F.3d at 1233 (internal citations omitted).

347. *Id.*

348. No. C10-1823JLR, 2013 WL 2111217, at *13 (W.D. Wash. Apr. 25, 2013).

349. *Id.* at *18.

350. *In re* Innovatio IP Ventures, LLC Patent Litig., No. 11 C 9308, 2013 WL 5593609, at *6 (N.D. Ill. Oct. 3, 2013).

Excluding the value that standardization adds to the standard from a FRAND royalty would deny SEP holders any portion of the benefit of increased downstream competition. If upstream firms (SEP holders) cannot receive any share of the benefit from downstream competition, then, given that those benefits provide an incentive for the upstream firms to continue to participate in standard setting, those firms will be less likely to participate in collective standard setting.

Those who believe that a FRAND royalty should not include any of the standard's value assume that SEP holders that have contributed to the creation of the standard's value should not capture any of that value. Implicit in that assumption is the idea that the implementers are entitled to capture the entirety of the surplus that is not passed on to consumers. What normative principle makes implementers worthier claimants to the producer surplus (or, more properly, seller surplus) from the standard than SEP holders, without whose inventions no standard would exist? No economic or normative justification supports the assumption that all of the seller surplus from the standard should accrue to the implementers. Without the SEP holder's contribution to the value of the standard, the implementer's profit from the sale of the end product that practices the standard would not exist. There is no economically sound reason to deny an SEP holder any portion of the value of the standard that it helped to create.

In sum, the apportionment requirement cannot logically prohibit a SEP holder from receiving the value of the standard created by the technology in suit. Excluding the value of the standard from a FRAND royalty would result in compensation that is *less* than the SEP's incremental value. By excluding the value of the standard from a FRAND royalty, the Federal Circuit would allocate a suboptimal amount of the value of the standard to SEP holders and threaten the long-run success of collective standard setting.

VII. CONCLUSION

The respective decisions of Chief Judge Davis and the Federal Circuit in *Ericsson v. D-Link* recognize important economic principles that can assist future juries, judges, and arbitrators in calculating a FRAND royalty. The two decisions confirm that royalties upon which parties willingly agree in real-world transactions to license the use of SEPs accurately reveal what market participants consider to be a FRAND royalty for those SEPs. Analyzing comparable licenses is an accurate and reliable methodology for calculating a FRAND royalty. Conversely, methodologies that rely on heuristics or indirect information about the value of the patent portfolio, such as extrapolations from patent pools or the "Top-Down Approach," risk an erroneous determination of a FRAND royalty.

In addition, both Chief Judge Davis and the Federal Circuit confirmed that royalties specified in comparable licenses provide reliable evidence of the value of the licensed SEPs and enable the adjudicator to apportion the damages award to include only the incremental value of the licensed patents. SEP licenses are typically negotiated by sophisticated parties who know that the SEP holder is obligated to license the SEPs on FRAND terms and conditions and that an implementer can enforce that obligation in court. Consequently, it is highly improbable that the royalties upon which the parties have agreed in those licenses include patent-holdup value. Calculating a FRAND royalty on the basis of comparable license agreements obviates accounting for the SEP holder's FRAND commitment because the royalty specified in those licenses already reflects that commitment.

The Federal Circuit correctly observed in *Ericsson v. D-Link* that the SEP holder's decision not to use the price of the chipset as the royalty base does not diminish the probative value of actual royalties specified in comparable licenses. The Federal Circuit observed that, in real-world licenses for SEPs, parties routinely use the value of the downstream product as the royalty base. The Federal Circuit confirmed that the practice is legitimate and consistent with the FRAND commitment. The Federal Circuit acknowledged that the practice of using the downstream product as the royalty base might not comport with the requirements of the EMVR, but the court emphasized that the EMVR is an evidentiary principle developed for a jury trial—in which jurors are, according to the court, "less equipped" than a judge in a bench trial to adequately apportion patent damages when presented with a large royalty base. Consequently, through its reliance on the EMVR, the Federal Circuit does not aim to direct the parties' behavior outside the courtroom. The Federal Circuit also emphasized that a jury can determine FRAND compensation on the basis of royalties observed in comparable licenses, even if those licenses use the value of the downstream product as the royalty base, as those royalties reveal what the licensor and the licensee consider to be fair compensation for the use of the licensed technology. Put differently, *Ericsson v. D-Link* clarified that the adjudicator may properly rely on information from licenses that use the value of the downstream product as the royalty base, even when there is no evidence that the licensed SEP portfolio drove the demand for the entire product.

The decisions by Chief Judge Davis and the Federal Circuit in *Ericsson v. D-Link* also reiterate that unsubstantiated conjectures, such as patent holdup and royalty stacking, should not influence the determination of a FRAND royalty. The finder of fact should attempt to account for the theorized risk of patent-holdup and royalty-stacking only when empirical evidence shows that those risks exist in a particular case.

The Federal Circuit said in *Ericsson v. D-Link* that a FRAND royalty should not include any value that the patented technology provides by virtue of its inclusion in the standard. This language would have bene-

fited from greater specificity, but economic analysis can aid its proper interpretation. The Federal Circuit's decision should not be interpreted to mean that one should exclude from a FRAND royalty *any and all* of the standard's value. When an invention covered by the SEPs in suit contributes to the value of the standard, only a FRAND royalty that includes a part of that contributed value will fully compensate the SEP holder for the incremental value of its invention. The most accurate and probative methodology to determine the value that an SEP contributes to the standard is to evaluate royalties paid in comparable licenses. Because comparable licenses implicitly disaggregate the value of the licensed technology from the value attributable to the noninfringing components of the standard, comparable licenses most accurately reflect the market-disciplined price for a patented technology.