Ongoing Royalties for Patent Infringement

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Section 283 of the Patent Act provides that, to prevent the ongoing infringement of a patent, courts "may grant injunctions in accordance with the principles of equity." If the court decides that the issuance of an injunction is not appropriate, it may direct the parties to negotiate a royalty for the infringer's future use of the patented technology. When such a negotiation fails, the court will impose an ongoing royalty that the infringer must pay. The U.S. Court of Appeals for the Federal Circuit has clarified that the calculus for an ongoing royalty differs from the calculus for a reasonable royalty typically awarded for past infringement, but it has not prescribed any particular methodology for a court to apply when determining an ongoing royalty. I conduct an empirical analysis of the courts' decisions on ongoing royalties, which shows that a court-awarded ongoing royalty typically exceeds the jury-determined reasonable royalty imposed for past infringement. However, my analysis does not identify any single variable that affects the court's determination of an ongoing royalty, which suggests that the courts have not yet developed a consistent methodology for determining an ongoing royalty. This article aims to fill that gap in the existing legal guidance by providing a simple yet rigorous economic methodology that courts can apply when determining an ongoing royalty. When determining an ongoing royalty for the prospective use of a patented technology, courts can apply a methodology similar to that used to calculate a reasonable royalty. Courts need to consider the changes in economic circumstances from the time of first infringement to the time of the jury's verdict and then determine how those changes affect the hypothetical negotiation for an ongoing royalty. In economic terms, courts should examine how the information that became available after the first infringement affects the bargaining range for the use of the patent or patent portfolio. That is, courts need to identify any changes in the patent holder's minimum willingness to accept and the infringer's maximum willingness to pay. Next, courts need to examine whether the parties' relative bargaining positions have changed (compared with their bargaining positions at the time of first infringement) to determine a point royalty within the bargaining range. I show that, although the court's determination of an ongoing royalty will be fact-specific and will vary on the basis of the specific circumstances of each case, the changes in the economic conditions between the time of first infringement and the time of the hypothetical negotiation for an ongoing royalty will typically support the award of an ongoing royalty that exceeds the reasonable royalty for past infringement.

I. Introduction

Section 283 of the Patent Act provides that a court may grant an injunction "in accordance with the principles of equity" to prevent the infringement of a patent right.[1] In 2006, in *eBay Inc. v. MercExchange, L.L.C.*, the Supreme Court clarified that the issuance of an injunction does not automatically follow from a finding of patent infringement, and it held that a court may issue an injunction only if the patent holder shows

> (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.[2]

When the specific facts of a case do not satisfy all of those conditions, a court will typically decline to issue an injunction. In lieu of granting an injunction, courts have determined that the infringer should pay an ongoing royalty for its continued use of the patent in suit.[3] The court will typically allow the parties to negotiate the license for the ongoing use of the technology. However, if that negotiation fails, the court will determine the ongoing royalty that the infringer must pay for its future use of the patented technology.[4]

The remedy of an ongoing royalty for the future use of the patented technology is particularly relevant in disputes over standard-essential patents (SEPs)—patents that are essential to practicing an industry standard. Some U.S. courts have found that, after an SEP holder has committed to license its SEPs on fair, reasonable, and nondiscriminatory (FRAND) terms, it might be difficult (although not impossible) to meet the *eBay* criteria and obtain an injunction.[5] Consequently, an ongoing royalty might be the patent holder's most accessible remedy to address the ongoing infringement of an SEP.

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1. 35 U.S.C. § 283 (2015).
2. eBay, Inc. v. MercExchange, L.L.C., 547 U.S. 388, 391 (2006).
3. *See, e.g.*, Ericsson, Inc. v. D-Link Sys., Inc., No. 10-cv-00473, 2013 WL 4046225, at *21 (E.D. Tex. Aug. 6, 2013); Apple, Inc. v. Motorola, Inc., 869 F. Supp. 2d 901, 918 (N.D. Ill. 2012) (citing Bard Peripheral Vascular, Inc. v. W.L. Gore & Assocs., Inc., 670 F.3d 1171, 1192 (Fed. Cir. 2012)); Hynix Semiconductor Inc. v. Rambus Inc., 609 F. Supp. 2d 951, 986 (N.D. Cal. 2009) (citing Paice LLC v. Toyota Motor Corp., 504 F.3d 1293, 1314–15 (Fed. Cir. 2007)).
4. *Paice*, 504 F.3d at 1315.
5. *See, e.g.*, Apple Inc. v. Motorola Corp., 757 F.3d 1286, 1332 (Fed. Cir. 2014) ("A patentee subject to FRAND commitments may have difficulty establishing irreparable harm. On the other hand, an injunction may be justified where an infringer unilaterally refuses a FRAND royalty or unreasonably delays negotiations to the same effect."), *overruled on other grounds by* Williamson v. Citrix Online, LLC, 792 F.3d 1339 (Fed. Cir. 2015). For a general analysis of the SEP holder's ability to obtain an injunction, see J. Gregory Sidak, *The Meaning of FRAND, Part II: Injunctions*, 11 J. COMPETITION L. & ECON. 201 (2015).

Although the Federal Circuit has clarified that "the calculus" for an ongoing royalty "is markedly different" from that for a reasonable royalty for past infringement, it has not prescribed any particular methodology for a court to apply when determining an ongoing royalty.[6] Nonetheless, the Federal Circuit has said that, after the court has found the patent in suit to be valid and infringed, there is "a substantial shift in the bargaining position of the parties."[7] Specifically, the Federal Circuit said that:

> Prior to judgment, liability for infringement, as well as the validity of the patent, is uncertain, and damages are determined in the context of that uncertainty. Once a judgment of validity and infringement has been entered, however, the calculus is markedly different because different economic factors are involved.[8]

Mark Lemley of Stanford Law School disputes the Federal Circuit's reasoning.[9] He argues that juries "are *already* required to assume that the patent is valid and infringed when setting past damages," such that "[t]here is no reason to think that asking the same question twice should produce different answers."[10] Consequently, Lemley doubts that the patent holder could negotiate a higher royalty after the finder of fact has found the patent in suit to be valid and infringed. In this article, I will show, among other things, that Lemley is wrong and the Federal Circuit is right.

I conduct an empirical analysis of the courts' decisions on ongoing royalties since *eBay*. That analysis shows that a court-awarded ongoing royalty typically does exceed the jury-determined reasonable royalties imposed for past infringement. However, my econometric findings do not identify any particular variable that affects the court's determination of an ongoing royalty, which suggests that the courts have not yet developed a consistent methodology for determining an ongoing royalty for the prospective use of the patented technology. This article aims to fill that gap in the existing legal guidance by providing a simple yet rigorous economic methodology that courts can apply when determining an ongoing royalty.

In Part II, I explain that an ongoing royalty is an equitable remedy distinct from the legal remedy of damages for past patent infringement.[11] Because a judge, rather than a jury, is the finder of fact when awarding an equitable remedy (as opposed to a remedy at law), *Daubert* and its progeny[12] are not implicated for purposes of evaluating the admissibility of evidence regarding an ongoing royalty (or, at the very least, the role of *Daubert* differs from its usual role of guarding against inadmissible

6 Amado v. Microsoft Corp., 517 F.3d 1353, 1362 (Fed. Cir. 2008).
7 ActiveVideo Networks Inc. v. Verizon Commc'ns Inc., 694 F.3d 1312, 1342 (Fed. Cir. 2012).
8 *Amado*, 517 F.3d at 1362.
9 Mark A. Lemley, *The Ongoing Confusion Over Ongoing Royalties*, 76 MO. L. REV. 695, 704−05 (2011).
10 *Id.*
11 *See* 35 U.S.C. §§ 283–84 (2015).
12 Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579 (1993); General Elec. Co. v. Joiner, 522 U.S. 136 (1997); Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999).

expert economic testimony). In addition, the rationale for using the entire market value rule (EMVR) to apportion patent damages—namely, to avoid jury confusion because of a large damage base—does not apply when calculating an ongoing royalty.[13]

In Part III, I conduct a regression analysis to test empirically whether ongoing royalties awarded in 35 patent-infringement cases from 2007 to April 2016 exceed by a statistically significant amount the reasonable-royalty damages awarded in those cases. Furthermore, I test whether the average increase in an ongoing royalty relative to a reasonable royalty varies by a statistically significant amount according to the number of days elapsed between the reasonable-royalty award and the determination of an ongoing royalty, the judicial district in which the litigation occurred, and the industry in which the patented technology is relevant, among other factors. The empirical analysis indicates that the courts have not adopted a consistent methodology for determining an ongoing royalty.

In Part IV, I explain that, when determining an ongoing royalty, courts can adopt a modified version of the hypothetical-negotiation framework typically used to calculate the reasonable royalty for past infringement.[14] One key difference between the hypothetical negotiation for a reasonable royalty and the hypothetical negotiation for an ongoing royalty is that the former occurs at the time of first infringement, while the latter occurs at the time of the jury verdict.[15] Consequently, the court should examine how information that became available between the date of first infringement and the date of the jury verdict affects the patent holder's minimum willingness to accept—that is, the lowest royalty that the patent holder would accept to license its patented technology while still being better off than it would have been had it not agreed to license its technology. The court should also examine how that new information affects the infringer's maximum willingness to pay—the highest royalty that the infringer would willingly pay for the ongoing use of the patented technology while still being better off than it would have been had it not acquired a license. The distance between the patent holder's minimum willingness to accept and the infringer's maximum willingness to pay defines the bargaining range for the ongoing royalty. Next, the court should determine where, within the bargaining range, the point royalty would fall, by examining the parties' bargaining positions at the time of the hypothetical negotiation for the ongoing royalty.

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13 For a general analysis of the proper royalty base for the calculation of patent damages, see J. Gregory Sidak, *The Proper Royalty Base for Patent Damages*, 10 J. COMPETITION L. & ECON. 989 (2014). *See also* J. Gregory Sidak, *Apportionment, FRAND Royalties, and Comparable Licenses After* Ericsson v. D-Link, 2016 U. ILL. L. REV. 1809 (analyzing the role of the EMVR in jury trials).

14 For a general analysis of the application of a hypothetical-negotiation framework when calculating damages for past infringement, see J. Gregory Sidak, *Bargaining Power and Patent Damages*, 19 STAN. TECH. L. REV. 1 (2015).

15 For a detailed analysis of the date of a hypothetical negotiation, see Part IV.B.

In Part V, I explain that the patent holder's minimum willingness to accept in a hypothetical negotiation for an ongoing royalty will typically exceed its minimum willingness to accept in a hypothetical negotiation for a reasonable royalty, because of the increased costs of enforcing its patents through litigation. In addition, when the dispute concerns a successful technology, the infringer's maximum willingness to pay in a hypothetical negotiation for an ongoing royalty will likely exceed its maximum willingness to pay in a hypothetical negotiation for a reasonable royalty.

In Part VI, I explain that variables such as the standard of review on appeal to prove invalidity or non-infringement and the risk of facing enhanced damages will typically decrease the infringer's bargaining power after the court has found the patents in suit to be valid and infringed. That decrease in the infringer's bargaining power supports the award of an ongoing royalty that is closer to the upper boundary of the bargaining range than was the reasonable royalty for past infringement. Therefore, although the court's determination of an ongoing royalty will be fact-specific and will vary based on the specific circumstances of each case, information that becomes available after the date of first infringement will typically support awarding an ongoing royalty that exceeds the reasonable royalty for past infringement. The application of a rigorous methodology when determining an ongo-ongoing royalty for the future use of a patented technology thus comports with the Federal Circuit's insight that the court's awarded ongoing royalty should typically exceed the reasonable royalty awarded for past infringement.

II. Is an Ongoing Royalty an Equitable Remedy?

The Federal Circuit has clarified that an ongoing royalty, awarded in lieu of a permanent injunction, is an *equitable* remedy available under section 283 of the Patent Act. An ongoing royalty is thus distinct from damages as a legal remedy for past patent infringement available under section 284.[16] Most important, *Daubert* and its progeny,[17] as well as the entire market value rule (EMVR), become less relevant when a judge, rather than a jury, sets a royalty for the future use of the patented technology.

A. Equitable Remedies and Remedies at Law

In the U.S. legal system, an important distinction exists between legal remedies and equitable remedies. That distinction arises from a more general distinction between law and equity. The law-equity dichotomy has its roots in the English legal system, which had Courts of Common Law to administer law and Courts of Chancery to administer equity.[18] Beginning in the 14th and 15th centuries, Courts of

16 35 U.S.C. § 284.
17 *Daubert*, 509 U.S. 579; *Joiner*, 522 U.S. 136; *Kumho Tire*, 526 U.S. 137.
18 *See, e.g.*, Thomas O. Main, *Traditional Equity and Contemporary Procedure*, 78 WASH. L. REV. 429, 437–44 (2003).

Common Law operated under strict legal rules based on precedent, and the only remedy that courts of law could award was monetary damages.[19] Due to that rigid application of law, "as new facts arose and new situations presented themselves it was often found that there was no rule of law applicable to the state of facts presented, and the courts would grant no relief."[20] However, the Lord Chancellor, the "keeper of the king's conscience," could, in certain occasions, also administer justice in the name of the king upon petition from an aggrieved party.[21] In situations in which the limitations of the common law precluded the court from granting adequate relief to the litigants in a particular case, the Lord Chancellor could, in the name of the king, devise some relief for the situation. As the political and legal landscape of England evolved, a special court called the Court of Chancery emerged as the unique forum in which the Lord Chancellor would administer what he believed to be fair and equitable remedies.[22] That discretionary branch of law came to be called "equity," to distinguish it from the more stringent "justice" administered by Courts of Common Law. In courts of equity, the judge would determine an equitable outcome on the basis of a relatively loose set of principles of justice, such as ethics, morality, and commonsense.[23] Consequently, a party could obtain a result that would often be impossible to obtain within a court of law's more rigid system of legal rules.[24]

In the modern-day United States, the traditional distinction between law and equity is less relevant. There are no separate courts of law and equity at the federal level.[25] In 1938, the Federal Rules of Civil Procedure ended the distinction between equitable action and legal action by establishing civil actions as the single type of action that a person may bring in the federal courts. Under Rule 2, a party may bring a civil action to seek any relief formerly obtainable through either a legal action or an equity action.[26]

Despite the merger of law and equity in the federal courts, the distinction between remedies at law and equitable remedies remains.[27] The legal remedies availa-

19 *Id.* at 440.

20 Warren B. Kittle, *Courts of Law and Equity—Why They Exist and Why They Differ*, 26 W. VA. L.Q. 21, 27 (1919).

21 *See, e.g.*, MARTIN FERDINAND MORRIS, AN INTRODUCTION TO THE HISTORY OF THE DEVELOPMENT OF LAW 278 (F. B. Rothman 1909).

22 Kittle, *supra* note 20, at 28.

23 *Id.* at 31.

24 Grace Murphy Long, *The Sunset of Equity: Constructive Trusts and the Law-Equity Dichotomy*, 57 ALA. L. REV. 875, 876 (2006).

25 *See* FED. R. CIV. P. 2 (1938) ("There shall be one form of action known as 'civil action.'").

26 *See, e.g.*, Union Mut. Life Ins. Co. v. Friedman, 139 F.2d 542, 544 (2d Cir. 1944) ("Under the present practice there is no longer a law side and an equity side of the court, but only a civil action in which all relief must be obtained that could formerly be secured either at law or in equity."); Kristin A. Collins, *"A Considerable Surgical Operation": Article III, Equity, and Judge-Made Law in the Federal Courts*, 60 DUKE L.J. 249, 336 (2010).

27 *See, e.g.*, eBay v. MercExchange, L.L.C., 547 U.S. 388, 391–92 (2006).

ble to litigants are generally limited to monetary damages, and the party that succeeds in a claim seeking legal remedies is entitled to those remedies as a matter of right.[28] In contrast, the range of possible equitable remedies is much broader and includes specific performance, rescission, restitution, subrogation, and disgorgement.[29] In exceptional cases, judges have even invoked their equitable powers to create new rights.[30] A court will generally award an equitable remedy where a remedy at law, such as monetary damages, would be inadequate.[31] However, whereas a successful litigant has the "right" to a legal remedy, a party does not have an absolute right to an equitable remedy. Judges have the discretion to grant or deny equitable relief.[32]

Another difference between remedies at law and equitable remedies is that the right to trial by jury under the Seventh Amendment—which provides that, "[i]n suits at common law[,] . . . the right of trial by jury shall be preserved"[33]—applies to legal claims but not to equitable claims.[34] Parties to a civil action seeking a remedy at law have the right to a jury trial, whereas the parties to a civil action seeking an equitable remedy do not.

B. The Legal Basis for Awarding an Ongoing Royalty

In cases of patent infringement, the Patent Act provides that the patent holder may request the court to impose remedies at law as well as equitable remedies. Damages for patent infringement are a remedy at law. Section 284 of the Patent Act provides that, in the case of patent infringement, a court should award a patent holder "damages adequate to compensate for the infringement, but in no event less than a reasonable royalty."[35] In addition, section 283 of the Patent Act provides that a court "may grant injunctions *in accordance with the principles of equity* to prevent the violation of any right secured by patent."[36] An injunction that prevents the use of the patented technology is thus an equitable remedy available at the court's discretion. When a court declines to issue an injunction after a finding of validity and infringement, it might decide that an ongoing royalty provides the appropriate relief. An ongoing royalty is a prospective remedy from the date of judgment that compensates the patent holder for the infringer's future use of the patented technology.[37]

28 *See* DAN B. DOBBS, LAW OF REMEDIES DAMAGES-EQUITY-RESTITUTION 9–10 (West Publishing Co. 2d ed. 1993).
29 Main, *supra* note 18, at 478.
30 *Id.*
31 Stern v. S. Chester Tube Co., 390 U.S. 606, 609 (1968).
32 DOBBS, *supra* note 28, at 10.
33 U.S. CONST. amend. VII.
34 *See* Tull v. United States, 481 U.S. 412, 417–18 (1987).
35 35 U.S.C. § 284; (2015); *see also* DONALD. S. CHISUM, CRAIG ALLEN NAIRD, HERBERT F. SCHWARTZ, PAULINE NEWMAN & F. SCOTT KIEFF, PRINCIPLES OF PATENT LAW 1284–85 (Found. Press 3d ed. 2004).
36 35 U.S.C. § 283 (2015) (emphasis added).
37 *See, e.g.*, Fresenius USA, Inc. v. Baxter Int'l, Inc., 733 F.3d 1369, 1379 (Fed. Cir. 2013).

The Federal Circuit has clarified that the remedy of an ongoing royalty differs from the remedy of patent damages available under section 284.[38] The Federal Circuit first distinguished an ongoing royalty from damages for past infringement in its 2007 decision in *Paice LLC v. Toyota Motor Corp.*[39] The U.S. District Court for the Eastern District of Texas had found that Toyota infringed several claims of Paice's '970 patent.[40] The jury awarded damages for past infringement, but the court denied Paice's request for a permanent injunction and instead required Toyota to pay an ongoing royalty for its future use of Paice's technology. Paice appealed the decision, arguing that the district court lacked the statutory authority to order an ongoing royalty and that, "even if the court did have such authority, Paice was denied its right to a jury trial under the Seventh Amendment."[41] On appeal, the Federal Circuit first emphasized that section 283 of the Patent Act grants the district court the discretion to issue an injunction as an equitable remedy "to prevent the violation of . . . [a] patent.'"[42] The Federal Circuit then questioned "whether an order *permitting* use of a patented invention in exchange for a royalty"—that is, an ongoing royalty—"is properly characterized as [a remedy] *preventing* the violation of the rights secured by the patent."[43] The Federal Circuit concluded that, "[u]nder some circumstances, awarding an ongoing royalty for patent infringement in lieu of an injunction may be appropriate."[44] The Federal Circuit's decision implies that a court's authority to award an ongoing royalty lies within section 283, rather than section 284, of the Patent Act.[45]

In *Paice*, the Federal Circuit emphasized two peculiarities of ongoing royalties. First, the Federal Circuit clarified that a court may not award an ongoing royalty on its own volition "whenever a permanent injunction is not imposed."[46] Instead, it should "allow the parties to negotiate a license amongst themselves regarding future use of a patented invention."[47] If the parties fail to reach an agreement, the court may then determine an ongoing royalty for the future use of the patented technology.[48] Second, in *Paice*, the Federal Circuit rejected the argument that the district court had wrongly denied Paice the right to a jury trial in determining the ongoing

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38 *Id.*

39 Paice LLC v. Toyota Motor Corp., 504 F.3d 1293, 1317 (Fed. Cir. 2007).

40 Paice LLC v. Toyota Motor Corp., 609 F. Supp. 2d 620, 622 (E.D. Tex. 2009).

41 *Paice*, 504 F.3d at 1314.

42 *Id.* (quoting 35 U.S.C. § 283 (2015)).

43 *Id.* (emphasis in original).

44 *Id.*; *see also* Apple, Inc. v. Samsung Elecs. Co., No. 12-cv-00630, 2014 WL 6687122, at *2 (N.D. Cal. Nov. 25, 2014) (quoting *Paice*, 504 F.3d at 1314) ("The Federal Circuit has identified 35 U.S.C. § 283, which authorizes 'injunctions in accordance with the principles of equity,' as statutory authority for awarding ongoing royalties.").

45 *But see* XY, LLC v. Trans Ova Genetics, LC, No. 13-cv-0876, 2016 WL 1391615, at *10 (D. Colo. Apr. 8, 2016) (internal quotation omitted) ("Entitlement to an ongoing royalty arises from 35 U.S.C. § 284, which provides that damages 'adequate to compensate for the infringement' should be 'in no event less than a reasonable royalty for the use made of the invention.'").

46 *Paice*, 504 F.3d at 1315.

47 *Id.*

48 *Id.*

royalty. The Federal Circuit agreed that the determination of damages is a legal question that carries the right to a jury trial, but it clarified that "not all monetary relief is properly characterized as 'damages.'"[49] The Federal Circuit found that the mere availability of monetary relief does not trigger the constitutional right to a jury trial.[50] The Federal Circuit's rejection of the right to a jury trial emphasized that an ongoing royalty is not a legal remedy for patent damages available under section 284 (which would typically warrant a jury trial), but rather an equitable remedy available under section 283.

The Federal Circuit also distinguished an ongoing royalty from patent damages in several decisions following *Paice*. In 2012, in *Edwards Lifesciences AG. v. Corevalve, Inc.*, the Federal Circuit said that a court may choose among different *equitable* remedies when deciding patent-infringement cases.[51] In providing examples of such remedies, the Federal Circuit said that a court may grant "a royalty-bearing license instead of imposing an injunction."[52] In 2013, the Federal Circuit confirmed that principle in *Fresenius USA, Inc. v. Baxter International, Inc.*, in which it emphasized that the calculation of an ongoing royalty "fell within [the court's] equitable authority to award prospective relief in the form of an injunction, a compulsory license, or some combination thereof."[53] The Federal Circuit added that, "[w]hile we may at times improperly use the term 'damages' as a shorthand term to encompass the concept of the right to some prospective *monetary* relief, that cannot change the equitable character of that relief."[54] Thus, the Federal Circuit classified an ongoing royalty as an equitable remedy.

The Federal Circuit has emphasized that the award of an ongoing royalty is at the court's discretion.[55] To determine whether the award of an ongoing royalty is warranted, a court will generally evaluate whether the patent holder has received compensation for the continued use of its patented technology. In some cases, the court may conclude that "no forward-looking relief is appropriate in the circumstances."[56] For example, the court might decline to award an ongoing royalty if it has already awarded lump-sum damages that cover the future use of the patented technology. The court will typically award an ongoing royalty for the future use of a

49 *Id.* at 1316 (citing Root v. Ry. Co., 105 U.S. 189, 207 (1881)).
50 *Id.*
51 699 F.3d 1305, 1315 (Fed. Cir. 2012).
52 *Id.* (citing ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc., 694 F.3d 1312, 1339–40 (Fed. Cir. 2012)).
53 733 F.3d 1369, 1375 (Fed. Cir. 2013) (citing *Edwards Lifesciences*, 699 F.3d at 1314–15).
54 *Id*. at 1379 (emphasis in original).
55 *See, e.g.*, Whitserve, LLC v. Comput. Packages, Inc., 694 F.3d 10, 35 (Fed. Cir. 2012) (citing Telcordia Techs., Inc. v. Cisco Sys., Inc., 612 F.3d 1365, 1379 (Fed. Cir. 2010); *Paice*, 504 F.3d at 1314–15).
56 *Whitserve*, 694 F.3d at 35; *see also* Prism Techs., LLC v. Sprint Spectrum L.P., No. 8:12-cv-00123, 2015 WL 9272861, at *2 (D. Neb. Dec. 18, 2015); Presidio Components, Inc. v. Am. Tech. Ceramics Corp., 702 F.3d 1351, 1363 (Fed. Cir. 2012).

patented technology if it determines that the patent holder has not yet been compensated for the prospective use of the patented technology.[57]

The Federal Circuit has not explicitly discussed ongoing royalties for SEPs. However, district courts have found that an ongoing royalty was an adequate remedy to compensate an SEP holder for the ongoing use of its SEPs.[58] For example, in the lengthy dispute *Hynix Semiconductor Inc. v. Rambus Inc.*, the District Court for the Northern District of California declined to issue an injunction to prevent Hynix's ongoing use of Rambus's patented technology essential to the DRAM standard and instead found that the award of an ongoing royalty was "the most appropriate form of relief."[59] The court rejected Hynix's argument that Rambus should file supplemental complaints for damages.[60] Similarly, in *Ericsson Inc. v. D-Link Systems, Inc.*, the jury found that the accused manufacturers of mobile devices had infringed three of Ericsson's patents essential to the Wi-Fi standard and awarded Ericsson a reasonable royalty of "approximately $10 million—roughly 10 cents per infringing device."[61] In a post-trial motion, Ericsson requested an ongoing royalty of $0.15 per unit,[62] and Chief Judge Leonard Davis of the District Court for the Eastern District of Texas found that, "based on the jury award, 15 cents per product was an appropriate ongoing RAND rate" for the future use of Ericsson's patents.[63] Given that disputes over the FRAND licensing terms for SEPs typically concern past infringement, as well as the ongoing use of those SEPs, ongoing royalties are likely to be particularly relevant in determining a FRAND royalty for SEPs.

C. The Implications of Awarding an Ongoing Royalty as an Equitable Remedy

Because an ongoing royalty is an equitable remedy, a court, rather than a jury, serves as the finder of fact when determining an ongoing royalty. The absence of a jury has two significant implications for computing an ongoing royalty. First, the absence of the jury from the trial obviates the court's role as a gatekeeper. The court has an obligation to ensure that expert testimony (including expert testimony on patent damages) presented in a jury trial meets the standard of admissibility for expert testimony, which the Federal Rules of Evidence and the principles espoused in

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57 *See, e.g.*, *Telcordia*, 612 F.3d at 1379.

58 *See, e.g.*, Ericsson Inc. v. D-Link Sys., Inc., No. 10-cv-00473, 2013 WL 4046225, at *1 (E.D. Tex. Aug. 6, 2013); Apple, Inc. v. Motorola, Inc., 869 F. Supp. 2d 901, 918 (2012) (citing Bard Peripheral Vascular, Inc. v. W.L. Gore & Assoc., Inc., 670 F.3d 1171, 1192 (Fed. Cir. 2012)); Hynix Semiconductor Inc. v. Rambus Inc., 609 F. Supp. 2d 951, 986 (N.D. Cal. 2009) (citing *Paice*, 504 F.3d at 1314–15).

59 *Hynix*, 609 F. Supp. 2d at 986.

60 *Id.*

61 Ericsson Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1214 (Fed. Cir. 2014); *see also Ericsson*, 2013 WL 4046225, at *21.

62 *Ericsson*, 2013 WL 4046225, at *20.

63 *Ericsson*, 773 F.3d at 1213 (citing Ericsson Inc. v. D-Link Corp. ("JMOL Order"), No. 6:10-cv-00473, 2013 WL 4046225 (E.D. Tex. Aug. 6, 2013)).

Daubert v. Merrell Dow Pharmaceuticals, Inc. and its progeny govern.[64] The purpose of the court's gatekeeping role is to protect *juries* from "dubious" expert testimony.[65] However, as the Eleventh Circuit has said, "[t]here is less need for the gatekeeper to keep the gate when the gatekeeper is keeping the gate only for himself."[66] When the court, and not the jury, determines a remedy, "there is no risk of tainting the trial by exposing a jury to unreliable evidence."[67] The Fifth Circuit has said that "[m]ost of the safeguards provided for in *Daubert* are not as essential in a case . . . where a district judge sits as the trier of fact in place of a jury."[68] Similarly, Judge Richard Andrews of the District of Delaware has reasoned in a patent case that, "when the trial is a bench trial," the judge's gatekeeper role "is not so important."[69] Therefore, rules for excluding expert testimony need not apply when a judge awards an ongoing royalty for the future use of a patented technology.

Second, the judge's determination of an equitable remedy obviates adherence to the evidentiary requirement of the entire market value rule (EMVR), a principle that limits the circumstances in which an economic expert may use the entire value of the infringing product as the royalty base for calculating damages. In *Ericsson v. D-Link*, the Federal Circuit said that the purpose of the EMVR is to "help our jury system reliably implement the substantive statutory requirement of apportionment of royalty damages to the invention's value."[70] The Federal Circuit clarified that a damages expert may apply different methodologies to determine a reasonable royalty that properly reflects the patent's value.[71] The Federal Circuit also said that, although each of those methodologies could, in theory, achieve the same result, a 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.[72] The Federal Circuit consequently developed an evidentiary principle for jury trials—the EMVR—that supports the use of the price of the downstream product as the royalty base only when "the patented feature drives the demand for an entire multicomponent product."[73] The EMVR aims to avoid the risk that the use of the entire value of

64 *See generally* FED. R. EVID. 702 (stating that witnesses may qualify as experts through "knowledge, skill, experience, training, or education"); Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 589–97 (1993) (establishing the district court as "gatekeeper" for admitting scientific expert testimony); Kumho Tire Co. v. Carmichael, 526 U.S. 137, 141 (1999) (extending *Daubert* to non-scientific experts).

65 David E. Watson, P.C. v. United States, 668 F.3d 1008, 1015 (8th Cir. 2012) (quoting *In re* Zurn Pex Plumbing Prods. Liab. Litig., 644 F.3d 604, 613 (8th Cir. 2011)).

66 United States v. Brown, 415 F.3d 1257, 1269 (11th Cir. 2005).

67 Whitehouse Hotel Ltd. P'ship v. Comm'r of Internal Revenue, 615 F.3d 321, 330 (5th Cir. 2010).

68 Gibbs v. Gibbs, 210 F.3d 491, 500 (5th Cir. 2000).

69 Order Denying Motion to Preclude at 1, Sanofi-Aventis U.S. LLC v. Eli Lilly & Co., No. 1:14-cv-00113 (D. Del. Aug. 18, 2015), ECF No. 266.

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

71 *Id.*

72 *Id.* at 1227.

73 LaserDynamics, Inc. v. Quanta Comput., Inc., 694 F.3d 51, 67 (Fed. Cir. 2012).

the product as the royalty base might "'skew the damages horizon for the jury.'"[74] However, the risk of skewing the damages horizon is less relevant when a judge, rather than a jury, determines the ongoing royalty for the future use of a patented technology. A judge is likely to understand the significance of apportioning the appropriate value of the licensed product to the patent in suit on the basis of the patent's incremental value. Therefore, the EMVR does not apply when a judge determines an ongoing royalty for the prospective use of a patented technology.

III. Empirical Analysis of Court-Awarded Ongoing Royalties

I analyze 35 cases from 2007 to 2015 in which the court awarded an ongoing royalty.[75] Appendix 1 lists those 35 cases, their case numbers, and the U.S. district courts in which the parties litigated the case.[76] In one case, *Warsaw Orthopedic, Inc. v. Nuvasive, Inc.*, both the plaintiff and the defendant alleged patent infringement by the opposing party, and the court awarded an ongoing royalty for the use of each party's patents in suit.[77] Because the court determined two separate ongoing royalties, for the purposes of my analysis, I treat *Warsaw Orthopedic* as two cases in which a court awarded an ongoing royalty. In 34 of the 35 cases, the jury awarded a reasonable royalty. In only one of the 35 cases, *Multimedia Patent Trust v. DirecTV*, did the court award reasonable-royalty damages in a default judgment.[78]

Using the data collected from those 35 cases, I analyze (1) whether, on average, an ongoing royalty exceeds, by a statistically significant amount, a reasonable royalty in a patent-infringement case; (2) whether the difference (if any) between an ongoing royalty and a reasonable royalty in a case varies depending on certain factors, including the length of time between the determination of a reasonable royalty and

[74] VirnetX, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1327 (Fed. Cir. 2014) (quoting Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1320 (Fed. Cir. 2011)).

[75] To create this sample, I used the "ongoing royalty" selector on *Docket Navigator* to identify cases in which a party requested an ongoing royalty, and I examined the list of cases in which the court considered awarding an ongoing royalty that is compiled in Christopher B. Seaman, *Ongoing Royalties in Cases After* eBay*: An Empirical Assessment and Proposed Framework*, 23 TEX. INTELL. PROP. L.J. 203, 246–49 (2015). I excluded from my sample those cases that did not allow a comparison between the reasonable royalty awarded for past infringement and the ongoing royalty for future use of the patented technology (for example, because the damage award was redacted, or because the court awarded a lump-sum reasonable royalty or ongoing royalty and did not clarify what the implied royalty rate was).

[76] The Supreme Court's decision in *eBay* in 2006 affirmed the traditional four-factor test that a patent holder must satisfy for a court to issue a permanent injunction—another form of equitable remedy for patent infringement. *See* eBay Inc. v. MercExchange, LLC, 547 U.S. 388, 391–95 (2006). The Court's adoption of the four-factor test increased the threshold for granting a permanent injunction. Expanding the dataset to include patent cases that precede *eBay* would enable a comparison of ongoing royalties awarded before *eBay* with ongoing royalties awarded after that decision.

[77] *See* Order Setting Post-Trial Ongoing Royalties at 8–9, Warsaw Orthopedic, Inc. v. Nuvasive, Inc., No. 08-cv-01512 (S.D. Cal. June 10, 2013), ECF No. 592.

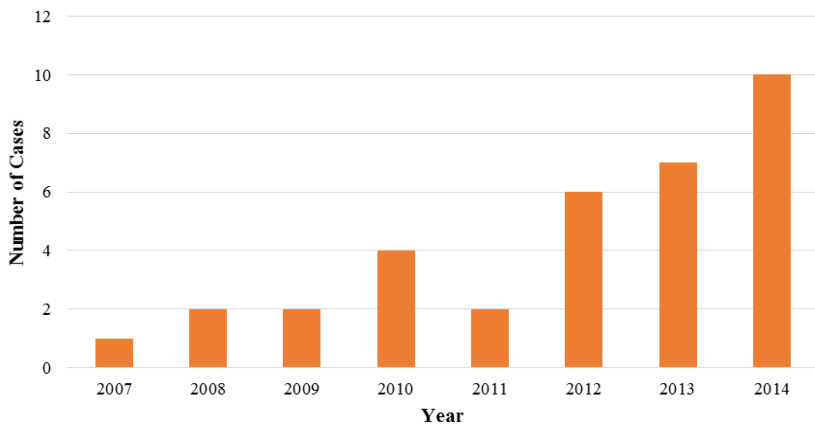
[78] *See* Order Granting Plaintiff's Motion for Default Judgment at 11, Multimedia Patent Trust v. DirecTV, No. 09-cv-00278 (S.D. Cal. Jan. 15, 2010), ECF No. 206.

the determination of an ongoing royalty, whether the court enhanced an ongoing royalty for willful infringement of the patents in suit, and the judicial district in which the litigation occurred; and (3) the magnitude of those factors' effects on the difference between ongoing royalties and the reasonable-royalty awards.[79]

A. Descriptive Statistics of the Relevant Cases

The empirical analysis shows that the number of cases per year in which courts have awarded an ongoing royalty has increased from 2007 through 2014. Figure 1 shows the number of cases per year in which a court awarded an ongoing royalty.

Figure 1: Number of Cases in Which the Court Awarded an Ongoing Royalty by Year, 2007–2014



The number of cases per year in which the court awarded an ongoing royalty has increased from one case in 2007 to 10 cases in 2014.

The analysis also shows that the Eastern District of Texas is the most common venue for cases in which courts have awarded an ongoing royalty. Table 1 reports the jurisdictional distribution of the 35 cases.

[79] For an analysis of enhanced damages for willful infringement, see J. Gregory Sidak, *Enhanced Damages for Infringement of Standard-Essential Patents*, 1 CRITERION J. ON INNOVATION 1101 (2016).

Table 1: Number of Cases in Which the Court Awarded an Ongoing Royalty by Judicial District, 2007–2015

Judicial District	**Number of Cases**
Eastern District of Texas	12
District of Delaware	3
Northern District of California	3
Southern District of California	3
Central District of California	2
Western District of Pennsylvania	2
Eastern District of Virginia	2
Other	8
Total	**35**

The Eastern District of Texas accounted for 12 of the 35 cases in which a court granted an ongoing royalty between 2007 and 2015. In Part III.B, I examine whether the Eastern District of Texas differs from other judicial districts with respect to its determination of an ongoing royalty.

The empirical analysis further shows that, in a majority of cases, courts have awarded an ongoing royalty that exceeds the jury-determined reasonable royalty for past damages. Table 2 identifies the 35 cases and reports, for each case, the reasonable royalty and the ongoing royalty. The court issued an ongoing royalty that exceeded the jury-determined reasonable royalty in 25 of the 35 cases (approximately 71 percent). In 8 of those 25 cases, the court enhanced an ongoing royalty after finding willful infringement. (In 5 of the 8 cases in which the court enhanced the ongoing royalties, the court had awarded an ongoing royalty equal to a reasonable royalty, whereas in the remaining 3 of those 8 cases, the court awarded an ongoing royalty that exceeded the jury-determined reasonable royalty). In 3 of the remaining 17 cases, the court mentioned willful infringement as a reason for awarding an ongoing royalty that exceeded the jury-determined reasonable royalty. Therefore, in 14 cases, the court awarded an ongoing royalty that exceeded the jury-determined reasonable royalty for reasons other than willful infringement. None of the 35 cases in which the court awarded an ongoing royalty specified an ongoing royalty below the jury-determined reasonable royalty for past damages.

Table 2: Comparison of Court-Awarded Ongoing Royalty Rates with Jury-Determined Reasonable Royalty Rates, 2007–2015

Case Name	**Reasonable Royalty**	**Ongoing Royalty**	**Normalized Ongoing Royalty**
Server Tech., Inc. v. Am. Power Conversion Corp.	5.0%	15.00%	3.00
Douglas Dynamics, LLC v. Buyers Prods. Co.	3.30%	6.23%	1.89
Telcordia Techs., Inc. v. Cisco Sys., Inc.	0.64%	1.00%	1.56
Carnegie Mellon Univ. v. Marvell Tech. Grp.	$0.50 per unit	$0.50 per unit	1.00
Golden Hour Data Sys., Inc. v. emsCharts., Inc.†	$14.40	$14.40	1.00
WBIP, LLC v. Kohler Co.	13.50%	13.50%	1.00
DePuy Synthes Products, LLC v. Globus Med., Inc.	15%	18.00%	1.20
Accessories Marketing, Inc. v. Tek Corp.	7%	7.00%	1.00
VirnetX, Inc. v. Apple, Inc.†	0.52%	0.65%	1.25
I/P Engine, Inc. v. AOL Inc.†	3.50%	4.60%	1.31
TransPerfect Global, Inc. v. MotionPoint Corp.	4%	4.00%	1.00
Morpho Detection, Inc. v. Smiths Detection Inc.*	$7,500 per unit	$9,375 per unit	1.25
Ericsson Inc. v. D-Link Sys., Inc.	$0.15 per unit	$0.15 per unit	1.00
Tomita Techs. USA, LLC v. Nintendo Co.	1.36%	1.82%	1.34
Internet Machines, LLC v. Alienware Corp.†	6%	6.00%	1.00
Fractus, S.A. v. Samsung Elecs. Co.†	$0.36 per unit	$0.36 per unit	1.00
Warsaw Orthopedic, Inc. v. Nuvasive, Inc.	10% | 3%	13.75% | 8.25%	1.38
Warsaw Orthopedic, Inc. v. Nuvasive, Inc.	5.50%	5.50%	1.00
Mondis Tech. Ltd. v. Chimei InnoLux Corp.*†	0.75% | 0.5%	0.75% | 1.50%	1.00
University of Pittsburgh v. Varian Med. Sys., Inc.	10.5% | 1.5%	10.5% | 1.50%	1.00
Boston Sci. Corp. v. Cordis Corp.*	2.95%	32.00%	10.85
Clear With Comp., LLC v. Hyundai Motor Am., Inc.	$0.56 per unit	$0.56 per unit	1.00
Broadcom Corp. v. Emulex Corp.†	3%	9.00%	3.00
Fresenius USA, Inc. v. Baxter Int’l, Inc.	1.7% | 0.007%	3.40% | 0.01%	1.00
DataTreasury Corp. v. Wells Fargo & Co.	$0.002 per unit	$0.005 per unit	2.50
Affinity Labs of Tex., LLC v. BMW N. Am., LLC†	$11 per unit	$11 per unit	1.00
Bard Peripheral Vascular v. WL Gore & Associates	10%	20.00% | 15.00% | 12.50%	1.25
Soverain Software LLC v. CDW Corporation	$0.088	$0.15	1.70
Multimedia Patent Trust v. DirecTV, Inc.	0.50%	0.50%	1.00
Transamerica Life Ins. Co. v. Lincoln Nat’l Life Ins. Co.	0.22%	0.22%	1.00
Creative Internet Advert. Corp. v. Yahoo! Inc.	20%	23.00%	1.15
Joyal Products, Inc. v. Johnson Elec. N. Am.	8%	26.00%	3.25
Amado v. Microsoft Corp.	$0.04 per unit	$0.12 per unit	3.00
Orion IP, LLC v. Mercedes-Benz USA, LLC	2%	2.00%	1.00
Voda v. Cordis Corp.	7.50%	7.50%	1.00

Notes: Appendix 1 lists the full names of the cases reported in this table. Cases marked with an asterisk (*) also included a lost-profits damages award. In cases marked with a dagger (†), the courts enhanced ongoing royalties listed in the table due to willful infringement. For cases in which multiple royalty rates are listed, the court awarded different royalty rates for each infringing product or for each patent in suit. For example, in *Mondis v. Chimei InnoLux*, the court awarded a reasonable-royalty rate of 0.5 percent of InnoLux's sales of its infringing monitors and 0.75 of InnoLux's sales of its infringing televisions. However, Mondis requested that the court award an increased ongoing royalty for only the infringing monitors. In *Telcordia v. Cisco*, the court awarded an ongoing royalty at the rate of 1.25 percent of Cisco's sales until the expiration of the first patent, after which the ongoing royalty rate would decrease to 1 percent of Cisco's sales. To be conservative, I calculated the normalized ongoing royalty using an ongoing royalty that would yield the lowest normalized ongoing royalty. In *Multimedia Patent Trust v. DirecTV*, the court awarded an ongoing royalty of 0.5 percent of DirecTV's sales with a minimum per-unit royalty of $1.50.

I calculate the ratio of an ongoing royalty to a reasonable royalty in each of the 36 cases to find what I call the normalized ongoing royalty, which enables a comparison of the courts' adjustments of ongoing royalties, relative to the jury-determined reasonable-royalty damages awards. The average percentage increase in the ongoing royalty, relative to the reasonable-royalty award, was approximately 66 percent. That is, on average, an ongoing royalty exceeded the jury-determined reasonable royalty in each of the 36 cases by 66 percent.

The highest percentage increase in the ongoing royalty in comparison with the reasonable royalty occurred in *Boston Scientific Corp. v. Cordis Corp.* (*Boston Scientific II*), in which Judge Sue Robinson of the U.S. District Court for the District of Delaware ordered an ongoing royalty rate that was 985 percent higher than the jury-determined reasonable royalty.[80] Judge Robinson awarded an ongoing royalty of 32 percent of Cordis's sales, which was more than ten times the jury-determined reasonable royalty of 2.95 percent of Cordis's sales. It is worth noting that the court awarded not only reasonable-royalty damages, but also lost-profit damages. Boston Scientific's expert calculated that the reasonable-royalty damages that Cordis owed Boston Scientific were equal to 32 percent of Cordis's sales,[81] and Judge Robinson awarded an ongoing royalty at the same rate, "declin[ing] to allow Cordis . . . to effectively owe less for its post-verdict infringement than the jury found for its preverdict infringement under the circumstances."[82]

B. Statistical Analysis of Ongoing Royalty Awards

Of the 58 cases in which courts awarded an ongoing royalty from 2006 through 2015, only 35 cases enabled one to compare the jury-determined reasonable royalty with the court-awarded ongoing royalty. In analyzing those 35 cases, I examine

80 838 F. Supp. 2d 259, 282 (D. Del. 2012).
81 *Id.*
82 *Id.* at 276.

whether it is possible to identify a statistically significant relationship between the court-awarded ongoing royalty and other observable variables, including the district in which the case was heard, the industry in which the infringement occurred, the number of patents in suit, and the length of time elapsed between the date of first infringement and the date of the award of an ongoing royalty. In other words, I examined whether there are any specific patterns in how the courts have determined ongoing royalties in the 35 cases from 2007 through 2015. A regression model using the normalized ongoing royalty (that is, the ratio of the court-awarded ongoing royalty to the jury-determined reasonable royalty) as a continuous dependent variable identifies limited relationships between the ongoing royalty and the independent variables.[83] However, given the small sample size, any results should be treated with skepticism.

First, analysis of the sample of the 35 cases in which the court awarded an ongoing royalty shows that the court-awarded ongoing royalty exceeds by a statistically significant amount the jury-determined reasonable royalty. I conduct a *t*-test for whether the normalized ongoing royalty equals or exceeds one. A *t*-test is a hypothesis test that assesses the probability that the mean of a random variable has a particular value.[84] In this case, I reject the possibility that the "true" mean for the normalized ongoing royalty has a value of 1 at the 95-percent confidence level. The results of the *t*-test imply that one should reject, at the 95-percent confidence level, the null hypothesis that the court-awarded ongoing royalty is equal to the jury-determined reasonable royalty. That is, the data strongly support the hypothesis that court-awarded ongoing royalties typically exceed the jury-determined reasonable royalty.

Second, I examine the differences in normalized ongoing royalties on a univariate basis. On average, a case in which the patent in suit related to medical devices had a higher normalized ongoing royalty than a case in which the patent in suit did not relate to medical devices. In other words, the difference between a court-awarded ongoing royalty and the corresponding jury-awarded reasonable royalty is larger in the medical-device industry than in other industries. In addition, on average, a case heard in the U.S. District Court for the Eastern District of Texas had a lower normalized ongoing royalty than a case heard in any other federal district court. Although commentators sometimes perceive that the Eastern District of Texas is especially plaintiff-friendly in patent litigation, the data with respect to ongoing royalties do not support that assumption.[85]

83 I estimated the regression models using ordinary least squares. For an explanation of ordinary least squares, *see generally* JAMES H. STOCK & MARK W. WATSON, INTRODUCTION TO ECONOMETRICS 113–15 (Addison Wesley 3d ed. 2011)

84 For an explanation of hypothesis tests as used in statistical analysis, *see id.* at 70–79.

85 If the normalized ongoing royalty is lower in the Eastern District of Texas because the reasonable royalty is greatest in this district, then the Eastern District of Texas could be "plaintiff friendly" with respect to reasonable royalties and neutral with respect to ongoing royalties. Such an outcome seems implausible absent corroborating evidence.

The analysis also shows that the court's decision to award an ongoing royalty that exceeds a reasonable royalty is typically unrelated to the question of willful infringement and the court's decision to enhance the royalty award. Section 284 of the Patent Act provides that a court may enhance damages up to three times.[86] However, the courts enhanced ongoing royalties due to a finding of willful infringement in only 8 of the 35 cases. In 3 of those 8 cases, the court awarded an ongoing royalty that exceeded the jury-determined reasonable royalty for reasons unrelated to willful infringement, and the court then decided to increase the ongoing royalty even further because of willful infringement.

On average, the normalized ongoing royalty—that is, the ratio of the court-awarded ongoing royalty (disaggregated from any enhancement due to willful infringement) to the jury-determined reasonable royalty—in cases in which the court did *not* enhance ongoing royalties due to willful infringement exceeds the normalized ongoing royalty in cases in which the court did enhance the ongoing royalty. Three courts have considered willful infringement to be a rationale for awarding an ongoing royalty that exceeds a reasonable royalty, although those courts did not analyze whether willful infringement was present within the specific facts of the case and whether the infringer's conduct was more or less culpable—an analysis that a court typically conducts when deciding whether to enhance patent damages.[87] As I will explain in Part VI.B, as the probability that the court will find willful infringement increases and, as a result, will enhance the damages award, a royalty upon which the parties would agree in a real-world negotiation might also increase. A court that determines an ongoing royalty on the basis of what that hypothetical negotiation will yield might thereby implicitly enhance an ongoing royalty for the *possibility* that the patent holder could successfully prove willful infringement. Conversely, other courts have awarded an ongoing royalty that exceeds the jury-determined reasonable royalty for reasons other than the possibility of enhancement due to this probabilistic value of multiple damages for willful infringement.

[86] 35 U.S.C. § 284 (2006); see Halo Elecs., Inc. v. Pulse Elecs., Inc., 136 S. Ct. 1923 (2016).

[87] The Federal Circuit has identified nine factors that should assist courts in evaluating the infringer's culpability for the purpose of determining whether the specific facts of the case support an award of enhanced damages upon a finding of willful infringement. Read Corp. v. Portec, Inc., 970 F.2d 816, 827 (Fed. Cir. 1992). Courts have typically applied the *Read* test when deciding whether to enhance damages for past infringement. *See, e.g.*, Power Integrations, Inc. v. Fairchild Semiconductor Int'l, Inc., 762 F. Supp. 2d 710, 720–26 (D. Del. 2011); Meyer Intell. Props. Ltd. v. Bodum, Inc., 764 F. Supp. 2d 1004, 1006–12 (N.D. Ill. 2011). At least seven courts have adopted the same test when determining whether the specific facts of the case supported enhancement of an ongoing royalty due to willful infringement. *See, e.g.*, Golden Hour Data Sys., Inc. v. emsCharts, Inc., No. 2:06-CV-381, 2014 WL 8708239, at *15–20 (E.D. Tex. Mar. 31, 2014); I/P Engine, Inc. v. AOL Inc., No. 2:11CV512, 2014 WL 309245, at *4 (E.D. Va. Jan. 28, 2014); Fractus, S.A. v. Samsung Elecs. Co., 876 F. Supp. 2d 802, 845–52 (E.D. Tex. 2012); Affinity Labs of Tex., LLC v. BMW N. Am., LLC, 783 F. Supp. 2d 891, 901–05 (E.D. Tex. 2011); Mondis Tech. Ltd. v. Chimei InnoLux Corp., 822 F. Supp. 2d 639, 652–53 (E.D. Tex. 2011); Order at 4–9, VirnetX, Inc. v. Apple, Inc., No. 13-cv-00211 (E.D. Tex. Mar. 6, 2014), ECF No. 53; Internet Machs. LLC v. Alienware Corp., No. 6:10-cv-23, 2013 WL 4056282, at *20–21 (E.D. Tex. June 19, 2013), *aff'd sub nom*. Internet Machs. LLC v. Cyclone Microsystems, Inc., 575 F. App'x 895 (Fed. Cir. 2014).

However, none of those differences in means is statistically significant.[88] In addition, an outlier of a relatively large normalized ongoing royalty awarded in *Boston Scientific II* appears to bias the results. If one excludes the normalized ongoing royalty from *Boston Scientific II* from the dataset, the mean normalized ongoing royalty for the medical-device industry is less than the mean normalized ongoing royalty for other industries.[89] Likewise, there is no statistically significant relationship between the length of time between the date of first infringement and the date of the award of an ongoing royalty, and the magnitude of the normalized ongoing royalty. In fact, there is a small negative correlation between the normalized ongoing royalty and the length of time between the date of first infringement (that is, the hypothetical negotiation for the reasonable royalty) and the date of judgment (that is, the hypothetical negotiation for the ongoing royalty). Put differently, the longer the length of time between the first infringement and the hypothetical negotiation for the ongoing royalty, the lower the normalized ongoing royalty.

Third, I use multivariate regression analysis to consider how the magnitude of the normalized ongoing royalty changes as other variables change. Because there might be some correlation between some of the observed variables, a regression model may identify results that are unobservable when examining only differences in means. However, the small sample size and the variance in the observed normalized ongoing royalty limit one's ability to make statistical inferences.

Table 3 shows the observed effects of certain variables on the normalized ongoing royalty. To keep my estimates conservative, where a range was observed for the ongoing royalty, I use the lower bound on the range to calculate the normalized ongoing royalty. As independent variables, I use a dummy variable to indicate cases in which the patent holder's requested ongoing royalty was equal to the jury-determined reasonable royalty. If the patent holder did not request an ongoing royalty that exceeded the jury-determined reasonable royalty, then there is little chance that the court would order an ongoing royalty that exceeds the reasonable royalty.[90] It is expected that the coefficients for this variable should be negative. I also use dummy variables for cases related to the medical-device industry and for cases

88 A difference in means is statistically significant if one can conclude that the probability that each sample was generated from a population with equal means is less than 5 percent or some other level as chosen by the researcher.

89 With *Boston Scientific II* included in the dataset, the mean normalized ongoing royalty was approximately 2.1 for cases in the medical-device industry and 1.5 for cases in all other industries. After excluding *Boston Scientific II* from the dataset, the mean normalized ongoing royalty was approximately 1.2 for cases in the medical-device industry and 1.5 for cases in all other industries.

90 An alternate treatment of those cases would be to exclude from the analysis those observations for which the requested ongoing royalty is equal to the reasonable royalty. However, if there is a selection bias in which patent holders seek ongoing royalties that exceed reasonable royalties, then excluding those observations might bias the other coefficient estimates.

heard in the Eastern District of Texas. In the medical-device industry, first infringement typically occurs when a device is first authorized for use on patients.[91]

Therefore, at the time of first infringement, the uncertainty about the commercial success of the infringing product might exceed the uncertainty about the commercial success of the infringing product in other industries, if in other industries an infringer can better observe whether the patented technology is commercially successful before deciding to infringe. To the extent that the uncertainty about the commercial success of the patented technology explains why an ongoing royalty typically exceeds the reasonable royalty, the fact that this uncertainty is greater in the medical-device industry than in other industries implies that the normalized ongoing royalty for patents related to the medical-device industry should exceed the normalized ongoing royalty for patents related to any other industry. The variable for the Eastern District of Texas will identify any difference between the normalized ongoing royalties in that district, relative to those in other observed districts.

Finally, in 22 cases, I can observe the number of days between first infringement and judgment, which I use as a proxy for the difference in time between the hypothetical negotiation for the reasonable royalty and the hypothetical negotiation for the ongoing royalty. Given my analysis in Part V below, I anticipate that this variable will have a positive coefficient. However, those data are available for only a limited number of cases.

I present four regression specifications, including and excluding the time between first infringement and judgment as a variable and including and excluding *Boston Scientific II* in the dataset. Table 3 presents the regression results.

[91] Identifying the time of first infringement is a fact-specific inquiry and will vary from case to case. As the time of first infringement moves, the effect of the relative uncertainty might increase or decrease, but it will not entirely disappear.

Table 3: Results of Multivariate Regression Models of a Normalized Ongoing Royalty

	Regression Specification			
Dependent Variable: Normalized Ongoing Royalty	**[1]**	**[2]**	**[3]**	**[4]**
Requested Ongoing Royalty Equal to Reasonable Royalty	–0.642** (0.274)	–1.308 (0.774)	–0.426** (0.184)	–0.422* (0.208)
Medical-Device Industry	0.608 (1.039)	1.208 (1.413)	–0.407* (0.235)	–0.370 (0.318)
E. D. Texas	–0.485* (0.259)	–1.001 (0.721)	–0.375 (0.240)	–0.223 (0.242)
Days Between First Infringement and Judgment		–0.001 (0.001)		0.000 (0.000)
Constant	1.812*** (0.232)	3.490** (1.743)	1.732*** (0.222)	1.451*** (0.333)
R^2	0.082	0.235	0.167	0.199
F	3.16**	1.23	2.62*	1.74
With *Boston Scientific II*?	Yes	Yes	No	No
Observations	35	22	34	21

Notes: * indicates statistical significance at the 90-percent confidence level, ** indicates statistical significance at the 95-percent confidence level, and *** indicates statistical significance at the 99-percent confidence level.

Across regression specifications, the coefficient for whether the requested ongoing royalty was equal to the reasonable royalty was always negative. The coefficient was statistically significant at a 95-percent confidence level when the number of days between first infringement and judgment is excluded from the model. With the smaller sample size in specifications 2 and 4, the coefficient estimate was no longer significant at the 95-percent confidence level. The coefficient for the Eastern District Texas is negative, although it is statistically significant at only the 90-percent confidence level in specification 1.

The coefficient estimates for both the medical-device industry and the number of days between first infringement and judgment change signs depending on the inclusion of *Boston Scientific II* in the dataset, although those estimates are never statistically significant at the 95-percent confidence level. The variation in the results depending on the inclusion of a single case shows how the relatively small sample size makes drawing inferences difficult. In fact, only in specifications 1 and 3, where the sample size is larger, does the *F*-test support the joint significance of all of the observations combined.

In sum, from the three inquiries listed in the introduction to this part, I am able to conclude that the ongoing royalty typically does exceed the reasonable royalty in patent-infringement cases. However, the set of observable trial outcomes is too limited to make any strong statements about how factors such as venue, industry, or the passage of time affect the probability that an ongoing royalty exceeds the reasonable royalty or the magnitude of any effect. It is possible that a larger sample size would reveal more statistically significant trends in how the courts have awarded ongoing royalties from 2007 through 2015. The lack of statistically significant trends based on the currently available data implies that, as an economic matter, the district courts have not yet adopted a systematic approach to determining an ongoing royalty. To reduce the uncertainty in patent-infringement litigation, the courts should apply a logically consistent, economically sound framework to the facts of a specific case so as to determine an ongoing royalty. A consistent framework for this exercise is a valuable tool for reducing the aggregate uncertainty of patent-infringement litigation for both the patent holder and the infringer.

IV. The Economic Methodology for Calculating an Ongoing Royalty

The Federal Circuit has not prescribed any particular methodology for a court to apply when determining an ongoing royalty. It has emphasized, nonetheless, that a court must "explain the reasoning" for awarding a specific ongoing royalty and that the award of an ongoing royalty is subject to review for abuse of discretion.[92]

When determining an ongoing royalty for the future use of the patented technology, courts can adopt a modified version of the hypothetical-negotiation framework typically used for the calculation of a reasonable royalty for past infringement. An important difference between the hypothetical-negotiation framework that judges use to calculate an ongoing royalty and the hypothetical-negotiation framework that judges and juries use to calculate a reasonable royalty for past infringement is that the hypothetical negotiation for an ongoing royalty occurs on the date of the jury verdict.[93] Because of the shift in the date of the hypothetical negotiation, a court should consider not only the information that was available at the time of first infringement, but also the information that became available between the date of first infringement and the date of the jury verdict. A court should then examine how that information affects the bargaining range for the patented technology—that is, the patent holder's minimum willingness to accept and the infringer's maximum willingness to pay—as well as the way in which that new information affects the parties' respective bargaining power.

[92] Bard Peripheral Vascular, Inc. v. W.L. Gore & Assoc., Inc., 670 F.3d 1171, 1192–93 (Fed. Cir. 2012) (citing Paice LLC v. Toyota Motor Corp., 504 F.3d 1293, 1315 (Fed. Cir. 2007)).

[93] For a detailed analysis of the significance of the date of a hypothetical negotiation for an ongoing royalty, *see infra* Part IV.B.

A. The Bargaining Range for a Reasonable Royalty

Courts typically have used damages awarded for past infringement as the starting point for calculating an ongoing royalty.[94] Thus, before examining the economic methodology for the calculation of an ongoing royalty, it is important to understand the methodology that courts apply when calculating damages for past infringement.

Damages for patent infringement may consist of the profits that the patent holder would have earned in the absence of the infringement (lost profits), a reasonable royalty, or a combination of both. Reasonable-royalty damages rest on the notion that, had the transaction between the patent holder and the infringer been voluntary rather than involuntary, the infringer would have paid the patent holder a royalty to use the patent. If no established royalty for the patent in suit has emerged from multiple market transactions at a readily observable price, then the court needs to infer a reasonable royalty upon which the parties would have agreed in a hypothetical negotiation immediately before the infringement began.[95] The determination of a reasonable royalty based on a hypothetical negotiation typically relies on the fifteen factors that the *Georgia-Pacific* decision established.[96]

An economic approach to determining a reasonable royalty upon which the parties would have agreed in a hypothetical negotiation is to identify the upper and lower bounds on the bargaining range, and then determine where, within that range, the point royalty would fall. The lower bound on the bargaining range is the patent holder's minimum willingness to accept, which is the lowest royalty that the patent holder would be willing to accept to license its patented technology while still being better off than it would have been had it not issued a license. The upper bound on the bargaining range is the infringer's maximum willingness to pay, which is the greatest royalty that the infringer would be willing to pay for the use of the patented technology while still being better off than it would have been had it not acquired a license. The total surplus from a successful licensing transaction (that is, how much better off both parties collectively are from licensing relative to not licensing) is equivalent to the bargaining range—the difference between the patent holder's minimum willingness to accept and the infringer's maximum willingness to pay. Be-

94 *See, e.g.*, Apple, Inc. v. Samsung Elecs. Co., No. 12-cv-00630-LHK, 2014 WL 6687122, at *14 (N.D. Cal. Nov. 25, 2014); Bianco v. Globus Med. Inc., 53 F. Supp. 3d 929, 939 (E.D. Tex. 2014); Mondis Tech. Ltd. v. Chimei InnoLux Corp., 822 F. Supp. 2d 639, 647 (E.D. Tex. 2011).

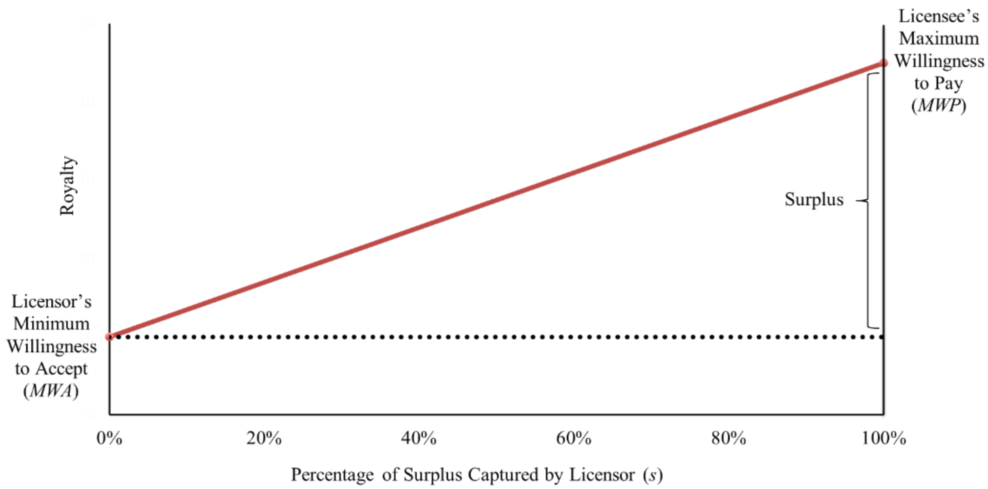
95 *See* Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1324 (Fed. Cir. 2011) (stating that a hypothetical negotiation occurs "just before infringement began"); Integra Lifesciences I, Ltd. v. Merck KGaA, 331 F.3d 860, 869–70 (Fed. Cir. 2003) (stating that a hypothetical negotiation occurs "at a time before the infringing activity began"), *vacated on other grounds*, Merck KGAA v. Integra Lifesciences I, Ltd., 543 U.S. 193 (2005). In practice, courts and litigants treat the "moment of first infringement" as simultaneous with the "eve of first infringement."

96 Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified and aff'd*, 446 F.2d 295 (2d Cir. 1971), *cert. denied*, 404 U.S. 870 (1971). For an economic restatement of the *Georgia-Pacific* factors, *see* Sidak, *Bargaining Power and Patent Damages*, *supra* note 14, at 17–20.

cause a hypothetical voluntary transaction necessarily makes both parties better off, a negotiated royalty must fall between those lower and upper bounds. That economic principle—that voluntary exchange is mutually beneficial—is as profound as it is simple, and for that reason it is called the "Fundamental Theorem of Exchange."[97]

Figure 2 illustrates the bargaining range.

FIGURE 2: THE BARGAINING RANGE



The equation for the line that represents all of the possible royalty outcomes within the bargaining range is:

$$Royalty = MWA + [s \times (MWP - MWA)],$$

where *MWA* is the patent holder's minimum willingness to accept, *MWP* is the infringer's maximum willingness to pay, and *s* is the percentage of the surplus captured by the patent holder. The vertical distance between the patent holder's minimum willingness to accept and the infringer's maximum willingness to pay represents the total surplus that the patent holder and the infringer will divide between themselves when negotiating a royalty.

1. The Patent Holder's Minimum Willingness to Accept

The patent holder's minimum willingness to accept—the lower boundary of the bargaining range—equals the patent holder's opportunity cost of licensing the patent in suit to the infringer at the time of the hypothetical negotiation. That opportunity cost is determined by the profit that the patent holder can earn by not issuing

97 *See* JACK HIRSHLEIFER, AMIHAI GLAZER & DAVID HIRSHLEIFER, PRICE THEORY AND APPLICATIONS: DECISIONS, MARKETS, AND INFORMATION 203 (Cambridge Univ. Press 7th ed. 2005).

a license to the infringer and by instead pursuing alternative methods of monetizing its technology—for example, maintaining its patent monopoly.

Suppose, for example, that the patent holder has only two possible options to monetize its technology. The patent holder can make exclusive use of the patented technology and generate $400 in revenue. Because the patent holder's marginal cost of using its own patent is zero (once the patented invention exists), the $400 in revenue becomes $400 of profit. Alternatively, the patent holder can grant an exclusive license to company *A* (which would preclude the patent holder from practicing the patent) and generate revenue solely through royalties. In that scenario, the patent holder's opportunity cost of licensing its technology to company *A* equals $400—that is, the profit the patent holder could generate by refusing to license its technology to *A* and making exclusive use of the patented technology. Therefore, the patent holder's minimum willingness to accept—the minimum royalty that the patent holder is willing to accept to grant an exclusive license to company *A*—is a lump-sum royalty of $400 (or a differently structured royalty that will generate an aggregate royalty having a discounted present value of $400).

Ideally, one should determine the patent holder's minimum willingness to accept on the basis of real-world observations. One source of empirical evidence that can be particularly probative of the patent holder's minimum willingness to accept is comparable licenses that the patent holder has executed for the patent in suit. To determine accurately the patent holder's minimum willingness to accept from an analysis of comparable licenses, one must identify a license in which the patent holder had little or no bargaining power or in which the patent holder chose not to exercise the bargaining power that it did have.[98]

2. The Infringer's Maximum Willingness to Pay

The infringer's maximum willingness to pay—the upper boundary of the bargaining range—is the most that the infringer would willingly pay to use the licensed technology while still being better off than it would have been had it not acquired a license. The infringer's maximum willingness to pay depends on, among other things, the acceptable non-infringing alternatives available at the time of the hypothetical negotiation. The maximum royalty that the infringer would be willing to pay equals the added increment of profit that the infringer expects to earn by licensing the patent in suit rather than using the next-best non-infringing substitute.[99]

For example, suppose that by using the patent holder's technology, the infringer expects to generate revenue of $200. If it does not acquire a license to the patent

98 *See* Sidak, *Bargaining Power and Patent Damages*, *supra* note 14, at 13–15.

99 *See, e.g.*, Riles v. Shell Exploration & Prod. Co., 298 F.3d 1302, 1312 (Fed. Cir. 2002) ("The economic relationship between the patented method and non-infringing alternative methods, of necessity, would limit the hypothetical negotiation."); J. Gregory Sidak, *The Meaning of FRAND, Part I: Royalties*, 9 J. COMPETITION L. & ECON. 930, 935 (2013).

holder's technology, it will use the next-best non-infringing alternative, which generates revenue of $100 and costs $60. The infringer's expected profit from using the next-best non-infringing alternative is $40. When negotiating a license for the use of the patented technology, the infringer will not pay a royalty that results in a surplus less than $40. Thus, the infringer's maximum willingness to pay for the patented technology is $160 because $200 of incremental revenue minus $160 in cost will allow the infringer to make a total profit of $40. A licensing agreement with a royalty that exceeds the upper boundary of the bargaining range—in the above example, $160—would never eventuate voluntarily between a willing licensor and a willing licensee.

It is crucial that the costs of licensing the next-best alternative be included in the incremental value analysis to ensure that the next-best alternative is actually a lawful option for the infringer to use. Failure to do so can lead to misidentification of the next-best alternative. For example, in the above scenario if one neglected to account for the costs of licensing the next-best alternative, then it would seem that the infringer could generate $100 of profit by using the next-best alternative. Subsequently, that error would lead one to conclude falsely that the infringer's maximum willingness to pay for the patented technology is $100. Thus, when identifying the next-best non-infringing alternative, it is important to account for the infringer's cost of acquiring that alternative.

3. The Point Royalty

Once the finder of fact has established the bargaining range, the ultimate outcome of the hypothetical negotiation will depend on the relative bargaining power of each party to the negotiation. Relative bargaining power varies from negotiation to negotiation depending on the parties involved. For example, the patent holder might have relatively high bargaining power in one negotiation but relatively low bargaining power in the next because it is negotiating with a different counterparty with its own unique circumstances. Relative bargaining power will determine how the parties to the negotiation divide the total surplus.[100] The two parties will strike a bargain at a price closer to the infringer's maximum willingness to pay (a higher *s* in Figure 2) if the *patent holder* has relatively greater bargaining power. In other words, the infringer will agree to give a relatively large portion of the surplus to the patent holder only if the infringer has less bargaining power. Conversely, the two parties will strike a bargain at a price closer to the patent holder's minimum willingness to accept (a lower *s*) if the *infringer* has relatively greater bargaining power. If the parties have roughly equal bargaining power, they will agree to a price close to the midpoint of the bargaining range.

[100] *See, e.g.*, ROBERT S. PINDYCK & DANIEL L. RUBINFELD, MICROECONOMICS 494–95 (Pearson Prentice Hall 6th ed. 2005).

B. The Date of the Hypothetical Negotiation for an Ongoing Royalty

When calculating a reasonable royalty for past infringement, the finder of facts needs to determine a reasonable royalty upon which the parties would have agreed in a hypothetical negotiation immediately before infringement began.[101] The Federal Circuit has said that the calculation of a reasonable royalty should rely on information available to the parties at the time of first infringement.[102] The Federal Circuit has clarified that information that became available after the first infringement may affect the calculation of a reasonable royalty only in exceptional circumstances—specifically, when that information aids the court in determining the parties' respective bargaining positions *at the time of the hypothetical negotiation*.[103]

I have previously discussed the appropriate date of the hypothetical negotiation when calculating a FRAND royalty for SEPs.[104] In *Microsoft Corp. v. Motorola Inc.*, Judge James Robart applied a modified *Georgia-Pacific* approach to calculate a FRAND royalty, and in examining *Georgia-Pacific* factor 9—which considers the utility and advantages of the patent property over old modes or devices—he found that "[t]he focus is on the period before the standard was adopted and implemented."[105] Judge Robart's reasoning suggests that in litigation over SEPs the date of the hypothetical negotiation moves from the moment of first infringement to the moment of standard adoption. The Ninth Circuit affirmed Judge Robart's damages determination.[106] However, I have previously explained why Judge Robart's *ex ante* approach is not *ex ante* enough.[107] If modified, the moment of the hypothetical negotiation between the willing licensor and the willing licensee should be pushed back in time not merely to Judge Robart's moment of standard adoption but rather all the way back to the moment when the inventor decides to monetize his invention within the open standard of an SSO rather than outside the SSO. The Federal Circuit has nonetheless expressed no view on the exact date of the hypothetical negotiation for SEPs. For simplicity in this article, I will refer to "the date of first infringement" to indicate the date when the parties would have negotiated a reasonable royalty for an SEP portfolio, although I acknowledge that one might move that date earlier in time—for example, to the time when the patent holder decided whether to contribute its patents to an industry standard.

The date of the hypothetical negotiation is far less controversial when a court is determining an ongoing royalty for the prospective use of FRAND-committed SEPs. Courts have recognized that the hypothetical negotiation for an ongoing roy-

[101] *See, e.g.*, Hanson v. Alpine Valley Ski Area, Inc., 718 F.2d 1075, 1079 (Fed. Cir. 1983).
[102] *See, e.g.*, *id.*
[103] *See* J. Gregory Sidak, *How Relevant Is Justice Cardozo's "Book of Wisdom" to Patent Damages?*, 16 COLUM. SCI. & TECH. L. REV. 246 (2016).
[104] Sidak, *supra* note 97, at 983.
[105] No. C10-1823JLR, 2013 WL 2111217, at *13, *19 (W.D. Wash. Apr. 25, 2013).
[106] Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024, 1030 (9th Cir. 2015).
[107] Sidak, *supra* note 97, at 983.

alty occurs when the finder of fact renders its decisions on validity and infringement. The Federal Circuit's reasoning in *Amado v. Microsoft Corp.* suggests that the date of the jury verdict—that is, the date when the liability for infringement and validity of the patent become certain—is the date of the hypothetical negotiation for an ongoing royalty.[108] However, some district courts in addressing the same question have found that the date of the hypothetical negotiation should be the date that the court renders its final judgment,[109] while others have failed to clarify which date is more appropriate.[110] The verdict and the final judgment are probably close in time, but they might not be simultaneous. For simplicity, I will assume that the verdict and the final judgment are simultaneous.

The change in the date of the hypothetical negotiation has important implications for the evidence on which the court can rely when setting the ongoing royalty. Because the date of the hypothetical negotiation for an ongoing royalty is the date when the jury issued its final verdict, the court may consider any information that became available between the time infringement began and the time of the verdict. The Federal Circuit recognized that fact in *Paice* and emphasized the importance of "tak[ing] additional evidence if necessary to account for any additional economic factors" that would affect the negotiation for an ongoing royalty.[111] Disregarding post-infringement data would thus contradict the Federal Circuit's instructions that a court setting an ongoing royalty account for the changes in the negotiating parties' relevant economic circumstances.

In economic terms, the post-infringement information might affect (1) the patent holder's minimum willingness to accept, (2) the infringer's maximum willingness to pay, and (3) the parties' bargaining power. As I will explain in Parts V and

[108] 517 F.3d 1353, 1362 (Fed. Cir. 2008) ("Prior to judgment, liability for infringement, as well as the validity of the patent, is uncertain, and damages are determined in the context of that uncertainty. Once a judgment of validity and infringement has been entered, however, the calculus is markedly different because different economic factors are involved.").

[109] *See, e.g.*, Presidio Components Inc. v. Am. Technical Ceramics Corp., No. 08-CV-335-IEG NLS, 2010 WL 3070370, at *5 (S.D. Cal. Aug. 5, 2010), *aff'd in part, vacated in part*, 702 F.3d 1351 (Fed. Cir. 2012) ("[T]he Court agrees with ATC that the appropriate date for the hypothetical negotiation [for the ongoing royalty] is . . . when the Court upheld the jury's finding of validity and infringement, and when the Court denied Presidio's motion for a permanent injunction."); DataTreasury Corp. v. Wells Fargo & Co., No. 2:06-CV-72 DF, 2011 WL 8810604, at *9 (E.D. Tex. Aug. 2, 2011) ("Because the Court enters Final Judgment contemporaneously with this Order, the Court finds no difficulty with the date of the hypothetical negotiation [for the ongoing royalty] being the date of this Order.").

[110] *See, e.g.*, I/P Engine, Inc. v. AOL Inc., No. 2:11CV512, 2014 WL 309245 (E.D. Va. Jan. 28, 2014); Mondis Tech. Ltd. v. Chimei InnoLux Corp., 822 F. Supp. 2d 639, 644–50 (E.D. Tex. 2011), *aff'd sub nom.* Mondis Tech. Ltd. v. InnoLux Corp., 530 F. App'x 959 (Fed. Cir. 2013); Creative Internet Advert. Corp. v. Yahoo! Inc., 674 F. Supp. 2d 847, 852–55 (E.D. Tex. 2009).

[111] Paice LLC v. Toyota Motor Corp., 504 F.3d 1293, 1315 n.15 (Fed. Cir. 2007); *see also* ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc., 694 F.3d 1312, 1343 (Fed. Cir. 2012) (instructing district courts to consider "additional evidence of changes in the parties' bargaining positions and other economic circumstances that may be of value in determining an appropriate ongoing royalty").

VI, each of those changes would independently affect the point value of the ongoing royalty within the bargaining range.

C. The Irrelevance of the Infringer's Profit for the Calculation of an Ongoing Royalty

Some courts have approached the determination of an ongoing royalty for the continued use of a patented technology by attempting to identify an "amount of money [that] would reasonably compensate a patentee for giving up his right to exclude yet allow an ongoing willful infringer to make a reasonable profit."[112] By that reasoning, the ongoing royalty could not exceed the infringer's profit margin on its infringing products. However, the Federal Circuit has correctly rejected that proposition by emphasizing that the infringer's past profit from infringing products does not cap either a reasonable royalty or an ongoing royalty.

The Federal Circuit has recognized that the infringer's *actual* profit does not impose a limit on a reasonable royalty that the court awards to compensate the patent holder for past infringement. In 1983, in *Hanson v. Alpine Valley Ski Area, Inc.*, the Federal Circuit dismissed the infringer's argument that the Federal Circuit should vacate the reasonable royalty that the district court awarded because that reasonable royalty would make the infringer's sales of the infringing product unprofitable.[113] Similarly in 2011, in *Powell v. Home Depot U.S.A., Inc.*, the Federal Circuit said that "it is settled law that an *infringer's* net profit margin is not the ceiling by which a reasonable royalty is capped."[114] In December 2014, in *Aqua Shield v. Inter Pool Cover Team*,[115] the Federal Circuit, in an opinion by Judge Richard Taranto, reiterated that principle by emphasizing that a reasonable royalty is the amount that a rational manufacturer would be willing to pay for the patented technology on the basis of information available to it at the time of the hypothetical negotiation.[116] That inquiry focuses not on "what turned out to have happened" but rather on "what the parties *would have anticipated, looking forward when negotiating*."[117] Thus, the Federal Circuit clarified that the infringer's *expected* profit from using the patented technology (at the time of the hypothetical negotiation), rather than its actual profit, is relevant to the outcome of the hypothetical negotiation.[118]

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112 *See, e.g.*, Paice LLC v. Toyota Motor Corp., 609 F. Supp. 2d 620, 624 (E.D. Tex. 2009) (citing Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified sub nom.* Georgia-Pacific Corp. v. U.S. Plywood-Champion Papers, Inc., 446 F.2d 295 (2d Cir. 1971)).

113 718 F.2d 1075, 1081 (Fed. Cir. 1983).

114 663 F.3d 1221, 1238 (Fed. Cir. 2011) (emphasis in original) (citing Golight, Inc. v. Wal-Mart Stores, Inc., 355 F.3d 1327, 1338 (Fed. Cir. 2004)).

115 774 F.3d 766 (Fed. Cir. 2014).

116 *Id.* at 772.

117 *Id.* (emphasis added).

118 *Id.*

In explaining that an infringer's actual profits do not constrain a reasonable royalty, Judge Taranto reasoned in *Aqua Shield* that "[a]n especially inefficient infringer . . . 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."[119] He emphasized that the royalty that a particular infringer can "profitably pay by going about its business in its particular way does not set the market value [of the patented technology] that the hypothetical negotiation aims to identify."[120] Judge Taranto added that an infringer "could have raised its prices (over what it actually charged for infringing sales) to account (fully or partly) for a royalty payment."[121] That is, an implementer would not be able to negotiate a low royalty simply to accommodate its thin profit margin on infringing products due to its other costs. In sum, the Federal Circuit has said that it is incorrect to assume that an infringer's profit sets a limit on a reasonable royalty for past infringement.

The Federal Circuit has established that the same principle applies when determining an ongoing royalty: the infringer's profit does not cap an ongoing royalty for the prospective use of a patented technology. In *Douglas Dynamics, LLC v. Buyers Products Co.*,[122] the District Court for the Western District of Wisconsin denied a permanent injunction to the patent holder and instead determined an ongoing royalty after the jury found the patents valid and infringed.[123] On appeal, the Federal Circuit found that the district court "clearly erred by limiting the ongoing royalty rate based on [the infringer's] profit margins."[124] The Federal Circuit emphasized that "[t]he infringer's selling price can be raised if necessary to accommodate a higher royalty rate" and that "requiring the infringer to do so may be the only way to adequately compensate the patentee for the use of its technology."[125] Thus, the Federal Circuit established that the infringer's profit does not cap an ongoing royalty, and that an ongoing royalty that adequately compensates the patent holder for the value of its technology might require the infringer to increase the price of its infringing product. A proper ongoing royalty might even require the infringer to take a loss if the infringer is not efficient enough to earn a profit while paying for the patented technology.

The Federal Circuit's reasoning in *Douglas Dynamics* comports with economic principles for calculating an ongoing royalty. During the period when it is infringing the patented technology, the infringer is not paying for one of the inputs essential to its infringing product—namely, the patented technology itself. Its failure to account for the cost of one of its inputs could have caused the infringer to charge an ineffi-

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119 *Id.* at 771.
120 *Id.*
121 *Id.*
122 717 F.3d 1336 (Fed. Cir. 2013).
123 *Id.* at 1339.
124 *Id.* at 1346.
125 *Id.*

ciently low price for its infringing product. That is, the infringer might have been selling its infringing product at a price that would not have allowed it to recover its production costs in full had those production costs included a royalty for the patented technology. Thus, it would be erroneous economic reasoning to limit the patent holder's compensation to the infringer's profit. As when determining a reasonable royalty, a court needs to determine an ongoing royalty on the basis of the "market value" of the patented technology, not on the basis of the infringer's past profits.[126] A policy of permitting the infringer's profit to limit an ongoing royalty would have the perverse effect of rewarding inefficient implementers and punishing efficient implementers by charging a lower ongoing royalty to the former rather than to the latter.

For example, suppose that an implementer's product infringes a patented technology, and that the implementer earns 50 cents of profit per unit of the infringing product. Suppose further that, after analyzing the "market value" of the technology, the court determines that an appropriate ongoing royalty for the continued use of the patented technology is 60 cents per infringing unit. In such a case, the court-awarded ongoing royalty exceeds the infringer's past profit margin on infringing products. However, it would be erroneous for the court to reduce the ongoing royalty to allow the infringer to earn a profit. The infringer's profit margin could be particularly low for reasons unrelated to the patented technology. The proper royalty, which the court has determined to be 60 cents, depends on the value of the patented technology, not on the infringer's profit margin. Thus, estimating a royalty that would reasonably compensate a patent holder for relinquishing his right to exclude while still allowing an infringer to make a reasonable profit is not useful for purposes of setting an ongoing royalty.

V. The Effect of New Information on the Bargaining Range for an Ongoing Royalty

The determination of the appropriate ongoing royalty for future use of the patented technology is fact specific, and will vary from case to case. However, an analysis of the possible effects that new information can have on the bargaining range for an ongoing royalty shows that new information will typically support the award of an ongoing royalty that exceeds the reasonable royalty awarded for past infringement. After the jury verdict on validity and infringement, the patent holder's minimum willingness to accept will typically increase because of increased costs of enforcing its patents against the infringer. The goal of judicial efficiency alone suggests that that factor should support the award of an ongoing royalty that exceeds a reasonable royalty. In addition, the infringer's maximum willingness to pay in a hypothetical negotiation for an ongoing royalty might increase if information that be-

[126] For a detailed analysis of the methodology for determining a patented technology's "market value," see Sidak, *supra* note 97, at 935–38. It is important to note that the value of a patented technology depends in part on the cost of acquiring the next-best alternative to that technology.

came available after the date of first infringement shows that the patented technology has gained commercial success. If new information shows that the bargaining range has shifted upward, then the ongoing royalty will increase even if the parties' relative bargaining power remains unchanged.

A. Changes in the Patent Holder's Minimum Willingness to Accept

Changes that have occurred in the market since the date of the hypothetical negotiation for a reasonable royalty might support adjusting the patent holder's minimum willingness to accept upward or downward (relative to its minimum willingness to accept in the hypothetical negotiation for the reasonable royalty), depending on the facts of the case. Typically, the patent holder's minimum willingness to accept for an ongoing royalty will exceed its minimum willingness to accept for a reasonable royalty for past infringement because the patent holder will need to negotiate a royalty that (1) compensates it for the costs that it incurred while enforcing its patent against the infringer and (2) encourages potential future licensees to negotiate a license rather than exercise a free option to infringe.

1. The Patent Holder's Enforcement Costs

The costs that the patent holder incurred while enforcing its patent rights in litigation against the infringer will typically increase the patent holder's minimum willingness to accept in a negotiation for an ongoing royalty. For example, in *Telcordia Technologies, Inc. v. Cisco Systems, Inc.*, the patent holder (Telcordia) argued that, "in recent license agreements, . . . it was willing to negotiate a lower rate because the voluntary licensees did not force [it] . . . to endure protracted, disruptive, and expensive litigation."[127] Telcordia emphasized that, in contrast, Cisco was an infringer that forced the patent holder into eight years of litigation. For that reason, Telcordia asked the court to order Cisco to pay a higher royalty than other licensees that had entered into voluntary license agreements for the same technology. Put differently, Telcordia signaled that its minimum willingness to accept had increased since the date of first infringement.

Telcordia's argument is economically sound. In Part IV.A, I explained that the patent holder's minimum willingness to accept depends on its opportunity cost of licensing—that is, the profit that the patent holder could generate by forgoing the license with the infringer and relying on other strategies to monetize its technology. Some commentators have suggested that a patent holder's minimum willingness to accept is effectively zero when granting a nonexclusive license because there is no opportunity cost of licensing—that is, granting a nonexclusive license to one licensee does not preclude the patent holder from licensing the same technology to other

[127] Telcordia Techs., Inc. v. Cisco Sys., Inc., No. CV 04-876-GMS, 2014 WL 1457797, at *3 (D. Del. Apr. 14, 2014).

licensees.[128] One could simplistically assume that, when negotiating nonexclusive licenses, the patent holder would always be better off by licensing its technology to an infringer, even for a very low royalty, because granting a license would provide to the patent holder some compensation, whereas forgoing a license would result in no compensation. However, several errors undermine that reasoning.

First, the transaction costs associated with negotiating a license are costs that the patent holder would not incur if it refused to license. Thus, at the very least the patent holder's minimum willingness to accept equals its licensing costs. One crucial difference between a hypothetical negotiation for a reasonable royalty and a hypothetical negotiation for an ongoing royalty is that, at the time of the hypothetical negotiation for an ongoing royalty, the patent holder has incurred substantial litigation costs in the process of defending its patent claims against the infringer's defenses of invalidity and non-infringement. That is, by litigating, the infringer has increased the patent holder's licensing costs. A rational patent holder will account for that increase in licensing costs when negotiating a royalty for the ongoing use of the patented technology, and it will require that an infringer that has imposed high licensing costs (a high-cost licensee by any other name) pay a higher royalty than a licensee that has not imposed such costs. Furthermore, to the extent that an infringer that has litigated in the past is more likely to litigate in the future, the patent holder's expected costs of licensing to that infringer will exceed its expected costs of licensing to an implementer that has never litigated. Therefore, the costs associated with enforcing the patent against the infringer increase the patent holder's minimum willingness to accept in a negotiation for an ongoing royalty (relative to its minimum willingness to accept at the time of first infringement).

One might argue that licensing costs, including litigation costs, represent a sunk cost (that is, a fixed cost that is not recoverable), and that a rational patent holder consequently would not consider those costs when negotiating a license with the infringer.[129] Economic theory explains that, *in the short run* a rational economic actor will consider only marginal costs when making decisions. However, in the long run all costs are variable[130]—that is, a patent holder's long-run decision to license its patents depends on its ability to recoup its licensing costs (including its litigation costs). Consequently, a patent holder will not enter into a license that does not cover

[128] *See, e.g.*, Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1999 (2007).

[129] *See* DENNIS W. CARLTON & JEFFREY M. PERLOFF, MODERN INDUSTRIAL ORGANIZATION 29 (Addison Wesley 4th ed. 2005) ("The portion of fixed costs that is not recoverable is a sunk cost. A sunk cost is like spilled milk: Once it is sunk, there is no use worrying about it, and it should not affect any subsequent decisions.").

[130] *See* N. GREGORY MANKIW, PRINCIPLES OF ECONOMICS 271–72 (Cengage Learning 7th ed. 2015) ("For many firms, the division of total costs between fixed and variable costs depends on the time horizon. . . . Over a period of only a few months, Ford cannot adjust the number or sizes of its car factories. . . . The cost of these factories is, therefore, a fixed cost in the short run. By contrast, over a period of several years, Ford can expand the size of its factories, build new factories, or close old ones. Thus, the cost of its factories is a variable cost in the long run.").

its costs of licensing, including its negotiating and enforcement costs. Even if past transaction costs were fully sunk, those transaction costs will signal high expected future transaction costs and support a higher minimum willingness to accept in future negotiations. Moreover, the argument that a patent holder's litigation costs are sunk is even less relevant to SEPs because an SEP holder and a licensee typically renegotiate the license terms on a repeated basis, generally every five or ten years. Consequently, it is likely that an increase in licensing costs for SEPs due to litigation would increase the SEP holder's minimum willingness to accept in the long run.

Second, the argument that a patent holder's minimum willingness to accept is effectively zero when granting a nonexclusive license ignores that one component of a patent holder's opportunity cost of licensing—and therefore its minimum willingness to accept—is the effect that a negotiated royalty will have on *future* royalties for that same technology. To the extent that a finder of fact determines a reasonable royalty on the basis of comparable licenses, royalties that *similarly situated* licensees pay will not significantly vary, because any implementer can use a patented technology and litigate a reasonable royalty. Thus, if a patent holder and an implementer negotiate a royalty for a patented technology, that royalty will influence future licensing negotiations for the same patented technology. That reasoning is particularly strong when licensing FRAND-committed patents, such as SEPs, where the patent holder has contractually agreed to license its technology on a non-discriminatory basis. Although courts have not yet provided a detailed definition of non-discriminatory, there is general agreement that a FRAND commitment requires the patent holder to charge comparable royalties to similarly situated licensees.[131] In a hypothetical negotiation for a FRAND-committed SEP, it would be discriminatory to charge a low-cost licensee—that is, a licensee that has promptly entered into a voluntary license agreement and imposed no patent enforcement costs on the SEP holder—the same royalty as a high-cost licensee, all other things being equal.[132] Thus, the patent enforcement costs that a patent holder incurs by engaging in litigation with an infringer support an upward adjustment of the patent holder's minimum willingness to accept in a hypothetical negotiation for an ongoing royalty.

[131] *See, e.g.*, Dennis W. Carlton & Allan L. Shampine, *An Economic Interpretation of FRAND*, 9 J. COMPETITION L. & ECON. 531, 546 (2013); Anne Layne-Farrar, *Nondiscriminatory Pricing: Is Standard Setting Different?*, 6 J. COMPETITION L. & ECON. 811, 815 (2010); Sidak, *supra* note 97, at 26; Sidak, *Apportionment, FRAND Royalties, and Comparable Licenses After* Ericsson v. D-Link, *supra* note 13, at 8–10.

[132] *See* GEORGE J. STIGLER, THE THEORY OF PRICE 209–10 (Macmillan 3d ed. 1966) ("Price differences do not necessarily indicate discrimination. . . . Conversely, price equality does not demonstrate the absence of discrimination. If a college charges the same tuition for a large elementary class taught by an instructor, and a small advanced class taught by an expensive professor, it is clearly discriminating.").

2. The Implementer's Free Option to Infringe

If the ongoing royalty that an infringer must pay is equal to the royalty that the patent holder would charge a low-cost licensee—that is, a licensee that has voluntarily entered into a licensing agreement with the patent holder—then potential future licensees would have an incentive to infringe the patent holder's technology rather than to negotiate a license. Suppose that a potential licensee could negotiate a license upfront for $100, and that license would generate revenue of $120 for the licensee. Thus, the licensee's expected profit from licensing upfront is $20. However, suppose further that by engaging in litigation the potential licensee has a 10 percent chance that the court will find the patent invalid or not infringed and would pay an ongoing royalty of $100 if the court found the patent valid and infringed. Thus, by infringing the patent and engaging in litigation the infringer's expected profits are $30—that is, $120 (the revenue from using the patented technology) minus $90 (the expected costs of acquiring the technology after the court awards an ongoing royalty—that is, $100 × 90 percent). In that scenario, it is in the potential licensee's best interest to infringe and litigate a patent. In economic terms, the infringer and potential future licensees receive a free option to infringe the patent holder's technology.

U.S. courts have recognized that economic insight. Judge Gregory Sleet of the District Court of Delaware acknowledged that concern when he observed that the interests of judicial efficiency support awarding an ongoing royalty that exceeds the jury-determined reasonable royalty for past infringement. In *Telcordia Technologies, Inc. v. Cisco Systems, Inc.*, Telcordia argued that "the court would not serve the interests of justice by affording Cisco an ongoing royalty under the same favorable licensing terms as . . . voluntary licensees."[133] Judge Sleet agreed and found that a failure "to consider the parties' changed legal status would create an incentive for every defendant to fight each patent infringement case to the bitter end because without consideration of the changed legal status, there is essentially no downside to losing."[134] Conversely, the prospect of facing an ongoing royalty that exceeds the reasonable royalty creates an incentive for an infringer to enter promptly into a voluntary licensing agreement with the patent holder. Other district courts have similarly acknowledged that, "to avoid incentivizing defendants to fight each patent infringement action for as long as possible to obtain the maximum benefit of infringement," it is appropriate to award an ongoing royalty that exceeds the jury-determined reasonable royalty.[135]

[133] No. CV 04-876-GMS, 2014 WL 1457797, at *3 (D. Del. Apr. 14, 2014).

[134] *Id.* at *4 (quoting Paice LLC v. Toyota Motor Corp., 609 F. Supp. 2d 620, 628 (E.D. Tex. 2009)) (internal quotation marks omitted).

[135] Server Tech., Inc. v. Am. Power Conversion Corp., No. 3:06-CV-00698-LRH-VPC, 2015 WL 1505654, at *5 (D. Nev. Mar. 31, 2015); *see also* I/P Engine, Inc. v. AOL Inc., No. 2:CV11512, 2014 WL 309245, at *3 (E.D. Va. Jan. 28, 2014) (citing Creative Internet Advert. Corp. v. Yahoo! Inc., 674 F. Supp. 2d 847, 861 (E.D. Tex. 2009)); Internet Machs. LLC v. Alienware Corp., No. 6:10-CV-23, 2013 WL 4056282, at *19 (E.D. Tex. June 19, 2013) (quoting Fractus, S.A. v. Sam-

For the same reason, a "rate-card" royalty—the royalty that an SEP holder announces when it licenses its patent portfolio—should not impose a cap on the ongoing royalty. A rate-card royalty serves as a starting point in a licensing negotiation. It reduces the transaction costs of licensing for both the patent holder and the implementer. However, there exists a misconception that the rate-card royalty that the patent holder charges for a portfolio of patents should serve as an upper bound on a reasonable royalty for past infringement or an ongoing royalty for future infringement. Such a practice would grant licensees a free option to infringe because the only downside for an infringer would be to pay for his unlicensed use at the conclusion of possibly lengthy patent litigation. The very same royalty that he would have paid had he licensed the patented technology in the first place. Therefore, a rate-card royalty should not cap either reasonable royalties or ongoing royalties.

3. The Commercial Relationship Between the Patent Holder and the Infringer

Changes in the commercial relationship between the patent holder and the infringer after the time of first infringement can also affect the patent holder's minimum willingness to accept. Under an analysis of *Georgia-Pacific* factor 5,[136] the licensor's minimum willingness to accept will be greater in a licensing negotiation with a horizontal competitor than with a firm with which the patent holder does not compete. Licensing to a horizontal competitor might cannibalize sales of the patent holder's own practicing product and induce price erosion, both of which will reduce the licensor's expected profit.[137] By licensing to a competitor, the patent holder might forgo some of its downstream profits, and it will thus require a higher royalty to compensate it for its opportunity cost of licensing. Therefore, if competition between the patent holder and infringer increased between the time of first infringement and the time of final judgment, then the patent holder's minimum willingness to accept in a hypothetical negotiation for an ongoing royalty will exceed its minimum willingness to accept in a hypothetical negotiation for the reasonable royalty for past infringement. Conversely, decreased competition between the patent holder and the infringer from the time of first infringement to the time of final judgment (for example, because the patent holder no longer participates in the infringer's market) would support a downward adjustment of the patent holder's minimum willingness to accept.

sung Elecs. Co., 876 F. Supp. 2d 802, 855 (E.D. Tex. 2012)), *aff'd sub nom.* Internet Machs. LLC v. Cyclone Microsystems, Inc., 575 F. App'x 895 (Fed. Cir. 2014); *Creative Internet*, 674 F. Supp. 2d at 861.

[136] *See* Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified sub nom.* Georgia-Pacific Corp. v. U.S. Plywood-Champion Papers, Inc., 446 F.2d 295 (2d Cir. 1971).

[137] *Id.* at 1120; *see, e.g.*, Tyco Healthcare Grp. LP v. Ethicon Endo-Surgery, Inc., 936 F. Supp. 2d 30, 82 (D. Conn. 2013) ("As to *Georgia-Pacific*'s factors four and five—Tyco's established licensing policy and the commercial relationship between the parties—the Court finds that the nature of the intensely competitive relationship, and the fact that Tyco has not licensed the patents in suit to others would drive up the reasonable royalty rate."), *aff'd in part, vacated in part on other grounds*, *rev'd in part on other grounds*, 774 F.3d 968 (Fed. Cir. 2014).

Courts have recognized that changes in the parties' relationship would affect the determination of the reasonable royalty. For example, in *Bard Peripheral Vascular, Inc. v. W.L. Gore & Associates, Inc.*, the Federal Circuit confirmed the district court's decision to award different ongoing royalties for different products because the parties were direct competitors with respect to some downstream products but not others.[138] The district court found, and the Federal Circuit agreed, that in a hypothetical negotiation for an ongoing royalty the parties would agree to a royalty that accounted for whether or not they competed in the same product market.[139] Similarly, in *Warsaw Orthopedic, Inc. v. Nuvasive, Inc.*, the District Court for the Southern District of California analyzed competition between the patent holder and the infringer when setting an ongoing royalty.[140] The court found that the commercial relationship between the parties had not changed since the hypothetical negotiation for a reasonable royalty, such that *Georgia-Pacific* factor 5 did not require that an ongoing royalty exceed the jury-awarded reasonable royalty.[141]

The commercial relationship between the parties is less relevant in litigations concerning SEPs. One could argue that by making a FRAND commitment the SEP holder has agreed to refrain from charging a higher royalty to one of its competitors because the FRAND commitment prevents discrimination between competitors and other firms. According to that argument, the SEP holder may not charge a higher royalty to licensees that compete with the SEP holder in the downstream market. If one applies that interpretation of the FRAND commitment, then competition between the SEP holder and the infringer in the market for a standard-compliant good should *not* have a significant effect on the patent holder's minimum willingness to accept in a hypothetical negotiation for an ongoing royalty. Put differently, a change in the commercial relationship between the SEP holder and the infringer will generally not affect the SEP holder's minimum willingness to accept.

Nonetheless, changes in the commercial relationship between the SEP holder and the infringer might affect the infringer's net royalty payment and thereby affect the determination of the ongoing royalty. For example, consider a scenario in which after first infringement the SEP holder exited the downstream market and focused exclusively upon developing and monetizing new technologies essential to an industry standard. Before exiting the manufacturing business, the SEP holder most likely entered into cross licenses with other companies in which each party agreed to license its SEP portfolio to the other. The party with the weaker SEP portfolio pays a net royalty, which equals the one-way royalty for the stronger portfolio mi-

[138] 670 F.3d 1171, 1192 (Fed. Cir. 2012), *vacated on other grounds*, 476 F. App'x 747 (Fed. Cir. 2012).
[139] *Id.*
[140] Order Setting Post-Trial Ongoing Royalties at 3, Warsaw Orthopedic, Inc. v. Nuvasive, Inc., No. 08-cv-1512 (S.D. Cal. June 10, 2013), ECF No. 592.
[141] *Id.* at 7.

nus the one-way royalty for the weaker portfolio.[142] For example, if a reasonable one-way royalty for the patent holder's SEP portfolio is $100 and a reasonable one-way royalty for the infringer's SEP portfolio is $80, then the infringer will pay a net reasonable royalty consisting of a balancing payment of $20. However, after the SEP holder exits the downstream market, it no longer needs a license to the infringer's SEPs. Thus, an ongoing royalty would be for a one-way license to the patent holder's SEP portfolio rather than a cross license. However, it is worth emphasizing that such an adjustment to the ongoing royalty is not due to a change in either the bargaining range or in the parties' bargaining position. The one-way royalty (in this example, $100) might have remained unchanged. The difference is that the SEP holder no longer needs to pay for a cross license, such that the infringer must make a higher net royalty payment to the patent holder.

B. Changes in the Infringer's Maximum Willingness to Pay

Changes in the market that occur after the date of first infringement can affect the infringer's maximum willingness to pay in the hypothetical negotiation for an ongoing royalty. Whether the infringer's maximum willingness to pay at the time of final judgment exceeds, falls short of, or equals the infringer's maximum willingness to pay at the time of first infringement depends on changes in two elements: (1) the availability of non-infringing alternatives, and (2) the established profitability and success of the patented technology.

1. The Availability of Acceptable Non-infringing Alternatives

As I explained in Part IV.A, the infringer's maximum willingness to pay equals the added increment of profit that the licensee could expect to earn by licensing the patent in suit rather than (1) using the next-best non-infringing alternative available at the time of the hypothetical negotiation or (2) designing around the patented technology.[143] Between the date of first infringement and the date of the final judgment, new non-infringing substitutes or low-cost, design-around alternatives for the patented technology might have emerged. It is also possible that previously existing alternatives have become less costly to implement, license, or purchase, which would reduce the incremental value of the patented technology. For example, suppose that at the time of the hypothetical negotiation for the reasonable royalty the infringer expected the patented technology to generate additional incremental profit of $100, and there were no alternatives to the patented technology. The infringer's maximum willingness to pay in the hypothetical negotiation for the reasonable roy-

[142] For an analysis of the difference between one-way licenses and cross licenses, see J. Gregory Sidak, *Converting Royalty Payment Structures for Patent Licenses*, 1 CRITERION J. ON INNOVATION 901 (2016); J. Gregory Sidak, *How Licensing a Portfolio of Standard-Essential Patents Is Like Buying a Car*, WIPO MAG., June 2015, at 10.

[143] *See, e.g.*, Riles v. Shell Expl. & Prod. Co., 298 F.3d 1302, 1312 (Fed. Cir. 2002) ("The economic relationship between the patented method and non-infringing alternative methods, of necessity, would limit the hypothetical negotiation."); Sidak, *supra* note 97, at 935.

alty would be $100—that is, the entire incremental value of the patented technology. Suppose further, that several years later at the time of the hypothetical negotiation for an ongoing royalty, an alternative technology has emerged. That alternative technology would generate $50 in gross profit for the infringer, and the infringer would need to pay a $20 royalty to acquire that technology, such that the alternative would generate a net profit of $30. Consequently, one could argue that because of the availability of new non-infringing alternatives the infringer's maximum willingness to pay in the hypothetical negotiation for an ongoing royalty would be $70 (that is, $100 – $30). This argument implies that the emergence of alternatives to the patented technology between the time of first infringement and the time of final judgment could decrease the infringer's maximum willingness to pay in the hypothetical negotiation for an ongoing royalty.

However, the argument that the development of new non-infringing alternatives would decrease the infringer's maximum willingness to pay disregards the very nature of the remedy of an ongoing royalty. A court typically issues an ongoing royalty in lieu of an injunction.[144] When deciding whether to issue a permanent injunction, a court considers the four traditional principles of equity that the Supreme Court enumerated in *eBay v. MercExchange, L.L.C.* Two of those four *eBay* factors are whether an injunction is warranted, "considering the balance of hardships between the plaintiff and defendant,"[145] and whether "the public interest would . . . be disserved by a permanent injunction."[146] If there are readily available non-infringing alternatives to the patented technology, or designing around the patented technology is fairly easy, it is unlikely that the issuance of an injunction would cause the infringer disproportionate hardship or that an injunction would disserve the public interest. In those circumstances, it is more likely that the court will grant an injunction, in which case there would be no need to award an ongoing royalty.[147] For example, in *Douglas Dynamics, LLC v. Buyers Prods. Co.*, the Federal Circuit emphasized when the infringer "ha[s] a non-infringing alternative which it could easily deliver to the market, then the balance of hardships would suggest that [it] should halt infringement and pursue a lawful course of market conduct."[148] Conversely, the court's decision to reject the request for an injunction—and the court's determination that awarding an ongoing royalty is more appropriate—often implies that there are no available and acceptable non-infringing substitutes to the patented technolo-

[144] *See* Paice LLC v. Toyota Motor Corp., 504 F.3d 1293, 1314 (Fed. Cir. 2007).

[145] eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 391 (2006).

[146] *Id.*

[147] *See, e.g.*, Ericsson Inc. v. D-Link Sys., Inc., No. 6:10-CV-473, 2013 WL 4046225, at *1 (E.D. Tex. Aug. 6, 2013), *aff'd in part, vacated in part, rev'd in part*, 773 F.3d 1201 (Fed. Cir. 2014); Apple, Inc. v. Motorola, Inc., 869 F. Supp. 2d 901, 918 (N.D. Ill. 2012) (citing Bard Peripheral Vascular, Inc. v. W.L. Gore & Assocs., Inc., 670 F.3d 1171, 1192 (Fed. Cir. 2012), *vacated in part on other grounds*, 476 F. App'x 747 (Fed. Cir. 2012)), *aff'd in part, rev'd in part and remanded*, 757 F.3d 1286 (Fed. Cir. 2014); Hynix Semiconductor Inc. v. Rambus Inc., 609 F. Supp. 2d 951, 986 (N.D. Cal. 2009) (citing *Paice*, 504 F.3d at 1314–15).

[148] Douglas Dynamics, LLC v. Buyers Prods Co., 717 F.3d 1336, 1345 (Fed. Cir. 2013); *see also* Apple Inc. v. Samsung Elecs. Co., 801 F.3d 1352, 1364 (Fed. Cir. 2015).

gy, and that designing around the patented technology is not a viable option for the infringer.[149]

Furthermore, the infringer's decision to continue using the patented technology after the court has resolved all questions of infringement and validity on the date of final judgment attests to the infringer's preference for using that technology over non-infringing alternatives. The theory of revealed preference explains that by observing a consumer's choices among a variety of differently priced baskets of goods one can determine that consumer's ordinal preferences for the goods included in the different baskets.[150] An infringer reveals its preference through its post-judgment decision either (1) to continue to use the patented technology and pay an ongoing royalty or (2) to stop using the patented technology, switch to a non-infringing substitute, or design around the patent and thereby avoid paying an ongoing royalty. If the infringer decides to continue using the patented technology even after the finder of fact has determined the patent in suit to be valid and infringed, then the infringer has revealed its preference for using the patented technology over using alternatives.

In sum, the emergence of non-infringing alternatives after the time of first infringement could theoretically decrease the infringer's maximum willingness to pay. However, the court's decision to reject an injunction and the infringer's decision to continue using the patented technology will typically support the conclusion that there are no acceptable and readily available non-infringing alternatives to that patented technology. Consequently, it is unlikely that an analysis of the non-infringing alternatives available at the time of the hypothetical negotiation for an ongoing royalty will support decreasing the infringer's maximum willingness to pay.

2. The Established Profitability and Success of the Patented Technology

In specific circumstances, the infringer's maximum willingness to pay in the hypothetical negotiation for an ongoing royalty will exceed its maximum willingness to pay in the earlier hypothetical negotiation for the reasonable royalty. As I explained in Part IV.A, the infringer's maximum willingness to pay depends on the expected incremental benefit that the infringer will derive from using the patented technology instead of the next-best non-infringing alternative. One factor relevant to that analysis is the market success of the patented technology, which courts typically consider under factor 8 of the *Georgia-Pacific* framework.[151]

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149 For a detailed analysis of the importance of available and acceptable non-infringing alternatives to the hypothetical negotiation, see Sidak, *supra* note 14, at 15–17; Sidak, *supra* note 97, at 935.

150 PINDYCK & RUBINFELD, *supra* note 98, at 89.

151 Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified sub nom.* Georgia-Pacific Corp. v. U.S. Plywood-Champion Papers, Inc., 446 F.2d 295 (2d Cir. 1971).

A potential licensee will be willing to pay a higher royalty for a patented technology that it expects will generate a higher profit. Therefore, if the patented technology has gained commercial success and is expected to generate a profit for the infringer that exceeds the profit that it expected at the time of first infringement, then the infringer's maximum willingness to pay in the hypothetical negotiation for an ongoing royalty will exceed its maximum willingness to pay in the hypothetical negotiation for the reasonable royalty.

For example, the infringer's maximum willingness to pay will increase if information that has become available since the moment of first infringement decreases the infringer's uncertainty about the success of the patented technology. Suppose that, on the eve of first infringement, the infringer expected to generate $200 in additional incremental profit from each product that practiced the patented technology if it implemented that technology successfully. Suppose also that the infringer thought that there was a 75-percent likelihood that the technology would achieve the predicted success, and that if the technology did not achieve success, it would generate no incremental profit for the infringer. Thus, at the time of the hypothetical negotiation for the reasonable royalty, the infringer's expected incremental profit generated by each product that practices the patented technology was $150 (that is, $200 × 75%). Assume further that between the time of first infringement and the time of the final judgment, the infringer successfully implemented the patented technology.

At the time of the hypothetical negotiation for an ongoing royalty, that past success increases the infringer's expected probability of future success—for example, to 90 percent. Consequently, at the time of the hypothetical negotiation for an ongoing royalty, the infringer's expected incremental profit from each product that practices the patented technology is $180 (that is, $200 × 90%). Because the infringer's expected incremental profit from the patented technology increased after the time of first infringement, its maximum willingness to pay in the hypothetical negotiation for an ongoing royalty will exceed its maximum willingness to pay in the hypothetical negotiation for the reasonable royalty.

Courts have implicitly recognized the economic principle that the increased success of the patented technology will increase the infringer's maximum willingness to pay for that technology. For example, in *Mondis Technology Ltd. v. Chimei InnoLux Corp.*, Judge John Ward of the Eastern District of Texas found that the patent holder, Mondis, properly argued for an ongoing royalty that exceeded the jury-determined reasonable royalty for past infringement by demonstrating that its patented technology "prove[d] to be more of a commercial success" since the date of first infringement.[152] Judge Ward observed that, "[i]n 2005 [the date of first infringement], Mondis had not yet had near the success in licensing that it now has in 2011," the time of final judgment.[153] After the date of first infringement, "Mondis [had] entered into over fifteen licenses in the industry."[154] That increased licensing success since the time of Chimei InnoLux's first infringement decreased the uncertainty that Chimei InnoLux could successfully monetize the patented technology. Consequently, Chimei InnoLux's expected incremental profit from using the patented technology increased, such that its maximum willingness to pay for that technology at the time of the hypothetical negotiation for an ongoing royalty would have exceeded its maximum willingness to pay at the time of the hypothetical negotiation for a reasonable royalty.

Conversely, a decrease in the patented technology's success could reveal that the patented technology is *not* as commercially viable as the parties predicted at the time of first infringement. In that case, the infringer's maximum willingness to pay at the time of the hypothetical negotiation for an ongoing royalty would fall short of its maximum willingness to pay at the time of the hypothetical negotiation for the reasonable royalty. For example, suppose that at the time of first infringement the infringer expected the patented technology to generate an incremental profit of $200 from each product that practiced the patented technology if implemented successfully, and the infringer estimated a 75-percent chance of successfully implementing the technology. Thus, at the time of the hypothetical negotiation for the reasonable royalty the infringer's expected incremental profit from each product that practiced the patented technology was $150 (that is, $200 × 75%). Suppose further that between the time of first infringement and the time of final judgment, the infringer failed to implement the patented technology successfully and did not generate any profit from it. That failure decreased the infringer's certainty that it could successfully generate profit from the patented technology (say, to 25 percent). Thus, at the time of the hypothetical negotiation for an ongoing royalty the infringer's expected incremental profit from each product that practiced the patented technology had fallen to $50 (that is, $200 × 25%), and consequently its maximum willingness to pay for the patented technology also decreased.

[152] 822 F. Supp. 2d 639, 648 (E.D. Tex. 2011), *aff'd sub nom.* Mondis Tech. Ltd. v. InnoLux Corp., 530 F. App'x 959 (Fed. Cir. 2013).
[153] *Id.*
[154] *Id.*

A dose of common sense is appropriate. Products that are commercial failures are unlikely to attract patent-infringement litigation. Consequently, most litigation concerns products that have been commercial successes. Thus, an analysis of events that might change expectations of the commercial success of the patented technology (embodied in a likely successful product) between the time of first infringement and the time of final judgment will likely indicate that the infringer's maximum willingness to pay in the hypothetical negotiation for an ongoing royalty exceeds its maximum willingness to pay in the hypothetical negotiation for the reasonable royalty.[155]

C. How Does a Change in the Bargaining Range Affect the Determination of an Ongoing Royalty?

Changes in the bargaining range will necessarily affect the determination of the ongoing royalty. If the post-infringement information supports the conclusion that the patent holder's minimum willingness to accept has increased, then the ongoing royalty will also increase, even if the infringer's maximum willingness to pay and the parties' relative bargaining power remains unchanged. Suppose that, in a hypothetical negotiation for a reasonable royalty for past infringement the finder of fact determines that the patent holder's minimum willingness to accept was $10, the infringer's maximum willingness to pay was $50, and that the patent holder had 25 percent of the bargaining power and the infringer had 75 percent of the bargaining power. Thus, the bargaining range for a reasonable royalty is from $20 to $50. The finder of fact would have determined a reasonable royalty of $20—that is, the patent holder's minimum willingness to accept plus a division of the surplus proportionate to the parties' respective bargaining positions.[156] Suppose further that the finder of fact determines that the patent holder's minimum willingness to accept for an ongoing royalty exceeds by $15 its minimum willingness to accept for a reasonable royalty. Suppose also that the parties' bargaining positions have not changed since the time of the hypothetical negotiation for a reasonable royalty. Consequently, the bargaining range for an ongoing royalty is between $25 and $50, and the finder of fact would have determined an ongoing royalty of $31.25.[157] Figure 3 demonstrates the effect that a change in the patent holder's minimum willingness to accept (taken in isolation) will have on the point value of the ongoing royalty.

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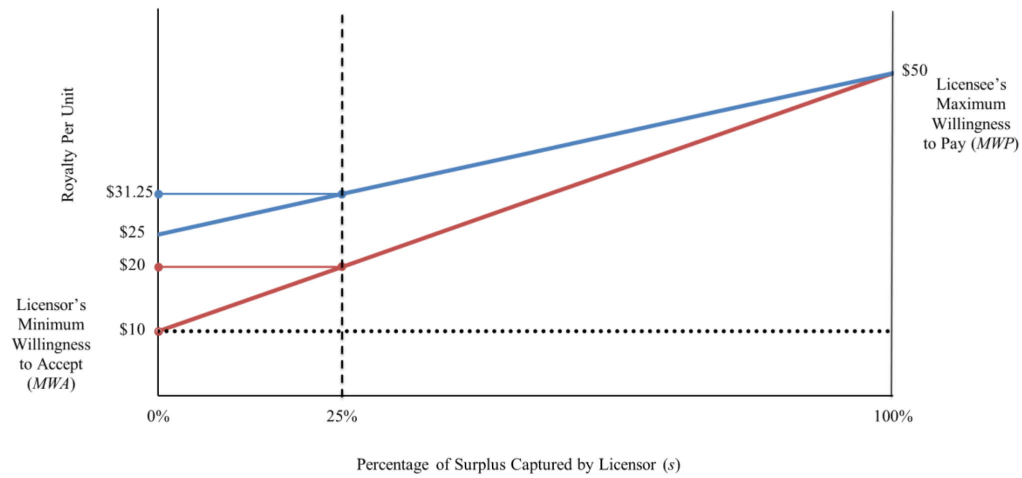
[155] *See, e.g.*, Jean O. Lanjouw & Mark Schankerman, *Characteristics of Patent Litigation: A Window on Competition*, 32 RAND J. ECON. 129 (2001); Shawn P. Miller, *What's the Connection Between Repeat Litigation and Patent Quality? A (Partial) Defense of the Most Litigated Patents*, 16 STAN. TECH. L. REV. 313 (2013).

[156] That is, $10 + [25% × ($50 – $10)] = $20.

[157] That is, $25 + [25% × ($50 – $25)] = $31.25.

Figure 3: Change in the Patent Holder's Minimum Willingness to Accept



Thus, if the patent holder's minimum willingness to accept for an ongoing royalty exceeds its minimum willingness to accept for a reasonable royalty for past infringement, then the ongoing royalty should exceed the reasonable royalty awarded for past infringement.

VI. The Effect of New Information on the Point Royalty

After the court has identified the bargaining range for the hypothetical negotiation for an ongoing royalty, it needs to determine how the parties would divide the surplus by evaluating the parties' respective bargaining positions. Again, the parties' relative bargaining power will be fact specific and vary from case to case. Nonetheless, variables such as the standard of review applied when reviewing a district court's finding of validity and infringement and the infringer's increased risk of facing enhanced damages will typically decrease the infringer's bargaining power after the court has found the patents in suit to be valid and infringed. If the infringer's bargaining power has decreased, the court should award an ongoing royalty that is closer to the upper boundary of the bargaining range than was the reasonable royalty awarded for past infringement.

A. The Parties' Bargaining Power After the Finding of Validity and Infringement

A patent holder negotiating an ongoing royalty for the prospective use of its patent will typically have greater bargaining power after the court has found its patent to be valid and infringed. In 2008, in *Amado v. Microsoft Corp.*, the Federal Circuit said that, "[p]rior to judgment, liability for infringement, as well as the validity of the patent, is uncertain."[158] A court's finding that a patent is valid and infringed strengthens the patent holder's bargaining position in the hypothetical negotiation for an ongoing royalty and therefore supports the award of an ongoing royalty that exceeds the reasonable royalty for past infringement.[159] That is, surviving the test of litigation strengthens the patent holder's bargaining power by affirming the validity of the patent in suit. The Federal Circuit confirmed that approach in its 2012 decision in *ActiveVideo Networks Inc. v. Verizon Communications Inc.*, affirming the district court's award of an ongoing royalty that exceeded the royalty awarded for past infringement.[160] The court said that, "while it is likely true that Verizon would not have agreed to that amount prior to litigation, Verizon has been adjudicated to infringe and the patent has been held not invalid after a substantial challenge by Verizon."[161] The Federal Circuit agreed with the district court that "there ha[d] been a substantial shift in the bargaining position of the parties" (in favor of the patent holder) and concluded that it was appropriate to award an ongoing royalty that exceeded the reasonable royalty awarded for past infringement.[162]

Mark Lemley believes that the Federal Circuit is wrong. He emphasizes that a jury awards reasonable royalty damages on the basis of the assumption that a patent in suit is valid and infringed.[163] Some district courts have similarly rejected the proposition that the confirmation of a patent's validity and infringement at trial supports an upward adjustment of the ongoing royalty.[164] For example, in *University of Pittsburgh v. Varian Medical Systems*, Judge Arthur Schwab of the District Court for the Western District of Pennsylvania said that because "[t]he jury was instructed to assume, for purposes of the damages portion of the trial, that the . . . patent [in suit] was valid," when the jury confirmed that the relevant claims were, "in fact, valid, there [was] no change in the circumstances from the jury's award of a reason-

158 517 F.3d 1353, 1362 (Fed. Cir. 2008).
159 *See id.*
160 694 F.3d 1312, 1342 (Fed. Cir. 2012).
161 *Id.*
162 *Id.*; *see also* Bard Peripheral Vascular, Inc. v. W.L. Gore & Assocs., Inc., 670 F.3d 1171, 1193 (Fed. Cir. 2012), *vacated in part on other grounds*, 476 F. App'x 747 (Fed. Cir. 2012).
163 Lemley, *supra* note 9, at 704−05.
164 *See, e.g.*, TransPerfect Glob., Inc. v. MotionPoint Corp., No. C 10-2590 CW, 2014 WL 6068384, at *5 (N.D. Cal. Nov. 13, 2014) (stating that a judgment affirming the patent's infringement and validity is not a reason for an ongoing royalty to exceed the jury-awarded reasonable royalty because "[the jury] was to assume that the patent holder and the infringer . . . believed the patent was valid and infringed"); Affinity Labs of Texas LLC v. BMW N. Am. LLC, 783 F. Supp. 2d 891, 898 (E.D. Tex. 2011) ("The jury's findings of infringement and no invalidity merely confirm the experts' assumptions of those facts."); Mondis Tech. Ltd. v. Chimei InnoLux Corp., 822 F. Supp. 2d 639, 648 (E.D. Tex. 2011) ("[T]he jury . . . assumed . . . validity and infringement . . . . Therefore, InnoLux's status as an adjudicated infringer (aside from potentially willfulness) has not changed the parties' bargaining position with respect to the 2005 hypothetical negotiation as compared to the post-judgment negotiation."), *aff'd sub nom*. Mondis Tech. Ltd. v. InnoLux Corp., 530 F. App'x 959 (Fed. Cir. 2013).

able royalty."[165] Judge Schwab concluded that "all that has occurred since the damages portion of the trial is that the jury and/or the Court confirmed what the jury was to assume for that portion of the trial."[166] He therefore found no valid justification to increase the royalty for the infringer's ongoing use of the patented technology.

A closer examination shows that, from an economic perspective, Lemley's and Judge Schwab's reasoning is not persuasive. Although it is true that the finder of fact and the damages expert assume for purposes of calculating reasonable royalties for past infringement that the patent in suit is valid and infringed, the patent holder still bears the burden of proving infringement at trial. If the patent holder fails to prove that the accused product infringes the patent in suit, the patent holder will not receive any compensation from the defendant. Put differently, although the finder of fact assumes patent validity and infringement for the purpose of calculating the damages award, the court obviously does not assume infringement when determining whether the patent holder is actually entitled to a damages award.[167] Until the patent holder shows that the defendant has indeed infringed a valid patent in suit, the prospect of obtaining a damages award (calculated on the assumption of validity and infringement) is merely probabilistic. The uncertainty regarding the patent's validity and infringement limits the patent holder's bargaining power in the negotiation with a potential licensee. However, the court's eventual finding of validity and infringement reduces that uncertainty and consequently increases the patent holder's bargaining power when negotiating a royalty for the future use of the patented technology. Although the infringer might appeal the decision, the Federal Circuit will review the district court's findings and conclusions under the appropriate standard of review.[168] Unless the Federal Circuit grants *de novo* review, it will be up to the infringer to show that the district court's finding of infringement was clearly erroneous. In that respect, the patent holder's bargaining power unambiguously increases after the jury verdict on validity and infringement.[169] Lemley and Judge Schwab may identify that the bounds of the bargaining range do not change, all else equal, based on the assumption of validity and infringement. However, that argument does not explain how the bargaining power of the parties could change.

[165] Univ. of Pittsburgh of Commonwealth Sys. of Higher Educ. v. Varian Med. Sys., Inc., No. 08CV1307, 2012 WL 1436569, at *11 (W.D. Pa. Apr. 25, 2012), *aff'd in part, rev'd on other grounds, and vacated on other grounds*, 561 F. App'x 934 (Fed. Cir. 2014).

[166] *Id.*

[167] *See, e.g.*, Medtronic, Inc. v. Mirowski Family Ventures, LLC, 134 S. Ct. 843, 849 (2014) ("It is well established that the burden of proving infringement generally rests upon the patentee.").

[168] *See, e.g.*, Hadco Prods., Inc. v. Walter Kidde & Co., 462 F.2d 1265, 1268 (3d Cir. 1972) (citing FED. R. CIV. P. 52(a) (2009)).

[169] *See, e.g.*, Boston Sci. Corp. v. Cordis Corp., 838 F. Supp. 2d 259, 276 (D. Del. 2012) ("With respect to the parties' change in bargaining positions, the Federal Circuit has finally adjudicated the issues of infringement and validity, and the PTO has allowed claim 36 on reexamination; Cordis has no other irons in the fire."), *aff'd*, 497 F. App'x 69 (Fed. Cir. 2013).

Lemley and Judge Schwab also fail to acknowledge that the framework for calculating a reasonable royalty and the framework for calculating an ongoing royalty are not identical. In *Paice*, the District Court for the Eastern District of Texas acknowledged that "[a] post-judgment, ongoing royalty negotiation . . . is logically different from the pre-trial hypothetical negotiation discussed in *Georgia-Pacific*."[170] In *Amado v. Microsoft Corp.*, the District Court for the Central District of California similarly noted that if the court applies an unmodified *Georgia-Pacific* analysis, "it runs the risk of skewing the analysis towards a pre-judgment framework."[171] Ignoring the finding of validity and infringement would detach the hypothetical negotiation from the real-world negotiation for an ongoing royalty.

My empirical analysis of cases decided by U.S. district courts between 2007 and 2015 shows that most district courts have followed the Federal Circuit's reasoning and have accepted the proposition that a finding infringement of validity and increases the patent holder's bargaining power post-judgment.[172] However, even if one rejects the argument that the finding of validity and infringement increases a patent holder's bargaining power, the court could still award an ongoing royalty that exceeds a reasonable royalty. As I explained in Parts IV.A and IV.B, increases in the patent holder's minimum willingness to accept or the infringer's maximum willingness to pay can result in an increased ongoing royalty, even if the parties' bargaining power has not changed since the date of the first infringement.

B. The Risk of an Enhanced Ongoing Royalty

Section 284 of the Patent Act provides that a court may enhance damages for patent infringement up to three times the original damages award.[173] Courts have

170 Paice LLC v. Toyota Motor Corp., 609 F. Supp. 2d 620, 624 (E.D. Tex. 2009).

171 Amado v. Microsoft Corp., No. SA CV 03-242 DOC ANx, 2008 WL 8641264, at *11 (C.D. Cal. Dec. 4, 2008).

172 *See, e.g.*, Server Tech., Inc. v. Am. Power Conversion Corp., No. 3:06-CV-00698-LRH-VPC, 2015 WL 1505654, at *5 (D. Nev. Mar. 31, 2015); Douglas Dynamics, LLC v. Buyers Prod. Co., 76 F. Supp. 3d 806, 821 (W.D. Wis. 2014); Apple, Inc. v. Samsung Elecs. Co, No. 12-CV-00630-LHK, 2014 WL 6687122, at *15 (N.D. Cal. Nov. 25, 2014); Telcordia Techs., Inc. v. Cisco Sys., Inc., No. CV 04-876-GMS, 2014 WL 1457797, at *4 (D. Del. Apr. 14, 2014); I/P Engine, Inc. v. AOL Inc., No. 2:11CV512, 2014 WL 309245, at *3 (E.D. Va. Jan. 28, 2014); Morpho Detection, Inc. v. Smiths Detection Inc., No. 2:11CV498, 2013 WL 5701522, at *9 (E.D. Va. Oct. 17, 2013); Syntrix Biosystems, Inc. v. Illumina, Inc., No. C10-5870 BHS, 2013 WL 3089448, at *2 (W.D. Wash. June 18, 2013); Mondis Tech. Ltd. v. Chimei InnoLux Corp., 822 F. Supp. 2d 639, 649 (E.D. Tex. 2011), *aff'd sub nom.* Mondis Tech. Ltd. v. InnoLux Corp., 530 F. App'x 959 (Fed. Cir. 2013); DataTreasury Corp. v. Wells Fargo & Co., No. 2:06-CV-72 DF, 2011 WL 8810604, at *14, *19 (E.D. Tex. Aug. 2, 2011); Redacted Order at 11–12, Bard Peripheral Vascular, Inc. v. W.L. Gore, No. CV-03-597 (D. Ariz. Sept. 8, 2010), EFC No. 1059; Soverain Software LLC v. Newegg Inc., 836 F. Supp. 2d 462, 483 (E.D. Tex. 2010), *rev'd in part, vacated in part*, 705 F.3d 133 (Fed. Cir. 2013); Creative Internet Advert. Corp. v. Yahoo! Inc., 674 F. Supp. 2d 847, 861 (E.D. Tex. 2009); *Paice*, 609 F. Supp. 2d at 630; *Boston Sci. Corp.*, 2009 WL 975424, at *5.

173 35 U.S.C. § 284 (2015).

typically enhanced patent damages in cases of egregious infringement.[174] When determining an ongoing royalty for the infringer's prospective use of the patents in suit, several courts have said that, "[f]ollowing a jury verdict and entry of judgment of infringement and no invalidity, a defendant's continued infringement will be willful absent very unusual circumstances."[175] Therefore, an infringer that continues to use the patented technology without a license agreement after the court has found that the patent in suit is valid and infringed faces the significant risk that the court will enhance the royalty for the ongoing use of the patented technology because of willful infringement.[176] Judge David Folsom of the Eastern District of Texas said in *Paice* that the infringer's increased risk of facing enhanced damages "significantly change[s] the ongoing royalty negotiation calculus."[177] However, no court has provided a detailed explanation of how that risk affects the proper determination of an ongoing royalty. Does it affect the licensee's maximum willingness to pay, the patent holder's minimum willingness to accept, the parties' relative bargaining position, or some combination of these three elements? Two scenarios are plausible.

First, one could argue that the risk that the court will enhance the ongoing royalty for the infringer's prospective use of patented technology affects the infringer's maximum willingness to pay. After the court declines to issue an injunction, it typically allows the parties to negotiate a royalty for the ongoing use of the patented technology. If the parties fail to reach a voluntary agreement, the court will determine the ongoing royalty that the infringer must pay for its future use of the patented technology. In that respect, the court-awarded ongoing royalty is the parties' alternative to a voluntarily negotiated ongoing royalty.

The risk that the court will enhance an ongoing royalty decreases the infringer's expected payoff from the alternative to a voluntary agreement. Suppose that both the patent holder and the infringer expect the court-awarded ongoing royalty to be \$20 per unit. Assume that the infringer makes a gross profit of \$100 per unit; thus, paying a \$20 per-unit royalty will generate for the infringer a net profit of \$80 per unit. Suppose that the infringer expects that there is a 40 percent probability that the court will enhance the ongoing royalty for willful infringement, and that if it does so, the court will enhance the ongoing royalty by 50 percent—that is, the court will

174 *See, e.g.*, Halo Elecs., Inc. v. Pulse Elecs., Inc., 136 S. Ct. 1923, 1932 (2016); *see also In re* Seagate Tech., LLC, 497 F.3d 1360, 1368 (Fed. Cir. 2007) ("Absent a statutory guide, we have held that an award of enhanced damages requires a showing of willful infringement.") (citations omitted); Beatrice Foods Co. v. New England Printing & Lithographing Co., 923 F.2d 1576, 1579 (Fed. Cir. 1991) ("[E]nhanced damages may be awarded only as a penalty for an infringer's increased culpability, namely willful infringement or bad faith."); i4i Ltd. v. Microsoft Corp., 598 F.3d 831, 858–59 (Fed. Cir. 2010), *aff'd*, 131 S. Ct. 2238 (2011).

175 Affinity Labs of Tex., LLC v. BMW N. Am., LLC, 783 F. Supp. 2d 891, 899 (E.D. Tex. 2011); *see also I/P Engine*, 2014 WL 309245, at *4 (quoting *Affinity*, 783 F. Supp. 2d at 899.).

176 As I explained in Part III.B in at least eight cases in my sample, the court enhanced the awarded ongoing royalty due to willful infringement.

177 *Paice*, 609 F. Supp. 2d at 626–27.

multiply the ongoing royalty by 1.5.[178] Equation 1 calculates the ongoing royalty that the infringer expects to pay if it fails to reach a voluntary agreement for a post-judgment license with the patent holder.

Expected Enhanced Ongoing Royalty = (Expected Ongoing Royalty × Probability of Enhancement × Factor of Enhancement) + [Ongoing Royalty × (1 – Probability of Enhancement)]

= ($20 × 0.4 × 1.5) + [$20 × (1 – 0.4)]

= $24 (Equation 1)

Because of the possibility of enhancement for willful infringement, the expected enhanced ongoing royalty that the court will award if the parties fail to reach a voluntary agreement is $24. Therefore, the infringer's expected profit in case it fails to reach an agreement with the patent holder falls to $76 (that is, $100 – $24), as opposed to its expected profit of $80 if there is no prospect that the court will enhance the ongoing royalty because of willful infringement. The infringer's expected profit from not reaching a voluntary agreement with the patent holder thus decreases if there is any risk that the court will enhance the ongoing royalty.

As I explained in Part IV.A, the infringer's expected profit from the next-best (non-infringing) alternative to a voluntary agreement with the patent holder determines the infringer's maximum willingness to pay. By decreasing the expected payoff from using the next-best alternative, the risk that the court will enhance the ongoing royalty because of willful infringement increases the infringer's maximum willingness to pay in the negotiation for an ongoing royalty. That is, the infringer would voluntarily agree to pay a higher royalty to avoid the possibility of paying an enhanced court-determined ongoing royalty. Hence, any risk that the court will enhance the ongoing royalty because of willful infringement increases the upper bound of the bargaining range.

The second plausible scenario is that the risk of facing enhanced damages decreases the infringer's bargaining power relative to its bargaining power in the hypothetical negotiation for a reasonable royalty. One can understand the infringer's bargaining power as its ability to walk away from the negotiation.[179] After the court has found that the asserted patent is valid and infringed, the infringer no longer has the luxury of time in negotiating a royalty. The failure to reach a prompt agreement with the patent holder could result in an enhanced royalty due to willful infringement. The need to obtain a license promptly decreases the infringer's bargaining

[178] The purpose of this example is not to suggest how a court should calculate the enhancement multiple for willful infringement. I take the law on that subject as given and assume a multiple of 1.5 for simplicity of illustration.

[179] *See, e.g.*, Sidak, *supra* note 14, at 21.

power and thereby supports awarding an ongoing royalty closer to the upper bound of the bargaining range than was the jury-determined reasonable royalty. According to this second plausible interpretation, the risk of facing enhanced damages does not necessarily affect the infringer's maximum willingness to pay; instead, it decreases the infringer's bargaining power in the hypothetical negotiation for an ongoing royalty.

An analysis of reported decisions shows that most courts have so far ignored the effect that the risk of facing enhanced damage has on the bargaining range and on the parties' respective bargaining power. That is, the courts have typically first considered whether the facts unrelated to willful infringement support the award of an ongoing royalty that exceeds the reasonable royalty, and then they have determined whether the specific facts of the case support an enhancement of that ongoing royalty for willful infringement.[180] In three cases, the court did not consider the issue of enhancement due to willful infringement separately but instead listed "willful infringement" as one of the several reasons that supported the imposition of an ongoing royalty that exceeded the reasonable royalty.[181] It is thus evident that the decision to award an ongoing royalty that exceeds the reasonable royalty for past infringement is not necessarily related to a court's rare decision to award enhanced damages for willful infringement.

C. How Does a Change in the Parties' Bargaining Power Affect the Determination of an Ongoing Royalty?

A change in the parties' relative bargaining power since the time of first infringement will support a change in the ongoing royalty even if the patent holder's minimum willingness to accept and the infringer's maximum willingness to pay have not changed in the interim. If the court finds that the infringer's bargaining power has increased after the date of the first infringement, it should award an ongoing royalty that is closer to the lower boundary of the bargaining range than was the reasonable royalty awarded for past infringement. Conversely, if the court finds that the patent holder's bargaining power has increased, it should award an ongoing royalty that is closer to the upper boundary of the bargaining range than was the reasonable royalty awarded for past infringement. As I have explained, however, the infringer's bargaining power is unlikely to increase after the court has found the patents in suit to be valid and infringed. Therefore, changes in the parties' bargain-

[180] *See, e.g.*, *I/P Engine*, 2014 WL 309245, at *4; Internet Machs. LLC v. Alienware Corp., No. 6:10-CV-23, 2013 WL 4056282, at *18 (E.D. Tex. June 19, 2013), *aff'd sub nom.* Internet Machs. LLC v. Cyclone Microsystems, Inc., 575 F. App'x 895 (Fed. Cir. 2014); *Affinity*, 783 F. Supp. 2d at 901–04.

[181] Telcordia Techs., Inc. v. Cisco Sys., Inc., No. CV 04-876-GMS, 2014 WL 1457797, at *5 (D. Del. Apr. 14, 2014); Soverain Software LLC v. Newegg Inc., 836 F. Supp. 2d 462, 482 (E.D. Tex. 2010), *rev'd in part, vacated in part*, 705 F. 3d 1333 (Fed. Cir. 2013); Joyal Prods., Inc. v. Johnson Elec. N. Am., Inc., CV. No. 04-5172 (JAP), 2009 WL 512156, at *9 (D.N.J. Feb. 27, 2009), *aff'd*, 335 F. App'x 48 (Fed. Cir. 2009).

ing position will typically support the court's award of an ongoing royalty that equals or exceeds the reasonable royalty awarded for past infringement.

VII. Conclusion

When determining an ongoing royalty for the prospective use of a patented technology, a court can apply a methodology similar to that used to calculate a reasonable royalty. In determining whether an ongoing royalty should differ from the royalty awarded for past infringement, the court needs to determine first how changes in the economic circumstances between the time of first infringement and the time of the final judgment affect the bargaining range. That is, the court needs to identify any changes in the patent holder's minimum willingness to accept and the infringer's maximum wiliness to pay. Although the court's determination of an ongoing royalty will be fact-specific and will vary on the basis of the specific circumstances of each case, my analysis has shown that the patent holder's minimum willingness to accept will typically increase when negotiating an ongoing royalty because of the increased costs of enforcing its patents through litigation. The infringer's maximum willingness to pay will typically remain unchanged: it will increase only if information that became available after the date of the first infringement demonstrates increased commercial success of the patented technology. Both of those changes would support the court's upward adjustment of the royalty for the prospective use of the patented technology.

Next, the court needs to examine whether the parties' relative bargaining positions have changed so as to determine a point royalty within the bargaining range. The need to meet the standard of review on appeal to reverse the district court's findings of invalidity or non-infringement and the risk of facing enhanced damages for willful infringement will typically decrease the infringer's bargaining power after the court has found the patent in suit to be valid and infringed. That decrease in the infringer's bargaining power supports the court's award of an ongoing royalty that is closer to the upper boundary of the bargaining range than was the reasonable royalty for past infringement. Therefore, changes in the economic conditions between the time of first infringement and the time of the hypothetical negotiation for an ongoing royalty will typically support the court's award of an ongoing royalty that exceeds the reasonable royalty that the jury awarded for past infringement.

Appendix 1: Cases in Which the Court Granted an Ongoing Royalty, 2007–2015

Case Name	Case Number	Court	Year of Ongoing Royalty
Server Tech., Inc. v. Am. Power Conversion Corp.	3:06-cv-00698	D. Nev.	2015
Douglas Dynamics, LLC v. Buyers Prods. Co.	3:09-cv-00261	W.D. Wis.	2014
Telcordia Techs., Inc. v. Cisco Sys., Inc.	1:04-cv-00876	D. Del.	2014
Carnegie Mellon Univ. v. Marvell Tech. Grp.	2:09-cv-00290	W.D. Pa.	2014
Golden Hour Data Sys., Inc. v. emsCharts., Inc.	2:06-cv-00381	E.D. Tex.	2014
WBIP, LLC v. Kohler Co.	1:11-cv-10374	D. Mass.	2014
DePuy Synthes Products, LLC v. Globus Med., Inc.	1:11-cv-00652	D. Del.	2014
Accessories Marketing, Inc. v. Tek Corp.	5:11-cv-00774	N.D. Cal	2014
VirnetX, Inc. v. Apple, Inc.	6:13-cv-00211	E.D. Tex.	2014
I/P Engine, Inc. v. AOL Inc.	2:11-cv-00512	E.D. Va.	2014
TransPerfect Global, Inc. v. MotionPoint Corp.	4:10-cv-02590	N.D. Cal.	2014
Morpho Detection, Inc. v. Smiths Detection Inc.	2:11-cv-00498	E.D. Va.	2013
Ericsson, Inc. v. D-Link Sys., Inc.	6:10-cv-00473	E.D. Tex.	2013
Tomita Techs. USA, LLC v. Nintendo Co.	1:11-cv-04256	S.D.N.Y.	2013
Internet Machines, LLC v. Alienware Corp.	6:10-cv-00023	E.D. Tex.	2013
Fractus, S.A. v. Samsung Elecs. Co.	6:09-cv-00203	E.D. Tex.	2013
Warsaw Orthopedic, Inc. v. Nuvasive, Inc.*	3:08-cv-01512	S.D. Cal.	2013
Warsaw Orthopedic, Inc. v. Nuvasive, Inc.*	3:08-cv-01512	S.D. Cal.	2013
Mondis Tech. Ltd. v. Chimei InnoLux Corp.	2:11-cv-00378	E.D. Tex.	2012
University of Pittsburgh v. Varian Med. Sys., Inc.	2:08-cv-01307	W.D. Pa.	2012
Boston Sci. Corp. v. Cordis Corp.	1:10-cv-00315	D. Del.	2012
Clear With Comp., LLC v. Hyundai Motor Am., Inc.	6:09-cv-00479	E.D. Tex.	2012
Broadcom Corp. v. Emulex Corp.	8:09-cv-01058	C.D. Cal.	2012
Fresenius USA, Inc. v. Baxter Int'l, Inc.	4:03-cv-01431	N.D. Cal.	2012
DataTreasury Corp. v. Wells Fargo & Co.	2:06-cv-00072	E.D. Tex.	2011
Affinity Labs of Tex., LLC v. BMW N. Am., LLC	9:08-cv-00164	E.D. Tex.	2011
Bard Peripheral Vascular v. WL Gore & Associates	2:03-cv-00597	D. Ariz.	2010
Soverain Software LLC v. CDW Corporation	6:07-cv-00511	E.D. Tex.	2010
Multimedia Patent Trust v. DirecTV, Inc.	3:09-cv-00278	S.D. Cal.	2010
Transamerica Life Ins. Co. v. Lincoln Nat'l Life Ins. Co.	1:06-cv-00110	N.D. Iowa	2010
Creative Internet Advert. Corp. v. Yahoo! Inc.	6:07-cv-00354	E.D. Tex.	2009
Joyal Products, Inc. v. Johnson Elec. N. Am.	3:04-cv-05172	D.N.J.	2009
Amado v. Microsoft Corp.	8:03-cv-00242	C.D. Cal.	2008
Orion IP, LLC v. Mercedes-Benz USA, LLC	6:05-cv-00322	E.D. Tex.	2008
Voda v. Cordis Corp.	5:03-cv-01512	W.D. Okla.	2007

Note: This list is current through April 25, 2016. In *Warsaw Orthopedic v. Nuvasive*, which is marked with an asterisk (*), the court ordered both parties to pay an ongoing royalty.