Patent Semi-Comparables

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Table of Contents

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Abstract. Over the last decade, courts have applied increasingly stringent standards to the evidence used to determine patent damages. While this has reduced the risk of awards untethered to the facts, the current focus on strictly comparable licenses covering technology similar to the patent that resemble one-way, royalty-bearing "hypothetical licenses" specified by law has created its own problems, particularly in the valuation of component patents, many of which are incorporated into a single product. The rejection of what we refer to as "semi-comparables"—licenses that deviate in some significant way from the terms of the hypothetical license—has led to distorted incentives, unpredictability, and the exclusion of many of the *ex ante* transactions that best reflect the incremental value of the invention. We believe that the wholesale exclusion of such licenses is wrong—the problem is not that certain licenses are insufficiently comparable but that courts need better approaches to properly and flexibly interpret evidence of comparables and semi-comparable licenses. Framed in this way, the solution is not to exclude licenses but instead to apply an inclusive but disciplined approach to reasonable royalty determinations that prioritizes objective evidence of a patent's incremental value even in the form of traditionally excluded "semi-comparable" transactions like technology (as opposed to "patent") licenses and sales. Though courts have been reluctant to use semi-comparables because of a lack of objective information about their formation, we begin to address this void, drawing upon the collective wisdom of licensing lawyers we interviewed, the nearly two-decade-long career of one of us as a licensing lawyer, and studies of thousands of actual licenses. When a reasonable, evidence-based estimate or upper bound cannot be derived, we consider the expanded use of tailored injunctions, assuming the other eBay elements are met.

I. Introduction

Consider your smartphone and the many functions it performs. How much is it worth to be able to click on a link in one application and have it open in another application (e.g., clicking on an address in an e-mail, which opens a maps app locating the address), as opposed to an alternative like double-clicking it? How about the ability to unlock the phone by sliding a virtual lever, rather than by tapping or shaking your phone? In April 2014, a jury was asked versions of these questions during the damages phase of a trial involving Apple and Samsung. Apple's experts said these and related features were worth $2.2B. Samsung's experts disagreed and said $5.9M.[1] The jury picked $120M, a number in between,[2] but how can one reasonably be expected to arrive at an accurate damages number when there is a difference of over 300 times or 30,000% between expert opinions?

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1 Order Granting in Part and Denying in Part Motions to Exclude Expert Opinions, Apple Inc. v. Samsung Elecs. Co., Ltd., (No. 12-CV-00630-LHK), 2014 WL 794328, at *3 (N.D. Cal. Feb. 25, 2014).

2 *Id.* at *4; *see also* Apple Inc. v. Samsung Elecs. Co., Ltd., 816 F.3d 788, 815–16 (Fed. Cir. 2016) (about a year later, the Federal Circuit said the real number should be $0).

One of the hardest problems in patent law is how to determine adequate compensation for the infringement of a patent when the infringing product incorporates many other inventions. Section 284 of the Patent Act provides that "[u]pon finding for the claimant [patent holder] the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer."[3] However, the code is silent regarding the "apportionment question" of how much the patented technology contributes to the product in question above and beyond all of the other technology incorporated into the product. For nearly a half-century,[4] courts have been determining reasonable royalties by hypothesizing the results of a presumed negotiation between a patent holder and an infringer over use of a patented invention *ex ante*, just before the point of first infringement.[5] Royalty awards must be based "on the *incremental* value of the invention,"[6] (emphasis added) that is to say, not the value of the swipe to unlock feature, but the marginal value of the feature as evaluated in view of the next best alternative available before infringement. This strikes the appropriate balance, by compensating the inventor at a level commensurate to the patent's actual contribution while not overcompensating the inventor at a level inflated by the infringer's sunk costs of implementation.[7] However, it is a particularly difficult task when the underlying product incorporates many other patented and unpatented inventions.

But what is one of the hardest problems in patent law may also become one of its most common. Software-based innovations, which are incremental and heavily patented,[8] are fueling our economy.[9] The Chevy Volt, for example, includes ten million lines of code, more than the Boeing 787.[10] The Volt code has a variety of

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3 35 U.S.C. § 284 (2012).

4 Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116 (S.D.N.Y. 1970) (nearly 50 years have passed since this decision).

5 *Id.* at 1122; *see* Norman V. Siebrasse & Thomas F. Cotter, *A New Framework for Determining Reasonable Royalties in Patent Litigation*, 68 FLA. L. REV. 929 (2016) (discussing that while the statute does not give guidance on the precise timing of the hypothetical negotiation, the results should take into account certain forms of *ex post* information).

6 Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1235 (Fed. Cir. 2014).

7 *See, e.g.*, Fed. Trade Comm'n, The Evolving IP Marketplace: Aligning Patent Notice and Remedies with COMPETITION 138 (2011) [hereinafter *Evolving Marketplace*] ("For remedies to protect the patent system's incentives to innovate and avoid distorting competition among technologies, they must replicate the reward the patentee would have earned in the market absent infringement.").

8 *See, e.g.*, Colleen V. Chien, *From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System*, 62 HASTINGS L.J. 297, 304 (2010); Bronwyn H. Hall & Rosemarie Ham Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979-1995*, 32 RAND J. ECON. 101, 107 (2001) (explaining that patents are used as part of a defensive strategy "to ensure the freedom to design and manufacture").

9 Lee Branstetter, Matej Drev & Namho Kwon, *Get with the Program: Software-Driven Innovation in Traditional Manufacturing* (Nat'l Bureau of Econ. Research, Working Paper No. 21752, 2015).

10 *Infographic: Chevy Volt has 10 Million Lines of Code; F-22 Raptor Only has 1.7 Million*, INSIDEEVS.COM, http://insideevs.com/infographic-chevy-volt-has-10-million-lines-of-code-f-22-raptor-only-has-1-7-million/ (last visited Oct. 1, 2016).

functions, such as helping drivers park their cars and detecting in a split-second that a driver is in a skid and triggering the anti-lock brakes.[11] Each novel and nonobvious improvement is potentially subject to patenting. In modern products that incorporate incremental innovation, where one advancement builds upon another, infringement is often inadvertent, even inevitable. For example, when a company incorporates a technology into its product in order to comply with a standard, it infringes all of the patents, often numbering in the hundreds or thousands,[12] that read on the standard, whether declared to the governing standards body or not. The share of U.S. "electrical engineering"[13] patents has increased from about 15% in 1975 to nearly 50% in 2014.[14] A broad swath of sectors, not just "technology" sectors, increasingly rely on software.[15] According to Unified Patents, 64% of 2015 patent litigation involved high-tech patents, covering "technologies related to computing or consumer electronics."[16] In such areas, remedies for infringement must be formed in order to compensate for current innovation without stifling future innovation.

To ground reasonable royalty determinations in reality, a line of cases beginning with the Federal Circuit's *Lucent* decision[17] has underscored the importance of relying on truly "comparable licenses" when deriving a reasonable royalty,[18] which is now the primary yardstick of damages.[19] Following those cases, courts have de-prioritized closely-analogous licenses and rules of thumb for determining damages, and instead prioritized licenses that most resemble the "hypothetical license" that the parties would have agreed to before the

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11 BlissfulWriter, *More Software Code in Chevrolet Volt Car than Boeing 787*, HUBPAGES, http://hubpages.com/technology/Software-Code-in-Your-Car (last updated Jan. 24, 2012).

12 Jorge L. Contreras & Richard J. Gilbert, *A Unified Framework for RAND and Other Reasonable Royalties*, 30 BERKELEY TECH. L.J. 1451, 1470 [hereinafter *A Unified Framework*] ("A typical standard in the information and communications technology sector can have hundreds or even thousands of patents that are declared essential to the standard.").

13 Electrical engineering is a class that includes information technology, semiconductors, telecommunications, and related fields. For a complete list of subclasses within "Electrical Engineering," see Ulrich Schmoch, *Concept of a Technology Classification for Country Comparisons: Final Report to the World Intellectual Property Office (WIPO)*, FRAUNHOFER INST. FOR SYS. AND INNOVATION RES. (June 2008), http://www.wipo.int/export/sites/www/ipstats/en/statistics/patents/pdf/wipo_ipc_technology.pdf.

14 Colleen V. Chien, *Opening the Patent System: Diffusionary Levers in Patent Law*, 89 S. CAL. L. REV. 793, 810 (2016).

15 Branstetter et al., *supra* note 9.

16 *2015 Patent Dispute Report*, UNIFIED PATENTS, https://www.unifiedpatents.com/news/2016/5/30/2015-patent-dispute-report, fig.3 (last updated Dec. 31, 2015).

17 Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1329 (Fed. Cir. 2009).

18 *See infra* Section II.

19 Chris Barry, Ronen Arad, Landan Ansell, Meredith Cartier & HyeYun Lee, *2015 Patent Litigation Study: A Change in Patentee Fortunes*, PRICEWATERCOOPERS LLP, 8, fig.8 (May 2015), https://www.pwc.com/us/en/forensic-services/publications/assets/2015-pwc-patent-litigation-study.pdf (reporting that 81% of patent damages awards over the past decade have been based on reasonable royalties).

infringement.[20] Under it, the "hypothetical license" is a stylized, often running-royalty license that is naked, nonexclusive, uncontested in terms of the patents' validity and infringement, covering only the infringed patent, and formed just before the time of infringement, between parties situated in a manner comparable to the litigated parties.[21] While it is well understood that no "real-world" license mimics exactly a concluded "hypothetical license," the courts are newly loath to depart substantially from its terms.

But while the courts' newfound rigor has brought greater rationality to damages determinations, it has created other problems. Reliance on strictly comparable licenses fuels a "vicious cycle" of overcompensation in which licensing is fed by the inflated values in component cases that patent holders can get from litigation, which in turn are informed by real-world licenses.[22] Raising the comparability bar creates the possibility that no licenses will make the cut and that expert testimony or damages determinations will be thrown out, chilling the use of comparable licenses at all. Most problematically, the rejection of "semi-comparable" licenses—licenses that deviate in one or more significant way from the terms of a hypothetical license—has meant that many *ex ante* transactions—because they contain know-how or technology and not just naked patent rights—would be left out as evidence of the *ex ante* value of the invention.

In this essay, we argue that courts should prioritize objective measures of the incremental value of the technology, whether or not they appear in strictly comparable licenses. Transactions whose *function* is to compensate the patent holder for the incremental value of the patented technology, the optimal measure of compensation, deserve as much if not more consideration than licenses whose *form* most resembles a "hypothetical license." Semi-comparable transactions, though currently disfavored, including technology licenses and sales, deserve greater consideration.

Proper consideration of such forms of evidence, we acknowledge, requires understanding of both the full *context* of the facts and circumstances of a given dispute as well as the licenses that are offered for evidence. This can be hard to discern through the lens of expert reports, such as the ones described earlier in the Apple Samsung case which led to $5.9M to $2.2B valuations for the same patent,[23] intended to provide the court views favorable to one side or another rather than to

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[20] 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) (the court should contemplate "the amount that a licensor (such as the patentee) and a licensee (such as the infringer) would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement," otherwise known as the hypothetical bargain).

[21] John C. Jarosz & Michael J. Chapman, *The Hypothetical Negotiation and Reasonable Royalty Damages: The Tail Wagging the Dog*, 16 STAN. TECH. L. REV. 769, 819–20 (2013) (describing a real-world license that is essentially identical to the hypothetical license).

[22] William F. Lee & A. Douglas Melamed, *Breaking the Vicious Cycle of Patent Damages*, 101 CORNELL L. REV. 385, 388–89 (2015).

[23] Apple Inc. v. Samsung Elecs. Co., Ltd., 816 F.3d 788, 815–16 (Fed. Cir. 2016)

objectively instruct the courts. The secrecy that surrounds licenses and license agreements, which are almost always subject to confidentiality clauses, does not help. To begin to fill this gap, we draw upon interviews, the career of one of us as a licensing lawyer, and studies of thousands of actual licenses to describe the contexts in which patent licenses are formed and the ways in which semi-comparables can be appropriately used. Although every license is unique, the relationships that appear consistently across large numbers of license agreements support the use of semi-comparable transactions as a base from which adjustments can then be made to arrive at a reasonable royalty.

Part II traces the role of comparable licenses in damages determinations, past and recent attempts to limit the types of licenses that can be considered, and the problems that a focus on strictly comparable licenses has created. In Part III, we argue for the expanded but disciplined use of what we refer to as "semi-comparable" licenses—licenses that deviate from the hypothetical license but nevertheless, when evaluated in context, can be used properly. It describes the motivations and contexts of several types of licenses and sales as they occur in the real world, covering *ex ante*, *ex post*, and freedom-to-operate (FTO) transactions. Part IV builds upon this base and studies of thousands of licenses and develops a framework by which objective approaches and semi-comparables can be properly adjusted and properly interpreted, rather than rejected. Part V considers the limited use of tailored injunctions when a reasonable, evidence-based estimate or upper bound cannot be established and the elements of the test set forth by the Supreme Court in *eBay v. MercExchange*[24] are met. Part VI concludes.

II. The Problem With Comparable Licenses

In order to restore an injured party to the position in which they would have been but for the improper appropriation of property—a bedrock principle behind compensatory damages—courts routinely look to the value of the appropriated property.[25] To restore a holder of an infringed patent to her rightful position, a court "shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer."[26]

A. From Existing Royalties to Reasonable Royalties

The notion of determining a patent's value based on the value of a patent as established by arm's-length, comparable transactions has been around as long as the U.S. patent system. The first Patent Act compensated an injured patentee based on the "price for which the patentee has usually sold or licensed to other persons."[27]

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[24] eBay, Inc. v. MercExchange, LLC, 547 U.S. 388, 394 (2006).

[25] DOUGLAS LAYCOCK, MODERN AMERICAN REMEDIES: CASES AND MATERIALS 12 n.1, 19 (4th ed. 2012).

[26] 35 U.S.C. § 284 (2012).

[27] *See* Patent Act of 1790, ch. 7, 1 Stat. 109–12 (1790), § 4; *see also* Patent Act of 1793, ch. 11, § 5, 1 Stat. 318–23 ("[The infringer] shall forfeit and pay to the patentee, a sum, that shall be at least

Over time, the Court modified this standard to take into account cases where the value of a particular patent was in protecting the inventor's exclusive use, rather than through an established program of licensing.[28] The 1922 amendments to the Patent Act authorized the award of a "reasonable sum" or "general damages,"[29] when lost profits and existing royalty rates could not be established; in 1946, "reasonable royalty damages" were made available in all cases.[30] The present framework, Section 284 of the 1952 Act, specifies that a "reasonable royalty for the use made of the invention by the infringer" shall provide as a floor for damages.[31] Licenses have remained an important component of the court's determination, figuring prominently in the *Georgia-Pacific* "hypothetical negotiation" framework[32] that has been in place since 1970. According to this framework, in order to determine reasonable royalty damages, courts may consult 15 factors,[33] the first two of which relate to comparable licenses. Factor 1 is "[t]he royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty."[34] Factor 2 is "[t]he rates paid by the licensee for the use of other patents comparable to the patent in suit."[35] These and other types of evidence help to determine the amount that a willing patent owner and a willing potential user as of the date when the infringement began would agree upon—the touchstone of the hypothetical negotiation.[36]

However, just as the courts have long relied on licenses to determine a patent's market value, they have also long worried about the comparability of licenses offered into evidence. The Supreme Court's 1889 *Rude v. Westcott* decision reviewed the decision of the trial court to exclude three licenses over mechanical drills that were made "in part under a threat of suit".[37] The Court affirmed that these

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equal to three times the price, for which the patentee has usually sold or licensed to other persons, the use of said invention."). Oskar Liivak, *When Nominal is Reasonable: Damages for the Unpracticed Patent*, 56 B.C. L. Rev. 1031, 1044–45 (2015) (the automatic trebling of damages was removed by Congress in 1836).

28 Three cases that show the progression are: Seymour v. McCormick, 57 U.S. (16 How.) 480, 488 (1853) ("[A]s experience began to show that some inventions or discoveries had their chief value in a monopoly of use by the inventor, and not in a sale of licenses, the value of a license could not be made a universal rule, as a measure of damages."), Suffolk Co. v. Hayden, 70 U.S. (3 Wall.) 315, 320 (1865) ("There being no established patent or license fee in the case, in order to get at a fair measure of damages, or even an approximation to it, general evidence must necessarily be resorted to."), and Dowagiac Manufacturing Co. v. Minnesota Moline Plow Co., 235 U.S. 641, 648 (1915) (finding, in the absence of lost profits or an established royalty, the patent holder was still entitled to damages on the basis of a "reasonable" royalty).

29 Act of Feb. 18, 1922, Pub. L. No. 67-147, § 8, 42 Stat. 389, 392 (1922).

30 Act of Aug. 1, 1946, Pub. L. No. 79-587, 60 Stat. 778, 778 (1946).

31 35 U.S.C. § 284 (2012).

32 Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1121 (S.D.N.Y. 1970), *modified and aff'd*, 446 F.2d 295 (2d Cir. 1971).

33 *Georgia-Pacific Corp.*, 446 F.2d at 397.

34 *Georgia-Pacific Corp.*, 318 F. Supp. at 1120.

35 *Id.*

36 *Id.*

37 Rude v. Westcott, 130 U.S. 152, 164 (1889).

licenses could not be "taken as standard" since they had been formed after the fact, were signed to avoid litigation, and failed to represent the market rate for the invention.[38]

B. Comparable v. Non-Comparable Licenses as Measures of a Patent's Value

Over a century later, the Federal Circuit, interpreting a different statute and applying a different standard, has repeatedly cited similar concerns regarding licenses it considers not "sufficiently comparable."[39] As the Federal Circuit enumerated in *Lucent Technologies, Inc. v. Gateway, Inc.*, "the hypothetical negotiation or the 'willing licensor-willing licensee' approach . . . attempts to ascertain the royalty upon which the parties would have agreed had they successfully negotiated an agreement just before infringement began," recreating "as best as possible . . . the *ex ante* licensing negotiation scenario and . . . resulting agreement."[40] This agreement, which we call the "hypothetical license," has several characteristics. It convers an arm's-length transaction (between two willing parties), covers only the infringed patent, is formed *ex ante* (before infringement), is non-exclusive, one-way, and often royalty-bearing, and it is built on the presumption that the patent is valid and infringed. The hypothetical negotiation has long been recognized as a "legal fiction"[41] that complicates direct comparisons with real-world transactions.[42] Nevertheless, the courts have embraced real-world licenses as highly probative of a reasonable royalty for patent rights, doing so because "actual licenses most clearly reflect the economic value of the patented technology in the marketplace."[43] At the same time, courts have ratcheted up the standards they apply to licenses that depart in significant ways from the hypothetical license.

In *Lucent v. Gateway*, the court vacated a lump-sum award of $358M for Microsoft's inclusion of a date-picker tool in Microsoft Outlook and various other

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[38] *Id.* at 165 (finding that the proffered licenses failed to reflect a royalty "paid or secured before the infringement complained of; . . . paid by such a number of persons as to indicate a general acquiescence in its reasonableness by those who have occasion to use the invention; and . . . uniform at the places where the licenses are issued").

[39] Wordtech Sys., Inc. v. Integrated Networks Sols., Inc., 609 F.3d 1308, 1319 (Fed. Cir. 2010) (citing Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1328–29 (Fed. Cir. 2009)).

[40] *Lucent Techs., Inc.*, 580 F.3d at 1324–25.

[41] *See, e.g.*, Panduit Corp. v. Stahlin Bros. Fibre Works, Inc., 575 F.2d 1152, 1159 (6th Cir. 1978) ("Determination of a 'reasonable royalty' after infringement . . . rests on a legal fiction. Created in an effort to 'compensate' when profits are not provable, the 'reasonable royalty' device conjures a 'willing' licensor and licensee, who like Ghosts of Christmas Past, are dimly seen as 'negotiating' a 'license.' There is, of course, no actual willingness on either side, and no license to do anything, the infringer being normally enjoined, as is Stahlin, from further manufacture, use, or sale of the patented product.").

[42] For example, infringement and validity are rarely assumed as a patent holder's overall success rate in patent cases is low. *See, e.g.*, Barry et al., *supra* note 19, at 9 fig.9 (indicating that the patent holder's overall success rate is 26% for NPEs and 35% for practicing entities); *see also* John R. Allison, Mark A. Lemley & David L. Schwartz, *Our Divided Patent System*, 82 U. CHI. L. REV. 1073, 1100 fig.4 (2015) (finding that patents are invalidated about 40% of the time).

[43] *Id.*

products that the jury had arrived at largely on the basis of eight license agreements.[44] Four of the eight licenses arose from "divergent circumstances and covered different material."[45] For example, the court found one lump-sum agreement covered multiple patents, and another "broad patent cross-licensing agreement" provided little more than speculation in terms of the value of the patent."[46] In *ResQNet.com v. Lansa*, the Federal Circuit found the majority of the licenses offered into evidence insufficiently related to the hypothetical negotiation because they had "no relationship to the claimed invention."[47] In *Wordtech v. Integrated Networks*, the court excluded licenses on the basis that "they arose from divergent circumstances"[48] from the ones at issue in case, including because, of the thirteen agreements, only two were lump-sum like the verdict.[49] In each of these cases, the court rejected verdicts based on licenses that deviated in some significant way from the hypothetical license. The upshot of these and related decisions has been the disfavoring of certain classes of licenses on the basis that they depart from the ideal analog, or as we define it, are "semi-comparable," rather than being strictly comparable. As described below, these include "depressed" licenses signed when the validity of the patent was in doubt, inflated settlement licenses, and "patent plus" (as opposed to naked) licenses signed *ex ante*.

Depressed Licenses: One basis upon which courts have rejected actual licenses is that they are too low, reflecting the sense that the patent may be invalid when the hypothetical negotiation instead assumes that the patent is valid and infringed. In a seminal case, a number of licenses were signed after the patent had been declared invalid by the Sixth Circuit but before it was found valid by the Supreme Court. Judge Learned Hand dismissed these licenses as indicia of the true value of the invention since the patent had been "crippled" by the Sixth Circuit's adverse decision.[50] Subsequent decisions have embraced the principle that licenses that include "diminished royalties" or "artificially depressed royalties"—royalties set under the impression that patent was not valid or otherwise deserved "disrepute"—should not supply the basis for a reasonable royalty. While few patents fall under the pattern of this line of cases, this line of cases can provide a reason to depart from an actual royalty when determining a reasonable one.[51]

(Inflated) Settlement Licenses: Just as courts have recognized certain licenses as reflecting depressed values, they have also historically disfavored certain

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44 *Lucent Techs., Inc.*, 580 F.3d at 1327.

45 Wordtech Sys., Inc. v. Integrated Networks Sols., Inc., 609 F.3d 1308, 1319 (Fed. Cir. 2010) (referring to the Circuit's reasoning behind *Lucent Techs., Inc.*).

46 *Lucent Techs., Inc.*, 580 F.3d at 1328, 1329 n.7.

47 ResQNet.com, Inc. v. Lansa, Inc., 594 F.3d 860, 869–71 (Fed. Cir. 2010).

48 *Wordtech Sys., Inc.*, 609 F.3d at 1319.

49 *Id.* at 1319–20.

50 Consol. Rubber Tire Co. v. Diamond Rubber Co. of N.Y., 226 F. 455, 458 (S.D.N.Y. 1915), *aff'd*, 232 F. 475 (2d Cir. 1916).

51 *ResQNet.com, Inc.*, 594 F.3d at 872 ("[T]his court has long recognized that a reasonable royalty can be different than a given royalty when, for example, widespread infringement artificially depressed past licenses.") (citations omitted).

licenses, in particular licenses that are signed to settle outstanding litigation, as inflated by factors other than the value of the technology. In *Rude v. Westcott*, the court evaluated licenses made in part under threat of suit and in part as a result of arbitration after litigation had been commenced, in order to avoid future litigation.[52] It rejected these licenses as the proper measure of damages because "[m]any considerations other than the value of the improvements patented may induce the payment in such cases . . . [including t]he avoidance of the risk and the expense of litigation."[53] The courts have continued to look upon settlement licenses with disfavor,[54] the Federal Circuit recently commenting that "[t]he propriety of using prior settlement agreements to prove the amount of a reasonable royalty is questionable,"[55] though also acknowledging that settlement licenses may potentially be of more relevance than other non-comparable licenses.[56]

"Patent Plus" Licenses: Licenses that cover more than the rights of the patent at issue, whether in the form of patent pools, non-patent intellectual property rights, technology, or know-how, have also posed challenges for the court. Evidence from patent pools has been rejected as non-comparable on the basis that it is impossible to determine the value of a single patent, unless explicitly identified, based on a rate that covers multiple patents.[57] In the *ResQNet* case, the Federal Circuit found that the inclusion of non-patent rights, including to finished software products and source code, and the lack of a link to the claimed technology in licenses cited by the expert undermined their use as benchmarks in the patent case.[58] In the Uniloc case, for example, the Federal Circuit rejected the "25% rule of thumb,"[59] that until recently was widely used as a starting point by courts, in part, because it was based on a commercial license agreement that included a portfolio of patent and non-patent rights.[60]

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52 Rude v. Westcott, 130 U.S. 152 (1889).

53 *Id*. at 164.

54 *See, e.g.*, Hanson v. Alpine Valley Ski Area, Inc., 718 F.2d 1075, 1078–79 (Fed. Cir. 1983) ("[S]ince the offers were made after the infringement had begun and litigation was threatened or probable, their terms should not be considered evidence of an 'established royalty,' since license fees negotiated in the face of a threat of high litigation costs may be strongly influenced by a desire to avoid full litigation.") (quotations and alterations omitted).

55 Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., 809 F.3d 1295, 1303 n.2 (Fed. Cir. 2015) (citing LaserDynamics, Inc. v. Quanta Comput., Inc., 694 F.3d 51, 77 (Fed. Cir. 2012)).

56 *ResQNet.com, Inc.*, 594 F.3d at 872 (evaluating various licenses considered by the district court, and finding that "the most reliable license in this record arose out of litigation").

57 Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1328–29 (Fed. Cir. 2009). But note Judge Robart's decision in the Motorola v. Microsoft, which used the MPEG-LA H.264 rate to determine the royalty for Motorola's H.264 patents (Microsoft Corp. v. Motorola, Inc., No. C10-1823JLR, 2013 WL 2111217, at *92 (W.D. Wash. Apr. 25, 2013).

58 *ResQNet.com, Inc.*, 594 F.3d at 870.

59 Robert Goldscheider, John Jarosz & Carla Mulhern, *Use of the 25 Per Cent Rule in Valuing IP*, 39 LES NOUVELLES 123, 123 (2002).

60 Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1313-14 (ruling that the 25 percent rule was "arbitrary" and prohibited).

"Lump-Sum" Licenses: Courts have also struggled with the challenge of converting the terms of lump-sum licenses to running royalty licenses between lump-sum licenses and running-royalty agreements, as favored in form at least by the statute's specification of not less than a "reasonable royalty." Part of the problem with the damages awarded in the Lucent case was that plaintiff sought a running royalty but was awarded a lump sum, and the record failed to reconcile the "fundamental differences [that] exist between lump-sum agreements and running-royalty agreements."[61] In ResQNet, the Federal Circuit found that a history of lump-sum licenses precluded a patent owner from seeking running-royalty damages.[62] Through this and related cases, the Federal Circuit has demonstrated an overemphasis on the form, rather than content, of a license.[63]

C. Relying on Strictly Comparable Licenses

To its credit, the Federal Circuit's gradual ratcheting up of the standards that apply to damages determinations has been in the service of trying to rationalize patent damages and limit unjustified damages verdicts, particularly when it comes to multi-component products, such as smartphones and computers. Damages awarded for patent infringement "must reflect the value attributable to the infringing features of the product, and no more," the court has ruled, making the principle of apportionment "the governing rule."[64] Given the range of available evidence, the court needs to be proactive in ensuring that the information presented to the factfinder is sufficiently reliable.[65] Were it to be otherwise, "[a patent owner] would be free to inflate the reasonable royalty analysis with *conveniently selected* licenses without an economic . . . link to the [patented] technology,"[66] the court has warned.

But while this stricter approach has reduced the risk of judgments untethered from the facts at hand, there are numerous problems with relying on a narrow subset of licenses as strictly comparable. It creates incentives to distort licenses in order to create favorable benchmarks, contributes to uncertainty about what evidence will be accepted and the royalty rates relied upon, and leads to the exclusion of patent plus and other semi-comparable licenses that are most likely to reflect the incremental value of the technology. Each of these drawbacks is described in greater detail below.

Reliance on Private Information: Because the comparable licenses approach relies on confidential agreements largely not available without discovery, parties do not have access to the same information during negotiation that will be presented to

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61 *Lucent Techs., Inc.*, 580 F.3d at 1330.

62 *ResQNet.com, Inc.*, 594 F.3d at 870.

63 *See, e.g.*, LaserDynamics, Inc. v. Quanta Comput., Inc., 694 F.3d 51, 79–80 (Fed. Cir. 2012) ("Actual licenses to the patents-in-suit are probative not only of the proper amount of a reasonable royalty, but also of the proper *form* of the royalty structure.") (emphasis added).

64 Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1226 (Fed. Cir. 2014) (citing VirnetX, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1326 (Fed. Cir. 2014)).

65 Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., 809 F.3d 1295, 1301 (Fed. Cir. 2015).

66 *LaserDynamics, Inc.*, 694 F.3d at 79 (emphasis added) (citing *ResQNet, Inc.*, 594 F.3d at 872).

the court when it determines a royalty.[67] The licenses that *are* publicly available are highly selected and non-representative of the universe of all licenses,[68] and often do not meet the standard of being "strictly" comparable. In their review of over 200 software and computer electronics licenses reported in RoyaltySource, a database of material agreements and term of agreements filed with the Securities Exchange Commission (SEC) and from other publicly available sources, for example, Epstein and Malherbe found only a single software license and a single consumer electronics license that fit the profile of being non-exclusive, naked, at arm's-length, one-way, and not reached in a litigation settlement (never mind being arrived at prior to the beginning of infringement).[69] In addition, because each party does not know what the other party does or does not know, much less what the court will know, the negotiation proceeds in the shadow of uncertainty about how to value the patent.

Incentives to Distort Licenses: Reliance on comparable licenses also creates incentives for patent owners and licensees to sign naked patent license agreements driven by a desire to establish favorable licensing benchmarks.[70] For example, a patent owner may offer licenses to third parties with a high royalty rate but otherwise favorable terms (or additional consideration outside of the license agreement) in order to set an "established" royalty rate for its patents.[71] Similarly, a reliance on comparables can motivate a sophisticated corporation regularly subject to patent infringement suits to obtain low-cost patent licenses relevant to its core products. Obtaining such licenses contributes to a track record of *low* royalties in connection with naked, one-patent licenses that the court may consider when looking for comparable licenses for a different but related patent. In both cases, the consideration of how a court or third party will view the transaction, and not the incremental value of the invention to the infringing products, sets license pricing.

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67 Lee & Melamed, *supra* note 22, at 439; *accord* Jonathan S. Masur, *Use and Misuse of Patent Licenses*, 110 NW. L. REV. 115, 119–21 (2015).

68 Only a small subset of agreements triggers SEC reporting requirements—agreements that are material to a public company, which, in turn, comprise only a small subset of all companies. *E.g.*, Colleen V. Chien, *Software Patents as a Currency, not Tax on Innovation*, 31 BERKELEY TECH. L.J. (forthcoming 2017) (manuscript at 8, 13, 29) [hereinafter *The Software Currency*] (describing the disclosure framework that requires reporting of material agreements to the SEC).

69 Ray J. Epstein & Paul Malherbe, *Reasonable Royalty Patent Infringement Damages After Uniloc*, 39 AIPLA Q.J. 3, 17 (2011).

70 *See, e.g.*, Ericsson, Inc. v. InterDigital Commc'ns Corp., 418 F.3d 1217, 1219 (Fed. Cir. 2005) (describing accusation that InterDigital manipulated licenses with Ericsson in order to extract a higher payment from Nokia); Lee & Melamed, *supra* note 22, at 439.

71 *See, e.g.*, Colleen V. Chien, *Startups and Patent Trolls*, 17 STAN. TECH. L. REV. 461, 477–78 (2014) [hereinafter *Startups and Patent Trolls*] (describing the tactic of targeting small firms to establish high royalty rates described by one defense lawyer: "I'm not proud of it, but most [of my small company] clients are willing to agree to a royalty agreement [with a] . . . tiny base, large rate. [The trolls] come against the little guy and say you've got really low revenue, we want to establish a high royalty rate. They hate to do this, and screws people later but [it's what happens].").

Ignorance of the Best Evidence of the *Ex Ante*, Incremental Value of the Invention: As described above, imposing a high standard means that courts often do not consider licenses whose forms depart from the terms of the "hypothetical license." Thus, as an example, when plaintiffs demand reasonable royalties as specified by the statute, lump-sum agreements may be disfavored by the court. However, running-royalty payments are not necessarily typical, especially in high-technology areas. To the contrary, parties that want simplicity and certainty and do not want to grant auditing rights often pursue lump-sum payments. Narrowly focusing on running-royalty licenses leaves out consideration of a large number, perhaps the majority, of licenses.

In addition, technology transactions negotiated in the shadow of competition rather than in the shadow of litigation often do not resemble hypothetical licenses. These transactions often deviate from the hypothetical license because they include grants for know-how or other non-patent rights, and often are in the form of technology sales agreements rather than licenses for use. But these market-based transactions arguably best reflect the incremental value of the invention. Technology transactions are driven by market forces, rather than legal considerations, so they are less likely to be subject to manipulation. Ironically, under the court's heightened standard for comparability, they are also among the most likely to be excluded from consideration.

After excluding these market-based technology licenses, and applying the court's narrow standards for comparability what *are* left for the court's consideration are "naked" patent-only licenses. But such licenses are much more likely to be negotiated *after* the patented invention has been incorporated into the accused infringer's product, and therefore, to reflect the avoided costs of transitioning to a different solution, and the sunk investment in commercializing the invention. These costs have less to do with the contribution of the patented technology to the infringing product and more to do with the "lock-in" of the infringer, that is, the infringer's cost and difficulty of switching to an alternative technology after its product is already on the market.[72]

III. How Patent Licensing Works in the Real World

The court's recent elevation of the standards of comparable licenses has contributed to an unhealthy reliance on a relatively small subset of patent transactions for measuring patent value. These naked patent licenses are vulnerable to gaming and, though they approximate the hypothetical license in form, depart from the incremental value of the invention in substance. Stated this way, then, the solution we advocate is obvious—to enlarge the pool of comparable licenses in general, making them harder to game, and to increase the consideration of transactions that reflect the *ex ante* valuation of the technology rather than just the naked patent rights. This more liberal approach to licenses also requires more rigor, to put "semi-comparables" in their proper context. We expand below on this partial

[72] Lee & Melamed, *supra* note 22, at 410.

solution—the embrace of a more inclusive, yet disciplined approach to damages valuation that prioritizes objective *ex ante* measures of the value of the invention.

Several principles underlie our approach. First, comparable licenses are only a means to determining the appropriate compensation for infringement, not an end in themselves. Second, all objective, relevant measures of this value, whether in the form of transactions that are strictly comparable or only "semi-comparable" to the hypothetical license, deserve disciplined consideration. Third, while objective evidence of value is to be favored and included, not excluded, each measure of value must be considered in context.

An inclusive, yet rigorous approach is well-supported by the case law. Indeed, several of the *Georgia Pacific* factors describe differences in licensing conditions that must be kept in mind when evaluating and applying comparable licenses,[73] in effect endorsing the use of licenses that depart from a hypothetical license along the contemplated dimensions. Each of the recent cases that exclude certain types of licenses indicates defects in the presentation of those licenses to the court without sufficient context, not inherent defects in the licenses themselves. For example, in *Lucent*, the Federal Circuit was "simply unable to ascertain from the evidence presented the subject matter of the agreements," and therefore was unable to evaluate the probative value of those agreements.[74] In *WordTech*, the problem was not the lump-sum licenses per se but the licenses that did not disclose the assumptions upon which they were based, and therefore, the licenses were difficult to analogize and adjust to the case at hand.[75] In *ResQNet*, the Federal Circuit attributed the district court's error to the lack of "factual findings that accounted for the technological and economic differences" between the licenses and the patent.[76]

Since no license is perfectly comparable, even an approach that values strict comparables must include adjustments. As the Federal Circuit recently described, an approach built on comparables "begins with rates from comparable licenses and then *account[s]* for differences in the technologies and economic circumstances of

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[73] For example, because the comparable licenses are, unlike the hypothetical license, exclusive (Factor 3), signed with an unwilling party (Factor 4), signed with a competitor (Factor 5), or of a duration that does not match the term of the patent (Factor 7). See discussion in Jarosz & Chapman, *supra* note 21, at 819–22.

[74] Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1327–28 (Fed. Cir. 2009) ("Second, with the other agreements, we are simply unable to ascertain from the evidence presented the subject matter of the agreements, and we therefore cannot understand how the jury could have adequately evaluated the probative value of those agreements.").

[75] Wordtech Sys., Inc. v. Integrated Networks Sols., Inc., 609 F.3d 1308, 1320 (Fed. Cir. 2010) ("This 'averaging' theory is flawed because the two lump-sum licenses provide no basis for comparison with INSC's infringing sales. Neither license describes how the parties calculated each lump sum, the licensees' intended products, or how many products each licensee expected to produce.").

[76] ResQNet.com, Inc. v. Lansa, Inc., 594 F.3d 860, 873 (Fed. Cir. 2010) ("[T]he district court erred by considering ResQNet's re-bundling licenses to significantly adjust upward the reasonable royalty without any factual findings that accounted for the technological and economic differences between those licenses and the . . . patent.").

the contracting parties."[77] Read this way, the problem is not that certain licenses are insufficiently comparable but that the courts' ability to properly interpret evidence of comparables is limited and insufficient.

If this is the problem, then why can't parties be expected to fill the gap? Much of the answer to this question is structural. In an adversarial system in which millions of dollars or more can turn on the selection of the royalty rate, the parties have large financial incentives to present information selectively rather than objectively. Objective information is also scarce because of the secrecy that shrouds technology licenses and sales. In general, parties to license agreements are not required to record their licenses, much less to disclose the rates paid.[78] Licenses disclosed during public court proceedings are often kept secret behind protective orders.[79] Even though material agreements are filed with the SEC and even these can be granted confidential treatment by the SEC, their terms can be redacted upon request by the discloser.[80] Thus, providing the courts and those involved in patent related licensing greater access to comparable and semi-comparable licenses is one way to improve damages calculations.

Another way to improve damages calculations would be to enhance the ability of the courts to properly evaluate and incorporate objective measures of value, including from semi-comparables. To do so, more objective information about the contexts in which licenses are constructed and the ways in which licensing in the real-world occurs would facilitate adjustments that the courts could then make.

To begin to address this latter gap, we begin by describing the contexts in which patent licenses are formed, focusing in particular on component technology licenses, and the factors that go into and are reflected in the terms of a license, including its financial terms. To do so, we draw upon three sources: 1) interviews we conducted with licensing experts and lawyers (described in appendix A), 2) one of the authors' eighteen-year career performing licensing work for a variety of companies, and 3) empirical studies of thousands of technology licenses.[81] We describe the two main types of transactions, *ex post* and *ex ante*, as well as a third type of transaction that is particularly pervasive in component technology

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77 Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., 809 F.3d 1295, 1303 (Fed. Cir. 2015) (emphasis added) (internal quotations omitted).

78 *See, e.g.*, Carlos J. Serrano, *The Dynamics of the Transfer and Renewal of Patents*, 41 RAND J. ECON. 686, 690 (2010) (describing the lack of a requirement to publicly record patent licenses and providing a summary of the anecdotal data that is available). *See also* Mark A. Lemley & Nathan Myhryold, *How to Make a Patent Market*, 36 HOFSTRA L. REV. 257 (2007).

79 *See, e.g.*, Jorge L. Contreras, Colleen Chien, Thomas Cotter & Brad Biddle, *Study Proposal - Commercial Patent Licensing Data* (University of Utah College of Law, Research Paper No. 164, 2016), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2755706 [hereinafter *Study Proposal*].

80 *See* Colleen V. Chien, *Contextualizing Patent Disclosure*, 69 VAND. LAW. REV. 1849, 1878 (2016) (describing the requirement to disclose patent licenses to the SEC).

81 In particular, see Thomas R. Varner, *Technology Royalty Rates in SEC Filings*, 47 LES NOUVELLES 120 (2010) [hereinafter Varner, *Technology Royalty Rates*] and Thomas R. Varner, *An Economic Perspective on Patent Licensing Structure and Provisions*, 46 BUS. ECON. 229 (2011) [hereinafter *An Economic Perspective*].

contexts—transactions motivated by freedom to operate (FTO), covering both developed and to-be-developed technology.

Next, we argue for the broader but appropriate use of objective indicia and approaches derived from these contexts. In particular, we believe that *ex ante* transactions, such as patent pools and technology licenses, and approaches that are used in *ex ante* contexts to value component patents, such as "numeric proportionality," and the "top-down" approach, as described later, should be given greater weight because they reflect the technical contribution of the patent. Certain FTO transactions can also be used as indicia of the licensee's willingness to pay. We agree with courts that have previously considered the issue that settlement transactions are least likely to be probative of a patent's technical contribution. We consider the findings regarding trends among thousands of licenses and consider their implications for the use of semi-comparable licenses.

A. A Non-exhaustive Overview of Licenses

Licenses can be classified by their primary purpose. Licenses that primarily transfer technology (typically, *ex ante*) are distinguishable from those that primarily transfer legal liability (often, *ex post* in high-tech industries).[82] *Ex ante* licenses for technology are formed before the product is developed and generally include the grant of patent rights plus the provision of technology (e.g., know-how and/or actual technological products). In the context of *ex ante* software patent licenses, for example, source code is often also licensed.[83] The price of the transaction primarily reflects the next best alternative, to use another technology, and the current or projected value of the technology. *Ex post* patent licenses for litigation avoidance are generally formed after the technology has been developed. Licenses formed on the basis of a patent demand, regardless of whether the patent owner is an operating company or a non-practicing entity (NPE), rarely include anything but the right to use the patent.[84] The price of the license reflects a consideration of the alternatives, principally avoidance, through design arounds or legal costs associated with demonstrating non-infringement or invalidity.

Freedom-to-operate (FTO) transactions comprise a third, although often overlooked third class. FTO transactions generally involve a patent or one or more portfolios of patents that the buyer gains permission to infringe upon without fear of suit, in exchange for money, reciprocal rights, or other consideration. When there are a large number of potentially relevant patents, as in component patent industries, it can be extremely challenging to identify which patents are licensing candidates and to successfully complete a licensing agreement with the numerous patent owners (this challenge is sometimes referred to as the "tragedy of the anti-commons").[85] FTO transactions allow firms to secure the numerous rights

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82 *The Software Currency*, *supra* note 68, at 8, 13, 17, 42.

83 *Id.* at 16–17.

84 Robin Feldman & Mark A. Lemley, *Do Patent Licensing Demands Mean Innovation?*, 101 IOWA L. REV. 137, 174 (2015).

85 MICHAEL HELLER, THE GRIDLOCK ECONOMY: HOW TOO MUCH OWNERSHIP WRECKS MARKETS,

implemented by a single, complex product and to "buy in bulk" and secure needed rights at scale. FTO licenses can affect *ex ante* transfers, insofar as they include patents that are not yet being practiced by the licensee but are expected to potentially be practiced later by the licensee; they may also include patents that the licensee is already practicing and therefore be *ex post*. Each of the three types of licensing contexts, and their relevance to reasonable royalty determinations, is described in greater detail and summarized in the Table 1 below.

B. *Ex Ante* Transactions

Of the three types of licenses, *ex ante* agreements are the most varied, and have been fueled by the growth of open innovation.[86] *Ex ante* agreements may include only patent rights, or patents plus know-how, trade secrets, and other deliverables. Rather than the seller (patent holder) initiating the transaction with a specific target as in the case of most *ex post* licenses, to form an *ex ante* transaction, in many cases, the prospective buyer initiates the transaction, the sale happens on the open market, or the outreach is mutual. Technology can be bought along with human capital, or even as part of a firm-level acquisition. Consideration for these rights can take diverse forms, such as lump-sum or running-royalty, equity,[87] or other payments. In the case of open-source licensing, the technology is provided royalty-free but value is still exchanged: a contributor agrees to provide technology under the applicable terms and benefits from a project that incorporates inputs from a variety of contributors; the contributor's reputation can also be enhanced.

Table 1: Considerations in Patent and Technology Transactions

Characteristic	***Ex Ante***	***Ex Post***	**Portfolio/FTO**
Primary Purpose	To improve a product	To avoid litigation	To gain freedom to operate

STOPS INNOVATION, AND COSTS LIVES 1 (2008).

86 *See, e.g.*, Henry Chesbrough & Sabine Brunswicker, *Managing Open Innovation in Large Firms*: *Survey Report | Executive Survey on Open Innovation 2013*, 6–7 (May 2013), http://ibbnetzwerk-gmbh.com/uploads/media/Fraunhofer_IAO_-_Open_Innovation.pdf (finding in 2013, based on a survey of large firms, that close to 80% were practicing open innovation but the majority had only begun doing so in the last 10 years); *see also* Colleen V. Chien, *Opening the Patent System: Diffusionary Levers in Patent Law*, 89 S. CAL. L. REV. 793, 810 (2016).

87 *See An Economic Perspective*, *supra* note 81, at 233 (finding, based on a review of licenses reported to the SEC, that 25 percent of the patent licenses and patent assignment agreements included equity and 30 percent of patent license agreements not containing a fixed fee included equity).

Valuation Inputs	Value of the technology to the business, competitive pricing in free market (relatively less vulnerable to circularity)	Legal costs, discovery, design- around cost, related licenses (relatively more vulnerable to circularity)	Relative value of portfolios (cross-licensing), market significance and litigation risk associated with the technologies covered by the portfolio
Initiation	Either party, Mutual	Licensee	Either party, Mutual
Examples	In- or out-licensing technology agreements, M&A, standards bodies and pools, pure patent purchases	Settlement licenses, in-bound pure patent licenses, pure patent purchases	In- or out-licensing portfolio, 1:1 or networked cross licenses, pure patent purchases
Subject of Transfer	Patent Rights, Patent Rights + Technology	Patent Rights	Patent Rights, Patent Rights + Business Value

Industry norms matter—studies have found that material licensing activity among public companies is concentrated in chemical, electronics, and computer industries,[88] but that chemical industry transfers are much more likely to be exclusive than those in other industries.[89] But what is common across all *ex ante* agreements is that they are initiated in response to a business and technological need. Within a large company, a business unit can submit a request to the legal team for assistance with acquisition of a technology. Such an agreement can involve different legal department functions, e.g., transactions, corporate and IP/patent, either standing alone or working together. For a smaller firm, a technology license may comprise a key asset that the company works to develop. *Ex ante* transactions can include multiple buyers, as in the case of pooled or standards patents, multiple patents, or a single seller and buyer negotiating over a single patent. Below we

[88] *See, e.g.*, Viktor Braun, *Licenses as Critical Sources of Innovation*, 43 LES NOUVELLES 225 (2008); *see also* Bharat N. Anand & Tarun Khanna, *The Structure of Licensing Contracts*, 48 J. INDUS. ECON. 103 (2000).

[89] Anand & Khanna, *supra* note 88.

compare and contrast the single-buyer/single-seller sale of rights *ex ante* with standards, pools, and other types of *ex ante* transactions, and the considerations that the resulting licenses reflect.

1. Single-Buyer/Single-Seller Ex Ante *Transactions*

When technology is transferred from one party to another, the price generally depends on the value of the technology to the business, how much it will cost to integrate the technology, and the price of the end-product. In other words, patent rights valuation is constrained by what the market for the end-product will bear. Material transactions tend to involve know-how, studies have found,[90] and agreements that include know-how are worth more than those that do not.[91]

When a standalone product like a pharmaceutical drug is sold, the rates may range considerably and to a greater extent reflect the risk of failure. A survey of pharmaceutical licensing executives by the Licensing Executives Society found, not surprisingly, that royalty rates tended to increase at each stage of development of a licensed product's development, that is, the greater the likelihood of success of a technology over time, the higher its royalty rate.[92] However, the royalty rate is set not by legal liability but the actual value added by reaching an important milestone. As the report explained, as "projects move from preclinical, through proof of concept in humans, to regulatory approval, the royalties do increase, reflecting the incremental value being created from these activities."[93] Industry and business model differences translate into differences in license practices. As one interviewee told us, the standard approach of technology licensing offices (TLOs) is to ask for equity and a yearly fee, while large public high-tech companies prefer to have fully-paid-up licenses that will not impact their ongoing revenue streams. Pharmaceutical agreements, like the ones described earlier, tend to be in the form of running royalties with milestones.

Specialized technology suppliers, like universities, also form technology licensing agreements.[94] According to our interviewees and based on our own experience, technology licensing organizations often do "pure patent deals" as any

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90 Braun, *supra* note 88, at 226 (reporting, regarding various empirical studies, that "Contractor (1985) found that in the early 1980s 75 percent of U.S. license agreements contained know-how transfers. Vickery (1988) in a Les survey of 119 international licensing transactions detected 67 percent. In the Chemical Industry, all but the simplest licenses involve a mixture of patents and know-how.").

91 *Technology Royalty Rates*, *supra* note 81, at 123–25 tbls.1, 3 & 4 (noting that patent plus "know-how" (e.g., technology, confidential information, data, discoveries, and formulas) rights licenses tend to command a higher royalty than bare patent licenses).

92 Press Release, Licensing Executives Society, Licensing Executives Society (USA & Canada) Publishes Biopharmaceutical Royalty Rates and Deal Terms Survey Report (July 22, 2008), http://www.lesfoundation.org/survey/pdfs/7.22.08rates.pdf.

93 *Id.*

94 *See* Ashish Arora, Wesley M. Cohen & John P. Walsh, *The Acquisition and Commercialization of Invention in American Manufacturing: Incidence and Impact* (Nat'l Bureau of Econ. Research, Working Paper No. 20264, 2014) (discussing the contribution of specialized technology suppliers to innovation in manufacturing).

know-how or additional information about the technology is already available to the public through academic publication, obviating the need for additional technology to be transferred. Others offer a subscription model in which licensees pay fees to obtain know-how and non-exclusive licenses to patents coming out of a particular lab. Based on a survey of the top 100 U.S. university-based technology-licensing offices, the factors that go into valuing the technology include "comparables, market experience, and [] business plans."[95] This reflects that the valuation of the technology depends, not only on the technology itself but the prospective licensee's likelihood of being able to successfully commercialize the invention and bring it to market.[96]

A company can also become aware of a single patent *ex ante* that is relevant to a direction that the company is interested in pursuing. Such situations are relatively rare in component technology contexts because of the plethora of potentially relevant patents as under U.S. patent law those who are found guilty of infringement face additional penalties if they knowingly infringed.[97] As a result, many high-tech companies recomend that their engineers not search for, or read, patents. When, however, such a patent is identified and a 1:1 negotiation takes place resulting in a license, and the patent is comparable to the litigated patent, such a license can be a valid data input into a reasonable royalty determination. In biopharma contexts, in contrast, a small number of patents can readily own the core of a technology, and become subject of intense and protracted negotiations.

A firm may also get patents as part of a package of technology it is buying. The technology acquisition can be through the purchase of a firm, business unit, or other corporate arrangement. In some cases, the licensed technology is sold in the market in a package that includes the finished product along with the rights to the intellectual property. In the high-tech context, one interviewee described being approached to take a license to patent rights over a chip when the rights and the chip itself were sold at a certain per unit price on the open market. The open market price of the hardware plus patent rights has relevance to pricing the patent rights. The interviewee was of the view that the per unit price should act as a limit on how much the royalty rate that his company should be asked to pay for just the patent rights.

2. Patent Pools and Standards Patents

Firms can also access and incorporate technology into their products without having to negotiate separately for all the rights implicated by the technology through patent standards and patent pools. Through patent pools, patent holders voluntarily assign their patents to a pool administrator, such as MPEG-LA or VIA

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95 Cory R. A. Hallam, Anita Leffel & Ismael Chinea, *Early Technology Management Valuation Practices by University Licensing Offices in the United States: Empirical Data from a Survey of the Top 100 Organizations*, 2011 PROC. PICMET '11: TECHNOLOGY MANAGEMENT IN THE ENERGY SMART WORLD (PICMET) (manuscript at 7).

96 *Id.*

97 *See* discussion of willfulness, *infra* at notes 106 and accompanying text.

licensing, and agree to offer their patents on non-negotiable commercial terms. In a typical standards process, covering an interoperability standard such as WiFi, the standards specification is developed by groups of engineers who collaborate across organizations under the auspices of a standards-setting organization.[98] In both cases, rights can be obtained by paying a royalty according to a predetermined and published royalty schedule (which could specify a royalty of zero) or via the intellectual property rights policy declared by the standards body or pool. To be more precise, pool licenses sometimes have pre-published rates whereas the intellectual property rights regime for a standard often just provides that licensing will be reasonable and non-discriminatory (or royalty-free, e.g., for various w3c standards). The point of offering patent rights through pools or standards organizations is to facilitate *ex ante* transactions. Thus, standard and pool licenses inherently share many of the same elements with the hypothetical license —they are often *ex ante*, based on a technology, and between willing parties.

3. FTO Licenses / Transactions

A desire for freedom to operate (FTO) motivates a substantial share of patent transactions, particularly as measured by the number of patent assets. Often the patents being acquired or licensed are not concurrently being practiced by the licensee; the patents, however, exist in a space of interest, and thus the transactions may fairly be characterized as both *ex ante* and *ex post*. To gain FTO, companies may license or purchase patents and do so between individual parties or through a group. FTO is important in both high-technology and biotechnology and pharmaceutical settings.[99]

FTO transactions can be initiated either by an organization, on behalf of its many members, or by an individual company, on a one on one basis. In the case of an organization, the organization may be asked by one or more members to pursue a license or purchase. In the case of an individual company, the company may become aware of the subject patent asset(s) in a variety of ways, e.g., via a broker, a licensing agent, or contact from the patent owner directly. The form of consideration in FTO licenses can vary significantly, ranging from, for example, rights to other patents (as in the case of cross-licenses) to cash payments to royalty streams. The factors that go into pricing the transaction often vary. In the case of a collaborative purchase, market prices, as defined by the availability of other technology assets covering similar technology may be relevant. Although this does

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98 *See, e.g.*, *A Unified Framework*, *supra* note 12, at 1453.

99 Colleen V. Chien, *Beyond Eureka: What Creators Want (Freedom, Credit, and Audiences) and How Intellectual Property Can Better Give It to Them (By Supporting Sharing, Licensing, and Attribution)*, 114 MICH. L. REV. 1081, 1087 (2016) (citing an interview with an employee at a global pharmaceutical company: "I agree that this subject matter likely shouldn't be patentable. But . . . right now, it *is* being patented by other people, and we're having to analyze their patents, spend tens of thousands of dollars analyzing them, rendering opinions, telling business people they have to make business risks based upon infringement issues. And . . . we're taking licenses . . . . What I want is something that I can trade with somebody . . . . I'm not interested in necessarily asserting these against anybody.") (book review).

not exactly mirror the incremental value of the technology, it does reflect the value of the portfolio *ex ante* (and *ex post*) relative to other technological options. For more expensive assets that have already been commercialized by the members of the group organization, the parties are more focused on the threat of litigation and who might be targeted if the patents were not bought, the likelihood of infringement and validity, the life of the patent, likelihood of design around and the revenue associated with the smallest saleable unit. In other cases, members provide their estimates of value, reflecting considerations that include the costs of the next best technological options.

FTO licenses to individual patents are also valued in a variety of ways. For example, negotiations may be based on licenses to similar patents/technology, savings to the business from adopting the patented technology, financial value over the next best technology, number of other costs associated with the product, revenue and profit attributable to the licensed invention, and the number of other patent licenses necessary for the product. Below, we discuss several classes of FTO-motivated transactions.

a. 1:1 Transactions

Companies that are pursuing freedom to operate may enter into one-way or reciprocal (cross) license or sales transactions with another company. In many cases, money does not actually change hands, and in others, royalties will go to one side, or potentially to both. Although a portfolio cross-license may involve large numbers of patents, it can nevertheless be motivated by the desire to get access to a specific patent or set of patents. As one biotechnology licensing attorney described, in acquiring technology, the goal can be for a firm to get the rights without revealing its strategy. To do this, the firm will do a "bucket exchange cross-license" offer. Such offers can include technology, for example, DNA sequences, or only patent rights. However, the value of the cross-license to a first party is largely based on the value of the counterparty's patented technology to the first party's business.

b. Collaborative FTO Transactions

Numerous innovative collaborative FTO arrangements have also been devised to reduce the risks to both current and future innovation. Member organizations such as the License On Transfer (LOT) Network,[100] RPX,[101] Unified Patents,[102] Allied Security Trust (AST),[103] and Open Invention Network (OIN)[104] redistribute

[100] Founded by one of the authors. *See* David L. Hayes & C. Eric Schulman, *An Updated Proposal for a License on Transfer (LOT) Agreement* (Working Paper No. 1.3, July 7, 2014), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2463660; C. Eric Schulman, *How Scalable Private-Ordering Solutions Improve IP Law: Lessons Learned From My Founding of the License on Transfer (LOT) Network* (Aug. 22, 2016), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2827904.

[101] RPX CORP., https://www.rpxcorp.com (last visited Oct. 9, 2016).

[102] NPE PAT. LITIG. INS. COVERAGE - UNIFIED PATENTS, https://www.unifiedpatents.com (last visited Oct. 9, 2016).

[103] ALLIED SECURITY TRUST, http://www.ast.com (last visited Oct. 9, 2016).

rights on behalf of their members. These mechanisms provide *ex ante* licenses that cover groups of patents including patents that are not yet being practiced by the licensee but that the licensee will arguably practice later, as well as *ex post* licenses over already-developed technology.

In the cases of OIN and LOT, rights are both granted to, and granted by, members as part of a networked cross-license.[105] Members of these organizations pay little or nothing by way of cash, but are required to provide rights or a grant back to the network.[106] For example, by joining the LOT Network, a company founded by one of us, a company with no patents can obtain a royalty-free patent license to a large number of patents (as of Fall 2017, more than 797 thousand patent assets belonging to 170 member companies), in exchange for granting rights to its own patent assets to other LOT members if the patent assets are asserted by a patent assertion entity (PAE).[107]

Though networked cross-licenses require little or no money to change hands, other forms of collaborative FTO licensing follow a different model. For example, organizations such as AST, RPX, and Intellectual Ventures buy patent assets on the open market and then license their members, thereby establishing pricing for licenses. Presumably, in an open and transparent patent exchange market, a patent's future royalty stream should be related to its purchase price. Interestingly, the licensing structure that some of these organizations employ does not differentiate based on who the licensee is and simply prices the license at a pre-stated share of revenue, reducing deal friction and encouraging transactions assuming the price is right.

C. *Ex Post* Transactions

In contrast to *ex ante* licenses, *ex post* licenses cover the patent transactions that happen when a company is already making or using the patented invention but lacks a license. Because patent infringement is a strict liability offense, the holder of an infringed patent is entitled to demand a royalty from the allegedly infringing company even if the company has unknowingly and allegedly incorporated the

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104 OPEN INVENTION NETWORK, http://www.openinventionnetwork.com (last visited Oct. 9, 2016).

105 *See* David L. Hayes & C. Eric Schulman, *An Updated Proposal for a License on Transfer (LOT) Agreement* (July 7, 2014) https://ssrn.com/abstract=2463660 or http://dx.doi.org/10.2139/ssrn.2463660; OPEN INVENTION NETWORK, http://www.openinventionnetwork.com (last visited Oct. 9, 2016); LICENSE ON TRANSFER NETWORK, www.lotnet.com (last visited on Oct. 14, 2017).

106 *Id.*

107 C. Eric Schulman, How Scalable Private-Ordering Solutions Improve IP Law: Lessons Learned From My Founding of the License on Transfer (LOT) Network (August 22, 2016) https://ssrn.com/abstract=2827904 or http://dx.doi.org/10.2139/ssrn.2827904; David L. Hayes & C. Eric Schulman, An Updated Proposal for a License on Transfer (LOT) Agreement (July 7, 2014) https://ssrn.com/abstract=2463660 or http://dx.doi.org/10.2139/ssrn.2463660; Open Invention Network, http://www.openinventionnetwork.com (last visited Oct. 9, 2016); License on Transfer Network, www.lotnet.com (last visited on Oct. 14, 2017).

patented technology into its product.[108] The scenario is quite common in high-technology areas because patent law provides incentives not to look proactively for patents[109] and searching is prohibitively expensive and unlikely to yield conclusive results.[110] Indeed, copying is rarely alleged in non-pharma patent cases.[111] In addition, it is often hard to tell if a company is in fact infringing as infringement often turns on claim constructions about which reasonable minds can disagree. As the patented invention has already allegedly been incorporated into the product, *ex post* transactions typically transfer only naked patent rights, in exchange for money, although the company might also provide discount services or some sort of other business deal.

After alleged infringement begins, most of the licensing scenarios noted above in the *ex ante* and FTO contexts can be replicated. However, the transaction is much less likely to include technology and considerations of the price of the next best technical alternative, and much more likely to be shaped by the strength of the legal case, and to reflect considerations of the legal alternatives to settlement – switching costs, legal costs, and possible legal liability at trial.

For example, if a standard has been adopted by the relevant community, and a patent owner asserts an essential patent (where the patent is not encumbered by the patent policy of the standard body) against a company that has adopted the standard, the company would likely suffer significant costs if it tried to switch off the standard at that point. In another example relayed by an interviewee, before a particular piece of hardware was chosen, the firm considered several options, evaluating them based on cost, quality, availability, and other aspects relating to the relative technical merits. When a patent owner later surfaced and demanded compensation for the selected option, the resulting conversation was much more focused on legal and switching cost considerations.

Within a firm, the formation of a typical *ex post*, pure patent license is primarily a legal matter. The path to a license agreement typically begins when the patent owner or her proxy either sends a notice letter or brings suit. Notice letters can identify a product or product line believed to be infringing, the number of the patent, an invitation to take a license to the patent, and in some cases, claim charts that map the product to the claims of the patent. Assuming the letter contains sufficient information, the company consults with product engineers, assisted by lawyers, to evaluate internally whether it believes it needs a license. It also assesses the risk of litigation (based, for example, on the patent owner's track record in suits, whether it is a patent assertion entity, individual, or operating company), and

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[108] 35 U.S.C. § 271(a) (2012).

[109] Through the willfulness doctrine, which assigns treble damages to the knowing infringement of patents. *See* Halo Electronics Inc. v. Pulse Electronics, Inc., 136 S. Ct. 1923, 1933, 1937 (2016) ("The subjective willfulness of a patent infringer, intentional or knowing, may warrant enhanced damages, without regard to whether his infringement was objectively reckless.").

[110] *Evolving Marketplace*, *supra* note 7, at 8.

[111] Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421, 1424 (2009).

determines how to respond. Even if the claim appears to be specious or the patent appears to be invalid, when the risk seems credible and the costs considerable, settlement offers substantially below these costs can be entertained.

The calculus is similar for a patent litigation case, but other litigation-specific considerations, like the venue of the dispute, likelihood of post-grant challenge and potential stay, and likelihood of early dispositive outcomes, such as early an Alice motion, and the rate and magnitude of projected spending (or "burn rate") also factor into what a prospective licensee is willing to pay. As the case proceeds, other considerations, like the cost of design around, the cost of disruption to the firm, and the burden of intrusive discovery also influence the calculus. When the patent holder is a patent assertion entity (PAE) with limited operations, the costs of discovery in particular are asymmetric and much greater for the defendant. Operating companies may be reluctant to produce trade secrets in discovery, even under a protective order, providing other motivations to settle that have nothing to do with the underlying merits of case.

For the smallest firms, a credible demand may force the consideration of more aggressive interventions. According to surveys that one of us conducted, 40% of startup survey respondents that received a patent demand experienced a "significant operational impact."[112] Settlement licenses signed by startups may reflect a calculus that included alternatives, such as delayed hiring or achievement of a significant milestone, changing a product, pivoting the business strategy, or shutting down a business line.[113]

If a settlement license is formed, the factors that influence the price include the cost of litigation, the cost of a design around, and what the courts might award should the patent owner be successful in asserting its patent (Table 1). As the recently concluded FTC report on the licensing and other practices of patent assertion entities[114] describes, "litigation PAEs" sign licenses that yield a total "less than the lower bounds of early stage litigation costs," a finding "consistent with nuisance litigation, in which defendant companies decide to settle based on the cost of litigation rather than the likelihood of their infringement."[115] The prospect of large discovery costs, regardless of the merits of the case, often induce settlement.

Interestingly, *ex post* demands can lead to *ex ante* and hybrid-FTO transactions. For instance, in 2013, IBM sent a letter to Twitter claiming that Twitter was infringing several of IBM's patents and invited Twitter to take a

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[112] *Startups and Patent Trolls*, *supra* note 71, at 465; Colleen V. Chien, *Patent Assertion and Startup Innovation* 23 (New Am. Found., Open Tech. Inst. White Paper, 2013), https://static.newamerica.org/attachments/3894-patent-assertion-and-startup-innovation/Patent%20Assertion%20and%20Startup%20Innovation_updated.62ca39039688474e9a588fc7019b0dde.pdf [hereinafter *Patent Assertion and Startup Innovation*].

[113] *Startups and Patent Trolls*, *supra* note 71, at 465; *Patent Assertion and Startup Innovation*, *supra* note 112, at 23.

[114] FED. TRADE COMM'N, PATENT ASSERTION ENTITY ACTIVITY: AN FTC STUDY (2016), https://www.ftc.gov/reports/patent-assertion-entity-activity-ftc-study.

[115] *Id.* at 43.

license.[116] The demand came as Twitter was preparing to go public.[117] Ultimately, Twitter bought many more patents, perhaps as many as nine hundred, than the handful that it was alleged to be infringing,[118] presumably for FTO purposes. Buying patents can skirt the multi-year process it takes to apply for and pursue a patent. Adding a patent purchase into a transaction can also obfuscate the lump sum that a licensee has paid for a license. Stated another way, a licensee may be worried that a future plaintiff may discover how much the licensee paid for a license and use that amount in the damages phase of a future case to argue for a large damages amount in the future case. By adding a patent purchase to a licensing deal, the licensee can make it difficult for a future plaintiff to use the amount paid to obtain a license against the licensee in a future patent litigation between that future plaintiff and the licensee.

IV. Adopting Real-world, Semi-Comparable Licenses to Damage Determinations

In order for courts to capture the benefit of the information provided by semi-comparable licenses when they determine an invention's *ex ante* incremental value, they must do two things. First, they must accept semi-comparables as evidence, and second, they must properly consider them in the context of the facts and circumstances of the particular reasonable royalty damages analysis. While we focus our discussion primarily on carrying out the second step, we acknowledge the risk associated with an expanded range of licenses at the license selection stage, that parties will have less certainty regarding which licenses will be considered sufficiently comparable. One mechanism for addressing this uncertainty would be to allow the parties to propose to the court which licenses its experts intend to rely on, and why, and to receive an indication from the court with respect to their acceptability prior to submission of the expert report. Just like trial court practices such as "reverse bifurcation,"[119] and early damages evaluation, early license evaluation can provide the parties with clues as to which pieces of evidence are sufficiently reliable for determining the value of the dispute. Currently, the costs of litigating low-value disputes, per side, can quickly exceed the amount of money at issue, making litigating through trial economically irrational in retrospect.[120] But early evaluation of damages evidence would provide a useful check for parties and support the consideration of a wide range of evidence without sacrificing the court's role as a gatekeeper. While a range of adjustments to the prices reflected in

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[116] Brid-Aine Parnell, *Twitter Avoids IP Face-off with Big Blue, Will Buy 900 IBM Patents*, THE REGISTER (Feb. 3, 2014, 11:17AM), http://www.theregister.co.uk/2014/02/03/twitter_ibm_patents/.

[117] *Id.*

[118] *Id.*

[119] 9A CHARLES ALAN WRIGHT & ARTHUR R. MILLER, FEDERAL PRACTICE AND PROCEDURE § 2390 (3d ed. 2008 & Supp. 2010) (describing reverse bifurcation in civil cases as the practice of "try[ing] damages and sometimes causation first, followed by a determination of liability").

[120] Colleen V. Chien & Michael Guo, *Does the US Patent System Need a Patent Small Claims Proceeding?* SANTA CLARA L. DIGITAL COMMONS (March 2013), http://digitalcommons.law.scu.edu/facpubs/666.

admissible transactions may still be required, the "worst" or "best" case scenarios that follow from such an assessment can help the parties manage litigation risk.

A. Evaluating and Adjusting Semi-Comparables

Because semi-comparable licenses have terms that, by definition, differ from the terms of the hypothetical license, they need to be understood and adjusted in context of the facts and circumstances of the given reasonable royalty damages analysis. Experts should explicitly call out the relevant differences in terms between a comparable or semi-comparable license and the hypothetical license being constructed in the context of the damages analysis and make appropriate adjustments for these term differences when arguing for a reasonable royalty.[121]

Ideally, the adjustments would be derived from data that is objective, verifiable, and accessible to all parties. One can analogize a typical hypothetical license to a residential real estate transaction, i.e., buying a home with certain characteristics. When a house is sold, an appraiser values the home by surveying the market for comparable sales, i.e., homes with similar characteristics in similar locations that were recently sold. There are now multiple open platforms that allow a prospective buyer or seller to input an address and obtain an estimate of the value of the house based on its particular features, as valued by the market and discerned through an updated record of transactions.

As one of us has previously described[122] and several of our interviewees stated, one way to reduce the wide range of values that experts assign to the incremental value of a technology would be to create a database that could be used by parties and courts to estimate the value of a "hypothetical patent license" in a manner similar to what is provided by commercial real estate estimators.[123] Such a database, with enough diverse data could be used to develop a linear regression model based on the characteristics of the relevant patent(s), the licenses, and the parties involved. Such a model would be all the more useful if it does not overly suffer from the circularity problem identified above with regard to pure patent licenses and instead is able to incorporate semi-comparables.[124] Currently, no such free publicly accessible database exists,[125] significantly compromising the functioning of the market, but a handful of studies are relevant. The most notable of these are a pair of

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[121] Kristopher A. Boushie & Kyle L. Hoff, *The Importance of a Reasonable Royalty License Comparability Analysis in Patent Litigation*, 2 Stout Risius Ross, Inc., (2013), http://www.srr.com/assets/pdf/importance-reasonable-royalty-license-comparability-analysis-patent-litigation.pdf.

[122] *See Study Proposal*, *supra* note 79.

[123] An independent, transparent entity could manage the entity and the funding could come from the users. Lemley and Myhrvold, *supra* note 78, at 257.

[124] As we point out *supra*, one way to reduce the circularity is to incorporate as much as possible agreements that are subject to market forces, e.g., "sale of technology" agreements (that happen to include IP rights).

[125] The Licensing Executives Society (LES) has a royalty rates survey that one can access by becoming a member of LES, *available at* http://www.lesusacanada.org/?page=royaltyrates (last visited on September 14, 2017).

studies carried out by Varner,[126] who has created a unique database of thousands of technology licenses submitted to the SEC.[127] Real-world licensing practices and the approaches that firms use to handle thorny valuation problems, such as assigning value to individual patents among multiple inputs, can also provide a principled basis for adjustment. Indeed one of the authors has experience developing a linear regression model for valuation of patent assets. It is at least plausible that similar techniques could be used to develop a model for valuing patent licenses. We draw upon these practices and studies to understand how empirical studies and real-world approaches can assist fact finders in their use of semi-comparables.

1. Patents Plus Transactions Can Provide a Ceiling for a Naked Patent License

Licenses that contain more than just the patent rights would appear to be among the best candidates for exclusion because of the difficulty of isolating the value assigned just to the patent rights. But semi-comparable licenses that include know-how and other forms of technology granted by the licensor (termed "patent plus" licenses), not just the patent, have much to recommend. First, they actually reflect the incremental value of the patented technology, the appropriate measure of reward for an infringed patent. Second, widely-adopted patent plus transactions, because they are driven by technical and commercial considerations, are much less likely to be unduly shaped by patent damages law or otherwise be distorted when formed. Third, patent plus agreements don't have to be limited just to licenses—they may include sales of the technology, for example through mergers and acquisition, or even unit sales of the patented component which may include the rights to numerous patents.

But while the Federal Circuit has acknowledged that "allegedly comparable licenses may cover more patents than are at issue in the action, include cross-licensing terms, cover foreign intellectual property rights, or, [] be calculated as some percentage of the value of a multi-component product,"[128] they have also admonished that the appropriate context for these agreements as applied to the patent litigation at hand is needed when presenting such transactions to the trial court.[129] The question is, how can semi-comparable patent plus licenses appropriately be used?

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[126] *See* Varner, *Technology Royalty Rates*, *supra* note 81; *see also An Economic Perspective*, *supra* note 81.

[127] Such a database is limited in scope because the reporting company preselected the licenses it deemed material to report to the SEC.

[128] Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1227 (Fed. Cir. 2014).

[129] *Id*. at 1228. ("We . . . conclude, however that, when licenses based on the value of a multi-component product are admitted, or even referenced in expert testimony, the court should give a cautionary instruction regarding the limited purposes for which such testimony is proffered if the accused infringer requests the instruction. The court should also ensure that the instructions fully explain the need to apportion the ultimate royalty award to the incremental value of the patented feature from the overall product.").

We believe that, at a minimum, patent plus agreements, analyzed in the context of a reasonable royalty analysis and appropriately adjusted, can serve as a ceiling on the incremental value of the invention. This follows from the intuition that, all other things being equal, transfers that include more than patent rights should be priced higher than transfers that only include patent rights. The difference in prices of patent plus licenses and prices of naked patent licenses has been observed empirically. Varner's study of 2,693 licenses found that licenses that included patents and grants to additional intellectual property including know-how, confidential information, data, discoveries, and formulas were priced, in general, higher than "bare patent" licenses, by about 38%-50%.[130] This pattern consistently held across all of the industries studied, including software, hardware, medical, and pharma.[131]

In some situations, specific adjustments to licenses can be made to arrive at a reasonable royalty. In other cases, it may be more appropriate to use the semi-comparable as a data point or input into the pricing of the reasonable royalty. For example, when the patented rights are sold in the open market, along with the hardware, the price of the hardware and rights, in most cases, should serve as a ceiling on the price of just the rights. Certain FTO transactions, open market or otherwise, that reflect the value of the patent rights as inputs into product development can similarly provide valuations that can be adjusted to resemble the terms of the hypothetical license. For example, if a company obtains a non-exclusive FTO license to a similar patent prior to commercializing the patent, and the negotiation reflects the transfer to support this commercialization, the terms of the license are arguably relevant. Other FTO transactions, when formed in the shadow of, and with an eye towards avoiding, litigation will have less probative value as to the incremental value of the technology. At the very least, though, these transactions may provide an indication of the willingness of the licensee to pay for comparable patent rights.

2. Lump-Sum Licenses

As described earlier, courts have also had trouble using lump-sum agreements to determine reasonable royalties, and vice versa.[132] But, as others have noted, running-royalty and lump-sum agreements are generally convertible after accounting for the nature and risk aversion characteristics of the parties, the circumstances of the license negotiations, the bundle of rights granted, etc.[133] For example, patent asserters will often provide their reasonable royalty analysis (typically a spreadsheet that includes which products are alleged to be infringing,

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[130] Varner, *Technology Royalty Rates*, *supra* note 81, at 122–23 tbl.1 (reporting average and mean royalties for "patent plus" licenses to be 5.1% and 4.5%, respectively, and for "bare patent" licenses to be 3.7% and 3.0%, respectively).

[131] *Id.*

[132] *See* discussions of *Lucent* and *WordTech* cases, *supra* in Part II. *But see infra* note 135 (discussing Personal Audio, LLC v. Apple, Inc. and other cases embracing lump sum evidence).

[133] *E.g.*, Epstein & Malherbe, *supra* note 69, at 6.

the past and projected future revenue of the accused products, the patents at issue, the expiration date of the patents at issue) in the alternate form of a lump-sum ask. There are few situations in which experts and courts could not do the opposite analysis to determine the royalty rate implied by a lump sum. Further, because, as one trial court has noted, "lump sums are one species of the broader genus of reasonable royalties, running royalties being another . . . . [And] a lump sum structure might better reflect what the hypothetical negotiation would produce,"[134] excluding lump-sum evidence is inadvisable. Courts can help all parties by describing how experts should justify a reasonable royalty from a lump sum agreement or when a lump sum is an appropriate reasonable royalty.[135]

3. Accounting for Validity and Infringement

One important question is how to account for validity and infringement. For example, during an *ex post* negotiation, the discussion usually focuses initially and oftentimes completely on invalidity and/or non-infringement when the distance between the patent owner and licensee is very large. *Ex ante* negotiations about the technology, in contrast, are less likely to factor in the likely validity of the patent because they are motivated by a desire to get the technology transferred, often independent of the patent.

Some commentators believe that licenses signed to settle litigation provide the best evidence of the value of a valid and infringed patent,[136] but we believe that there are better ways to make adjustments to semi-comparables, and avoid the numerous problems with settlement licenses described earlier. Indeed, though difficult for courts, in the real-world, the possibility of non-infringement and invalidity are regularly accounted for in licensing transactions. For example, a patent asserter's damages analysis often includes a discount for likelihood of success on validity and a discount for likelihood of success on infringement. The hazard of a court finding a patent invalid has stayed remarkably stable over the years, at around 43%,[137] and patent holders have steadily prevailed on cases that are adjudicated to a final judgment, a highly selected sample, about 26% of the time.[138]

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[134] Order Denying Motion to Exclude Expert Report of Dr. Stephen Prowse at 3, HTC Corp. v. Tech. Props. Ltd., No. 5:08-cv-00882-PSG, 2013 WL 4782598 (N.D. Cal. 2013), ECF No. 563.

[135] *See id.* at 3-4; Personal Audio, LLC v. Apple, Inc., No. 9:09CV111, 2011 U.S. Dist. LEXIS 83746, at *42 (E.D. Tex. July 29, 2011); Lighting Ballast Control, LLC v. Philips Elecs. N. Am. Corp., 814 F. Supp. 2d 665, 693 (N.D. Tex. 2011), *appeal denied*, Nos. 2012-1015, 2012-1014, 2012 U.S. App. LEXIS 5808 (Fed. Cir. Mar. 16, 2012).

[136] *See, e.g.*, Masur, *supra* note 67, at 147 (arguing that a license reached on the eve of litigation should serve as a "guiding star" in valuation because it reflects the expectation that the patent will be found valid and infringed by the court); Michael J. Chapman, *Using Settlement Licenses in Reasonable Royalty Determinations*, 49 IDEA 313, 316 (2009) (arguing, somewhat persuasively, that forward-looking settlement licenses share many features with the hypothetical license).

[137] John R. Allison, Mark A. Lemley & David L. Schwartz, *The Realities of Modern Patent Litigation*, 92 TEX. L. REV. 1769, 1801 (2014) ("Forty-six percent of patents whose validity was decided in the 1990s were held invalid; today the invalidation rate is 43%.") (footnotes omitted).

[138] *Id.* ("Ten years ago, Janicke and Ren found that patentees won only 25% of decided cases; we find that number virtually unchanged today.") (footnotes omitted).

A rational approach would be to derive a multiplier based on this number to account for the finding that a patent has been infringed and to apply it to contracts that take into account the likelihood of non-infringement or invalidity. Parties do this in their licenses, specifying royalty reductions based on subsequent findings that the licensed patent is invalid or infringed.[139] In his review of 1,458 patent licenses and assignments, Varner found that almost 30% of all patent and patent-plus-know-how licenses that specified a running royalty rate included a contingency to reduce the royalty under certain circumstances,[140] and that the premium associated with the presumption of validity and infringement was sizeable. Among patent licenses that included contingent royalty reductions, three-quarters specified a base royalty rate reduction of 50% or more.[141]

B. Rational and Objective Allocation of Incremental Value Across Multi-Component Products

Another key issue that courts struggle with is how to properly allocate value across products that incorporate multiple components. The development and refinement of apportionment approaches through case law has helped rationalize component liability,[142] but still leaves considerable uncertainty with respect to how damages will ultimately be calculated. However, because parties regularly have to perform apportionment when they secure and sell rights to make products and gain freedom to operate, real-world approaches can be instructive.

One approach is the "numeric proportionality" approach used by patent pools to compensate firms based on the number of patents they contribute to the pool.[143] For example MPEG-LA publishes participation fees and terms for certain standards.[144] The share of the total pooled patents contributed, plus their importance, are key inputs in the determination of a reasonable royalty. Applying this approach in the *Microsoft v. Motorola* case, Judge Robart determined the royalty owed to Microsoft to be three times the pool rate.[145]

Another related way of allocating value across a complex product that is based on the proportion of the total number of relevant patents to the number of patents at issue represents the "bottom-up" approach adopted by the court in the *Innovatio*

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139 *An Economic Perspective*, *supra* note 81, at 236.

140 *Id.* at 235.

141 *Id.* at 236.

142 For an overview, see David Franklyn & Adam Kuhn, *The Problem of Mop Heads in the Era of Apps: Toward More Rigorous Standards of Value Apportionment in Contemporary Patent Law*, 98 J. PAT. & TRADEMARK OFF. SOC'Y 182, 190–205 (2016).

143 Described, e.g., in Tom Cotter's draft of Chapter 7, "What is a Component Patent Worth?," in COLLEEN CHIEN, TOM COTTER & RICHARD POSNER, REDESIGNING PATENT LAW (unpublished manuscript) (on file with the journal).

144 *See, e.g.*, *AVC/H.264 License Agreement*, MPEGLA.COM, (last visited Oct. 2, 2016), http://www.mpegla.com/main/programs/AVC/Pages/Agreement.aspx.

145 Microsoft Corp. v. Motorola, Inc., No. C10-1823JLR, 2013 WL 2111217, at *92 (W.D. Wash. Apr. 25, 2013).

case.[146] At issue were nineteen standards-essential patents held by Innovatio and considered to be of "moderate to moderate-high importance," out of an estimated 3,000 patents essential to the 802.11 WiFi standard. The court allocated to Innovatio a portion of the estimated profit due to the "top 10%" of the essential patents, or 300 patents, resulting in a ratio of 19/300, and applied that to the estimated profit.[147]

A proportionality-based approach makes sense for several reasons. As in the standards context, the key inputs to these determinations are, unlike private license data, reasonably and objectively observable or determinable. They are harder to game, at least in the short-term, as the share of patents and of "high value" patents in particular that a single contributing firm can expect to capture is the result of a number of processes out of the firm's control, including the evaluation of patent applications by the U.S. Patent and Trademark Office (USPTO), patenting by others, the development of the pool or standard, and the evaluation of patents as essential to the relevant technology, important or not. As applied by the courts, top-down numeric proportionality and bottom-up approaches account for differences in the importance of individual patents.

These benefits can be captured across every level of abstraction,[148] with many of the same benefits. For example, one can determine value based on the share of total research and development (R&D) costs, share of patents (or patents of varying degree of importance) in the infringing product, share of patents in the smallest saleable patentable product unit, share of total code base, share of features in the product, or share of features that drive demand implicated by the patent. Unlike comparable licenses, these inputs to the calculation are observable and hard to game for the purposes of litigation.

Proportionality approaches have also been incorporated into licensing agreements.[149] When, at the time of licensing, a licensee does not know all of the possible inputs it will need, it can limit its overall exposure by using so-called "royalty stacking" provisions. In his review of 1,458 patent and patent plus licenses, Varner found a variety of types of clauses.[150] Some agreements specified that if the licensee later requires a license from a third-party in order to sell a product, the royalty would be reduced.[151] Other licenses specified a reduction in the event that the licensed product was combined with another product not covered by the patent, most commonly by reducing the royalty by a proportion based on the relative values of the licensed and unlicensed components.[152] Parties to an agreement can agree to

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146 *In re* Innovatio IP Ventures, LLC Patent Litig., No. 11 C 9308, 2013 WL 5593609, at *37 (N.D. Ill. Oct. 3, 2013).

147 *Id.* at *38–39, *43.

148 *Accord* Contreras & Gilbert, *supra* note 12, at 1486–88 (arguing that approaches to determining FRAND royalties should not be limited to standards patents, but to royalties determinations more generally).

149 *An Economic Perspective*, *supra* note 81, at 235–36.

150 *Id.* at 235.

151 *Id.*

152 *Id.* at 236.

modify the terms of their license based on "manufacturing or fully allocated cost, the number of active components, and the number of functions performed."[153] These qualities are fixed and independent of litigation.

V. Tailored Injunctions

So far we have discussed improving how courts determine compensation levels for component patents. But in some cases, what a willing licensor would likely agree to does not encompass what a willing licensee would be willing to pay. In that case, the most realistic hypothetical license may be no license. As one interviewee from an electronics company explained:

> [I]f all we get [the] rights to use [the] patent, we have to figure out how to make [the] thing, integrate it, and then build the factory . . . . For a [particular hardware chip], there are multiple suppliers. Some are easier to work with, have a better chip, [or] capacity. We can sell our [product] at a certain price. If we want to make a profit, we can't spend more than [a certain amount] on all the parts. Someone in the firm does the big analysis. If you add it all up, and you can't pay what a particular partner is offering, then you don't negotiate with them.

In this part, we contemplate the limited use of tailored injunctions in cases when a reasonable, evidence-based number, range, or ceiling for damages cannot be established and the elements set forth by the Supreme Court's decision in *eBay Inc. v. MercExchange, L.L.C.*[154] are met. We note at the outset that these situations may be relatively rare. In most cases, even if comparables or semi-comparables are hard to find, R&D costs or the costs of acquisition and development costs, plus some reasonable return, as well as past relevant records of transacting can provide evidence of the adequate level of compensation.[155]

However, according to *eBay*, an injunction is appropriate when legal damages are inadequate, the harm caused by the infringement is irreparable, and the balance of hardships and public interest favor grant of the injunction.[156] Enjoining a complex product, which includes many unpatented or licensed inputs, can result in a disproportionate remedy for the infringement of a single or small number of patents. In this situation, "tailored injunctions" can provide a more palatable, equitable option. As described previously, by a tailored injunction, we mean injunctions whose implementation is delayed or whose scope is narrowed, and compensating the plaintiff along the way.[157]

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153 *Id.* at 236.

154 eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 394 (2006).

155 For a fuller description of the idea of using costs as a basis for recovery, see Ted Sichelman, *Purging Patent Law of "Private Law" Remedies*, 92 TEX. L. REV. 517, 567–68 (2014).

156 *eBay Inc.*, 547 U.S. at 394.

157 Colleen V. Chien & Mark A. Lemley, *Patent Holdup, the ITC, and the Public Interest*, 98 CORNELL L. REV. 1, 28-32 (2012). *See also* John M. Golden, *Injunctions as More (or Less) than "Off Switches": Patent-Infringement Injunctions' Scope*, 90 TEX. L. REV. 1399 (2012) (discussing specially-tailored injunctions).

Courts have done some tailoring of injunctions, by allowing their implementation to be delayed, outside of patent contexts. In 1955, the Supreme Court ordered school desegregation to happen "with all deliberate speed" in the famous *Brown v. Board of Education* case.[158] A court in Texas once enjoined a state property tax but let the state to collect it for two more years.[159]

In the patent context, carve-outs and delays have been used in the U.S. by the International Trade Commission (ITC), whose only remedy is an injunction,[160] as well as to some degree by district courts.[161] When one of us published an article including injunction tailoring in 2012, we found three examples of tailoring at the ITC.[162] But since then, tailored injunctions have been requested, argued, and granted more frequently. In *Certain Sleep-Disordered Breathing Treatment Systems and Components Thereof*, Inv. No. 337-TA-890, the Commission's exclusion order exempted infringing parts imported for service and repair of medical equipment.[163] Similarly, in *Certain Mobile Electronic Devices, Including Wireless Communication Devices, Portable Music and Data Processing Devices, and Tablet Computers*, Inv. No. 337-TA-794, the court denied a request for the delayed implementation of the exclusion order,[164] but included a provision that allowed respondent Apple to provide refurbished handsets as replacements for identical infringing handsets for a period of two years.[165] In a handful of cases, the ALJ or Commission endorsed the idea of a tailored injunction but the Commission declined to enter it because it found no violation.[166] And in yet other cases, parties have asked for, but have not received, tailored injunctions.[167]

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158 Brown v. Board of Education, 349 U.S. 294, 301 (1955) (*Brown II*).

159 Carrollton-Farmers Branch Indep. Sch. Dist. v. Edgewood Indep. Sch. Dist., 826 S.W.2d 489 (Tex. 1992).

160 19 U.S.C. § 1337(d)-(g) (2012) (describing the exclusive remedies for violations of 19 U.S.C. § 1337 as exclusion and cease and desist orders). For an overview of the ITC and its jurisdiction, see Colleen V. Chien, *Patently Protectionist? An Empirical Analysis of Patent Cases at the International Trade Commission*, 50 WM. & MARY L. REV. 63, 70 (2008).

161 *See, e.g.*, Golden, *supra* note 157, at 1449–55 (describing and giving examples of "moderated injunctions," one form of specially tailored injunction that carves out certain types of infringing behavior).

162 *See* Chien & Lemley, *supra* note 157, at 33–35 (describing Certain Baseband Processor Chips and Chipsets, Transmitter and Receiver (Radio) Chips, Power Control Chips, and Products Containing Same, Including Cellular Telephone Handsets, Inv. No. 337-TA-543, USITC Pub. 4258, at 150-51 (June 19, 2007) (in which the Commission grandfathered in existing models of handsets) and Personal Data and Mobile Communications Devices and Related Software, Inv. No. 337-TA-710, USITC Pub. 4331, at 81, 83 (July 15, 2011)).

163 Comm'n Op. at 47 (Dec. 23, 2014).

164 Comm'n Op. at 105–14 (July 5, 2013).

165 *Id.* at 135.

166 *See* Certain Television Sets, Television Receivers, Television Tuners, and Components Thereof, Inv. No. 337-TA-910 (Cresta v. Silicon Labs, MaxLinear, Samsung, Vizio, Sharp, LG, etc.) (although the Commission found no violation, it endorsed Staff's proposal of delaying issuance of exclusion order for 12 months given the impact on consumers of a lack of TVs); Certain Microprocessors, Components Thereof, and Products Containing Same, Inv. No. 337-TA-781 (X2Y Attenuators v. Intel, Apple, and HP) (although the Commission found no violation, it endorsed Staff's proposal of delaying issuance of exclusion order for 9 months to allow for work

Making tailored injunctions in component patent cases, rather than full injunctions the default when injunctions are warranted, has several benefits. First, tailored injunctions are less disruptive than removing the product but more powerful than simply giving damages. In this way, it can address both hold-up: the wielding of power by the patentee in light of the high costs of switching, and hold-out[168]: the refusal of accused infringers to consider legitimate patent demands because they can. Under the threat of a non-tailored injunction, an implementer may end up settling based on unnecessary switching or design around costs, even though the patent is invalid or not infringed, a concept often referred to as "hold-up." But without the threat of injunction, the patentee cannot get the alleged infringer to the table, a concept often referred to as "hold-out."[169]

While the prospect of a tailored, rather than all-or-nothing injunction, changes the dynamic for the parties, it benefits third parties as well. Tailored injunctions reduce the risk of error in calculating long-term damages. Rather than having to approximate the damages until the patent expires, the court orders the specific relief of injunction. That relief is simpler to determine (though it does create monitoring costs). Tailored injunctions reduce disruption to the public or third parties who have sunk costs into the existing solution.

VI. Conclusion

The problem of how to compensate for component liability is as important as it is difficult. This paper argues that the court's increasingly stringent approach should be moderated to accommodate more forms of objective evidence of a patented invention's value, including sales and licenses for technology. Implementing this

around, given possible shortages in the U.S. of microprocessors, computers, servers, and workstations); Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof, Inv. No. 337-TA-868, Order No. 84 (Dec. 18, 2013) (ALJ recommended a remedial order with a six-month delay but the Commission found no violation). In still other cases, e.g., Certain Recombinant Factor VIII Products, Inv. No. 337-TA-956, the Commission has asked for briefing on how it would tailor, assuming it were to do so. ("If the Commission were to tailor any remedial order to allow current users to continue to reliably obtain Novoeight, how could the Commission draft such an exception?" available at https://www.usitc.gov/secretary/fed_reg_notices/337/337_956_notice07292016sgl.pdf).

167 Certain Optoelectronic Devices for Fiber Optic Communications, Components Thereof, and Products Containing Same, Inv. No. 337-TA-860, Comm'n Op. (May 9, 2014) (The commission rejected respondents' requests for a delay in the implementation of its remedial orders and for an exemption for replacement parts and warranty repairs. *Id.* at 33-35.); Certain Electronic Digital Media Devices and Components Thereof, Inv. No. 337-TA-796, Comm'n Op. at 109-132 (Sept. 6, 2013) confirmed (After the commission found a violation of Section 337, two dozen non-party briefs were submitted arguing that the exclusion order would be against the public interest. The commission declined to narrow or delay its remedial orders, except to expressly permit importation of specific models determined to be noninfringing.).

168 Also known as a "reverse hold-up." For a description, see Damien Geradin, *Reverse Hold-Ups: The (Often Ignored) Risks Faced by Innovators in Standardized Areas*, THE PROS AND CONS OF STANDARD-SETTING 101, 102–04 (2010). *See also* Colleen Chien, *Holding Up and Holding Out*, 21 MICH. TELECOMM. & TECH. L. REV. 1 (2014).

169 *Id.*

will require the development of more objective accounts of licensing and technology transactions as they happen on an everyday basis—not solely as a byproduct of litigation to serve one side or another. To address this void, we have provided a description of these contexts and encourage others to do the same. When the objective value of a patented invention cannot be determined, an order enjoining the complex product that incorporates it is not the only possible alternative to money damages. Following the example of the International Trade Commission and others, we argue, tailored injunctions can provide another solution to resolving thorny component liability problems.