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### The Next FRAND Battle: Why the Royalty Base Matters

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### I. INTRODUCTION

The first round of the FRAND wars was fought over injunctions. It produced a broad consensus among competition enforcement agencies that holders of FRAND-encumbered standard-essential patents (“SEPs”) may seek injunctive relief only in extraordinary circumstances.<sup>2</sup> The consensus is encapsulated in the European Commission’s determination that seeking or enforcing injunctive relief with respect to FRAND-encumbered SEPs is permissible only where the alleged infringer (1) is insolvent, (2) has no assets in jurisdictions that can enforce damages awards, or (3) is unwilling to enter into a license agreement on FRAND terms and conditions.<sup>3</sup>

The new FRAND battleground is the royalty base that may be used for calculating SEP royalties. The battle has been waged thus far predominantly in the United States. In a series of opinions rendered mostly outside the SEP context, the Court of Appeals for the Federal Circuit has ruled that the appropriate royalty base for purposes of calculating a reasonable royalty is the smallest saleable unit that practices the patented invention, unless “the patented feature drives the demand for an entire multi-component product.”<sup>4</sup> Both the Justice Department (“DOJ”) and the Federal Trade Commission (“FTC”) have endorsed this approach, particularly for complex products that incorporate numerous technologies.<sup>5</sup> The only potentially open issue, introduced

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<sup>2</sup> European Union: *See* Case AT.39985 *Motorola* (Apr. 29, 2014), ¶ 427; Case AT.39939 *Samsung* (Apr. 29, 2014); United States: *See Motorola Mobility LLC*, Analysis of Proposed Consent Order to Aid Public Comment (Jan 3, 2013), available at <http://ftc.gov/os/caselist/1210120/130103googlemotorolaanalysis.pdf>; U.S. Dep’t of Justice and U.S. Patent & Trademark Office, *Policy Statement On Remedies For Standards-Essential Patents Subject To Voluntary F/RAND Commitments* (Jan. 8, 2013), available at <http://www.justice.gov/atr/public/guidelines/290994.pdf>; Korea: *See* Korea Fair Trade Commission Guidelines for Review of Unreasonable Exercise of Intellectual Property Rights (Dec. 17, 2014).

<sup>3</sup> Case AT.39985 *Motorola* ¶ 427; Case AT.39939 *Samsung* ¶ 67. The question of when invocation of injunctive relief with respect to FRAND-encumbered SEPs may constitute an abuse of dominance under EU law is currently pending before the European Court of Justice. The court’s Advocate General has opined that seeking injunctive relief is abusive when the alleged infringer is willing and able to negotiate a license agreement. Opinion of Advocate General Wathelet in Case C-170/13, *Huawei Technologies Co. Ltd., v ZTE Corp., ZTE Deutschland GmbH* ¶ 103 (20 Nov. 2014).

<sup>4</sup> *LaserDynamics, Inc. v. Quanta Computer, Inc.*, 694 F.3d 51, 67 (Fed. Cir. 2012).

<sup>5</sup> *See* Letter from Renata B. Hesse to Michael A. Lindsay, Feb. 2, 2015, at 12, available at <http://www.justice.gov/atr/public/busreview/311470.pdf>; U.S. Federal Trade Commission, *THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION* at 212 (Mar. 7, 2011), available at <http://www.ftc.gov/os/2011/03/110307patentreport.pdf>.

by the Federal Circuit in its recent decision in *Ericsson Inc. v. D-Link Systems, Inc.*,<sup>6</sup> is whether the smallest saleable unit requirement is a substantive rule or an evidentiary rule for jury cases.

The United States, however, is the only jurisdiction in which the issue has received considerable vetting.<sup>7</sup> Given that SEP licenses are often worldwide in scope, many SEP holders that have based royalties on final product prices are likely to continue to do so in their worldwide licenses until the issue is resolved in more jurisdictions, at least where the relevant standard setting organization (“SSO”) has not provided for the use of the smallest saleable component as the royalty base. Thus far, one leading SSO based in the United States, the IEEE-SA, has adopted bylaws that require consideration of “[t]he value that the functionality of the claimed invention or inventive feature within the Essential Patent Claim contributes to the value of the relevant functionality of the smallest saleable Compliant Implementation that practices the Essential Patent Claim” in setting FRAND royalties.<sup>8</sup> The issue is likely to be fought in the coming months and years within SSOs, in the courts, and at competition enforcement agencies.

At first blush, it may seem puzzling why the royalty base should matter. After all, if the reasonable royalty on a patent that reads on a \$10 component is \$1, should it matter whether the royalty is expressed as 10 percent of the price of the component or 1 percent of the \$100 price of the multi-component product into which it is incorporated?

The revealed preferences of market participants suggest that the royalty base does matter. SEP holders with patent monetization businesses consistently seek to base royalties (and justify royalty levels) for SEPs that read at the component level on the price of the complete systems that incorporate those components. By contrast, standard implementers consistently advocate the use of component prices as the royalty base. Moreover, many monetizing SEP holders avoid licensing component manufacturers at all, even when the standard-compliant component manufacturers are far fewer than the final product manufacturers that use their components, such that licensing component makers offers very substantial transaction cost efficiencies. This suggests that SEP holders expect to earn greater net revenues by basing royalties on final products’ prices, even though it is virtually certain that they will collect royalties on fewer products because of the transaction costs of reaching the larger universe of device manufacturers.

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<sup>6</sup> 773 F.3d 1201, 1227 (Fed. Cir. 2014).

<sup>7</sup> The royalty base issue was one of the subjects addressed by China’s National Development and Reform Commission (“NDRC”) in connection with its antitrust investigation of Qualcomm. According to an unofficial translation of the NDRC’s decision, the NDRC determined that it was “unfair of [Qualcomm] to use as base for calculating royalty the net wholesale price of the whole device, which is beyond the coverage of the SEPs held by [Qualcomm], while insisting on a relatively high royalty rate at the same time ....” The NDRC barred Qualcomm from “insisting on comparatively high royalty rates” while using devices’ wholesale prices as the royalty base. A Qualcomm SEC filing suggests that the NDRC may have accepted Qualcomm’s use of a discounted system price as the royalty base. See Qualcomm Inc., Form 8-K (Feb. 9, 2015), available at <http://files.shareholder.com/downloads/QCOM/3959978433x0xS1234452-15-31/804328/filing.pdf>. At the same time, China’s Ministry of Industry and Information Technology has released a Template for Intellectual Property Policies in Industry Standardization Organizations that advocates that standard-setting organizations establish the smallest salable patent practicing unit as the royalty base for SEPs.

<sup>8</sup> IEEE-SA Standards Board Bylaws, ¶ 6.1 (Feb. 8, 2015), available at <http://standards.ieee.org/develop/policies/bylaws/approved-changes.pdf>.

This article surveys U.S. law on the royalty base issue and then discusses the economic evidence regarding the relevance of the royalty base to the magnitude of the final royalty. Based on this evidence, it concludes that the choice of the royalty base affects the royalty size.

## II. THE “ENTIRE MARKET VALUE RULE” IN THE UNITED STATES

In the United States, long-standing Supreme Court precedent requires that “the patentee ... must in every case give evidence tending to separate or apportion the defendant’s profits and the patentee’s damages between the patented feature and the unpatented features [of the infringing product],” or show that “the profits and damages are to be calculated on the whole machine, for the reason that the entire value of the whole machine, as a marketable article, is properly and legally attributable to the patented feature.”<sup>9</sup> This is the “entire market value” rule.<sup>10</sup>

In a series of cases involving computer and electronics products, the Federal Circuit has held that this rule requires the royalty to be based on the smallest saleable component that practices a patented feature unless the patentee proves that the patented feature is the basis for demand for the entire product. The court’s decisions represent a reaction to outsized jury awards for minor patents reading on complex products with rich feature sets. For example, in *Lucent Techs., Inc. v. Gateway, Inc.*,<sup>11</sup> the court reversed a damages award amounting to 8 percent of Microsoft’s revenues from the sales of Outlook for infringing a single patent on a date entry method. In *Uniloc USA, Inc. v. Microsoft Corp.*,<sup>12</sup> the court held that damages for a patent on a minor feature of Windows and Office could not be based on the billions of dollars in revenues that Microsoft earned from these products, on which the jury had assessed a 2 percent royalty. The court held that patent damages may be “based on the entire market value of the accused product only where the patented feature creates the ‘basis for customer demand’ or ‘substantially create[s] the value of the component parts.’”<sup>13</sup>

In *LaserDynamics, Inc. v. Quanta Computer, Inc.*,<sup>14</sup> the Federal Circuit addressed a demand for a 2 percent royalty on the price of an entire notebook computer for a single patent that read on a method for identifying the type of optical disc inserted into a disc drive. The court concluded that “[w]here small elements of multi-component products are accused of infringement, calculating a royalty on the entire product carries a considerable risk that the patentee will be improperly compensated for non-infringing components of that product.”<sup>15</sup> It held that “in any case involving multi-component products, patentees may not calculate damages based on sales of the entire product, as opposed to the smallest salable patent-practicing unit, without showing that the demand for the entire product is attributable to the patented feature.”<sup>16</sup>

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<sup>9</sup> *Garretson v. Clark*, 111 U.S. 120, 120 (1884) (internal quotation marks omitted).

<sup>10</sup> Strictly speaking, this is the “entire market value” exception to the apportionment rule.

<sup>11</sup> 580 F.3d 1301, 1332 (Fed. Cir. 2009).

<sup>12</sup> 632 F.3d 1292 (Fed. Cir. 2011).

<sup>13</sup> *Id.* at 1318 (citations omitted).

<sup>14</sup> 694 F.3d 51 (Fed. Cir. 2012).

<sup>15</sup> *Id.* at 67.

<sup>16</sup> *Id.* at 67-68.

The court said that this rule was necessary to “ensure that the royalty rate ... does not overreach and encompass components not covered by the patent.”<sup>17</sup>

In its 2014 decision in *VirnetX, Inc. v. Cisco Systems, Inc.*,<sup>18</sup> the Federal Circuit explained that the reasonable royalty may have to be apportioned even into subcomponents when a component itself incorporates multiple valuable features that are unrelated to the patent in suit. Thus, “[w]here the smallest salable unit is, in fact, a multi-component product containing several non-infringing features with no relation to the patented feature ..., the patentee must do more to estimate what portion of the value of that product is attributable to the patented technology.”<sup>19</sup>

The court reaffirmed this point in *Ericsson*, where it stated that the “realistic starting point” for royalty calculations is “the smallest salable unit and, at times, even less.”<sup>20</sup> Further, in the context of standard-essential patents, “[j]ust as we apportion damages for a patent that covers a small part of a device, we must also apportion damages for SEPs that cover only a small part of a standard.”<sup>21</sup> *Ericsson*, however, introduced a new twist to the royalty base jurisprudence by suggesting that the smallest saleable unit requirement may be an evidentiary rule for jury cases, rather than a substantive rule of patent damages.<sup>22</sup> It remains to be seen how the court will apply this requirement outside the jury context.

The Federal Circuit has rejected the argument that the royalty base should not affect the ultimate damages award because the rate may be calibrated to the size of the base. For example, in *Uniloc*, the court said that “[t]he disclosure that a company has made \$19 billion dollars in revenue from an infringing product cannot help but skew the damages horizon for the jury, regardless of the contribution of the patented component to this revenue.”<sup>23</sup> In *Ericsson*, it said that, although an appropriately apportioned royalty award theoretically could be crafted on the basis of the final product’s price by “dramatically reducing the royalty rate to be applied,” use of “the entire market value might mislead the jury, who may be less equipped to understand the extent to which the royalty rate would need to do the work in such instances.”<sup>24</sup> These were, of course, jury cases, and it remains to be seen whether the court would apply the same approach when the decision maker is a judge and not a jury.

The appropriate royalty base also was at issue in two pre-*Ericsson* judicial determinations of FRAND royalty rates. In *In re Innovatio IP Ventures, LLC Patent Litig.*, the court held that “the appropriate royalty base in this case is the Wi-Fi chip, the small module that provides Wi-Fi capability to electronic devices in which it is inserted.”<sup>25</sup> In *Microsoft Corp. v. Motorola, Inc.*, the court did not rule explicitly on the royalty base but considered a royalty rate based on the price of

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<sup>17</sup> *Id.* at 70.

<sup>18</sup> 767 F.3d 1308 (Fed. Cir. 2014).

<sup>19</sup> *Id.* at 1327.

<sup>20</sup> 773 F.3d at 1227.

<sup>21</sup> *Id.* at 1232-33.

<sup>22</sup> *Id.* at 1226-27.

<sup>23</sup> 632 F.3d at 1320.

<sup>24</sup> 773 F.3d at 1227. This view represents course reversal from the court’s earlier view that “the base used in a running royalty calculation can always be the value of the entire commercial embodiment, as long as the magnitude of the rate is within an acceptable range (as determined by the evidence).” *Lucent*, 580 F.3d at 1338-39.

<sup>25</sup> 2013 WL 5593609 at \*8 (N.D. Ill. 2013).

a Wi-Fi chip to be “an indicator of a RAND rate for Motorola’s 802.11 [Wi-Fi] SEP portfolio.”<sup>26</sup> In this regard, it is telling that the court chose to highlight testimony that “a 1% royalty on a chip placed in an \$80,000.00 Audi A8 would be \$800.00, or about 267 times the retail price of the chip.”<sup>27</sup>

### III. DOES THE ROYALTY BASE MATTER?

The Federal Circuit’s conclusion that exposure to companies’ revenues from the sale of final products is likely to produce excessive damages awards implicitly embraces the concept of “anchoring” from the behavioral economics literature. This concept posits that individuals’ estimates of uncertain values are highly sensitive to an “anchor” value to which the individuals are exposed before reaching a decision. The court’s analysis embraces the idea that juries inappropriately anchor the reasonable royalty’s magnitude to the finished product’s revenues. Anecdotal evidence of outsized jury awards, such as in *Lucent* and *Uniloc*, tends to lend credence to the theory in the jury context.

How valid is this anchoring concept and does it have any relevance outside the United States, where patent damages are assessed by judges and not juries? The concept is based on the pioneering experimental work of Amos Tversky and Daniel Kahneman, for which Kahneman won a Nobel Prize (Tversky had passed away by the time of the award of the prize), on judgments under conditions of uncertainty. In one famous experiment, individuals were asked to estimate the number of African nations in the United Nations after being shown a number that was generated in their presence by spinning a wheel of fortune. The arbitrary numbers had a marked effect on the study participants’ estimates. Subjects who were shown higher numbers gave higher estimates.<sup>28</sup>

Subsequent research has observed anchoring in a broad range of other settings under uncertainty.<sup>29</sup> One set of studies of particular relevance to the decision making by judges, rather than juries, involved sentencing decisions. In a study by German researchers, German trial judges were divided into two groups that received identical cases studies involving an alleged rape, but were given different sentencing recommendations. When asked to impose a sentence, the group that received the higher recommendation imposed a higher sentence on average.<sup>30</sup> This anchoring effect held regardless of the judges’ level of experience. Moreover, the anchoring effect held even when judges were told that the sentencing recommendations came from a computer science student. Subsequent research involving German judges and prosecutors showed an

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<sup>26</sup> 2013 WL 2111217 at \*95 (W.D. Wash. 2013).

<sup>27</sup> *Id.* at \*94. In another cases involving FRAND-encumbered Wi-Fi SEPs, the court instructed the jury to consider the contributions of the SEPs at issue to the standard and “consider the contribution of the standard as a whole to the market value of Realtek’s products utilizing the standard,” which were Wi-Fi chips. *Realtek Semiconductor Corp. v. LSI Corp.*, No. C-12-3451, ECF No. 267 at 23 (N.D. Cal. June 16, 2014) (quoted in *Ericsson*, 773 F.3d at 1229 n.6).

<sup>28</sup> See Amos Tversky & Daniel Kahneman, *Judgment under Uncertainty: Heuristics and Biases*, 185 SCIENCE 1124-31 (1974).

<sup>29</sup> A good summary of the research is found in DANIEL KAHNEMAN, THINKING FAST AND SLOW (2011).

<sup>30</sup> Birte Englich & Thomas Mussweiler, *Sentencing Under Uncertainty: Anchoring Effects in the Courtroom*, 31 J. OF APPLIED SOCIAL PSYCHOLOGY 1535 (2001).

anchoring effect in a hypothetical shoplifting case in which researchers gave the subjects a prosecutor's sentencing demand and told them that the demand was determined randomly.<sup>31</sup>

Behavioral economics, however, is a controversial discipline. One particularly cogent criticism of the research in this field is offered by Judge Richard Posner, who points out that most behavioral economics studies use university students as their subjects to assess marketplace behavior. In everyday life, these subjects, like most individuals, have no experience as sellers. Consequently "[e]xperimental situations in which the subjects are asked to trade with each other are artificial, and so we cannot have much confidence that the results generalize to real markets."<sup>32</sup> As Commissioner Joshua Wright & Judge Douglas Ginsburg argue, "many (but not all) of the behaviorists' findings are fragile and disappear when exposed to market discipline and the profit motive, which create incentives for participants to specialize and to learn to reduce their errors."<sup>33</sup>

These criticisms, however, do not appear to apply directly to the assessment of reasonable royalties in litigation. In assessing patent damages, decision makers have no financial stake in the outcome. Judges (and, of course, juries) are not directly subject to market discipline. And to the extent that a common law system of decisional law is self-correcting,<sup>34</sup> the correction process undoubtedly occurs over longer time horizons than when players with financial stakes engage in market transactions. This leaves decision makers subject to anchoring biases.

Even so, one might argue that the anchoring argument is incomplete and thus may not explain why exposure to the final product price will lead decision makers to award excessive royalties. Defense lawyers, after all, are free to present judges or juries with their own anchors and demonstrate the fallacy of patentees' anchors by furnishing evidence concerning the multitude of innovative features in a final product that are unrelated to patents in suit. If the Federal Circuit in *Lucent* was astute enough to observe that the insignificant patented feature at issue there was "but a tiny feature of one part of a much larger software program,"<sup>35</sup> why should we think that other judges and juries would be inordinately swayed by the price of a final product?

One answer may be that evidence of the contributions of other components to the final product is likely to be complex and require considerable trial time to present. Given judicially imposed time constraints on the presentation of a party's case, and the need to devote the lion's share of the allotted time to infringement, defense counsel's ability to discredit the high anchor represented by the final product price may be limited. Moreover, as Lemley & Melamed point out, "the intense focus in the trial on the patents-in-suit almost guarantees that their importance

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<sup>31</sup> Birte English, Thomas Mussweiler, & Fritz Strack, *Playing Dice With Criminal Sentences: The Influence of Irrelevant Anchors on Experts' Judicial Decision Making*, 32 PERSONALITY & SOCIAL PSYCHOLOGY BULL. 188 (2006). See also Mark A. Lemley & A. Douglas Melamed, *Missing the Forest for the Trolls*, 113 COLUM. L. REV. 2117, 2144 n.118 (2013) (summarizing research).

<sup>32</sup> Richard A. Posner, *Rational Choice, Behavioral Economics, and the Law*, 50 STAN. L. REV. 1551, 1566 (1998).

<sup>33</sup> Joshua D. Wright & Douglas H. Ginsburg, *Behavioral Law and Economics: Its Origins, Fatal Flaws, and Implications for Liberty*, 106 NW. U. L. REV. 1, 11-12 (2012).

<sup>34</sup> See George L. Priest, *The Common Law Process and the Selection of Efficient Rules*, 6 J. LEGAL STUD. 65 (1977).

<sup>35</sup> 580 F.3d at 1332.

will be exaggerated relative to that of the other technologies and, thus, that the damages award will be based on an inflated sense of the value of the patents-in-suit.”<sup>36</sup> That enhances the risk that the system price royalty base will produce an inflated royalty.

In addition, in a world in which a smartphone implements 250,000 patents<sup>37</sup> and a laptop computer implements more than 250 standards,<sup>38</sup> an appropriately apportioned royalty for a given set of patents may strike at least some decision makers as minuscule when presented as a percentage of the system price, thereby creating upward pressure on the royalty amount. This can be seen in the *Uniloc* case, where at trial the plaintiff successfully based its objection to Microsoft’s proposed royalty on the argument that it offered the inventor merely 0.00003 percent of Microsoft’s revenues from Windows and Office.<sup>39</sup> Typical announced royalty rates for telephony SEPs holders are single-digit percentages on a system-level royalty base,<sup>40</sup> which may reflect the *appearance* of single-digit rates as quite ordinary, whether the royalty base is the system price or the component price.<sup>41</sup>

In addition, the idea that the royalty rate will automatically adjust to the royalty base with a proportionally lower rate on a higher royalty base, while superficially appealing, may be overly simplistic. This is because negotiated licenses typically cover product lines rather than individual products and invariably apply a single royalty rate to all licensed products. Consequently, the use of the same standard-compliant component in two differently priced systems will result in a different royalty burden on the two systems.

Consider a telephony SEP license to a manufacturer of two smartphones, one selling for \$250 and the other for \$400, which use the same standard-compliant chipset. If the chipset price were used as the royalty base, the royalty on both phones would be the same. Use of the phone’s price, however, results in a royalty on the pricier phone that is 60 percent higher than that on the cheaper phone. Although one might argue that the negotiated royalty rate will be adjusted to something resembling a weighted average that would match the component-based royalty, SEP holders tend to demand the same royalty rate from most manufacturers (in part because of the

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<sup>36</sup> Lemley & Melamed, *supra* note 31, at 2144.

<sup>37</sup> See RPX Corp., Amendment No. 3 to Form S-1, Apr. 11, 2011, at 59, *available at* <http://www.sec.gov/Archives/edgar/data/1509432/000119312511101007/ds1a.htm>; Steve Lohr, Apple-Samsung Case Shows Smartphone as Legal Magnet, N.Y. TIMES, 25 Aug. 2012, *available at* <http://www.nytimes.com/2012/08/26/technology/apple-samsung-case-shows-smartphone-as-lawsuit-magnet.html>.

<sup>38</sup> See Brad Biddle et al., *How Many Standards in a Laptop? (And Other Empirical Questions)* (2010), *available at* [http://www.standardslaw.org/How\\_Many\\_Standards.pdf](http://www.standardslaw.org/How_Many_Standards.pdf).

<sup>39</sup> 632 F.3d at 1320-21.

<sup>40</sup> See Eric Stasik, *Royalty Rates and Licensing Strategies for Essential Patents on LTE (4G) Telecommunications Standards*, LES NOUVELLES 116 (September 2010), *available at* <http://www.investorvillage.com/uploads/82827/files/LESI-Royalty-Rates.pdf>.

<sup>41</sup> For the resulting royalty stack, see Ann Armstrong, Joseph J. Mueller, & Timothy D. Syrett, *The Smartphone Royalty Stack: Surveying Royalty Demands for the Components Within Modern Smartphones* (2014), *available at* [https://www.wilmerhale.com/uploadedFiles/Shared\\_Content/Editorial/Publications/Documents/The-Smartphone-Royalty-Stack-Armstrong-Mueller-Syrett.pdf](https://www.wilmerhale.com/uploadedFiles/Shared_Content/Editorial/Publications/Documents/The-Smartphone-Royalty-Stack-Armstrong-Mueller-Syrett.pdf).



nondiscrimination element of FRAND), so this sort of calibration is unlikely to occur in the real world.<sup>42</sup> For this reason, the same effect also occurs across manufacturers.

Evidence that royalty rates do not calibrate to the royalty base is presented by Lemley & Shapiro, whose analysis of data from trial verdicts showed that royalty rates levied on components were less than 50 percent higher than rates imposed on complete systems.<sup>43</sup> As Lemley & Shapiro observe, this ratio “does not reflect commercial reality, at least in the telecommunications and computer industries. Even if each of the litigated component inventions was part of a simple two-component product, we should expect to see a more significant reduction in the royalty rate if the system were working as intended.”<sup>44</sup>

#### IV. LICENSORS’ REVEALED PREFERENCE

The stronger evidence that the royalty base matters comes from the revealed preferences of market participants, some of which generate billions of dollars in licensing profits and thus, to paraphrase Wright & Ginsburg, are exposed to market discipline and the profit motive. One common feature of the litigated royalty base cases is that it is always the patent holder that seeks to use the price of the final product as the royalty. This revealed preference by firms that monetize patents suggests that patentees expect that using the price of a complete system as the royalty base will yield higher royalty income than basing royalties on the value of the infringing component. The revealed preference of market participants with large sums at stake suggests that the royalty base does matter.<sup>45</sup>

The *Ericsson* case that ultimately landed in the Federal Circuit, which involved Wi-Fi SEPs, yielded a wealth of evidence on the revealed preferences of one leading SEP monetization enterprise. In that litigation, Ericsson licensing executives testified that their company licensed only end-product manufacturers because it expected to obtain higher royalties by licensing them and not the chipmakers that implement the Wi-Fi standard in their chipsets, whose first sale of a licensed chipset would exhaust licensed patents.<sup>46</sup> Ericsson earns more than \$1 billion annually in licensing revenues,<sup>47</sup> so its view presumably reflects considerable marketplace experience.

Consideration of transaction costs reinforces the conclusion that using the final product price as the royalty base results in higher royalties. This can be seen from *Ericsson*, where the way to minimize transaction costs would have been to license chipmakers. This is because only a

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<sup>42</sup> This effect may be bounded to some extent by royalty caps and floors, but the existence of these bounds does not obviate the effect.

<sup>43</sup> Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 2034 (2007).

<sup>44</sup> *Id.*

<sup>45</sup> The theory of revealed preference was first developed by Paul Samuelson. See Paul A. Samuelson, *A Note on the Pure Theory of Consumers' Behavior*, 5 ECONOMICA 61 (1938).

<sup>46</sup> For example, one senior executive testified that by licensing only end products, “the royalty income will be higher since we calculate the royalty on a more expensive product.” *Ericsson Inc. v. D-Link Systems*, Case No. 6:10-CV-473 (E.D. Tex.), trial testimony of Christina Petersson, June 4, 2013, pm session at 37. Another executive agreed that “Ericsson can demand a higher royalty income” from end product manufacturers “because those products are more expensive than for example, Wi-Fi chip.” *Id.*, testimony of Nhils Forslund, dep. transcript of Dec. 14, 2012, at 96-97.

<sup>47</sup> According to Ericsson’s annual report, the company derived 10.6 SEK from licensing activities in fiscal 2013. Ericsson, 2013 Annual Report at 37.

handful of manufacturers make Wi-Fi chips,<sup>48</sup> while thousands make end products that incorporate Wi-Fi chips.<sup>49</sup> Granting licenses to chipmakers almost certainly would have increased the number of standard-compliant products on which a royalty is paid, given the difficulty of reaching all manufacturers of end products that incorporate Wi-Fi functionality, as compared to licensing a few chipmakers. It also would have substantially eliminated the hold-out problem that some cite in support of allowing FRAND-encumbered SEP holders to obtain injunctions.<sup>50</sup>

A potential objection to licensing component manufacturers is that it leaves licensors exposed to infringement lawsuits by their licensees' customers, which will be licensed through exhaustion, and thereby defeat the licensor's right to a reciprocal SEP license.<sup>51</sup> But SEP holders may protect themselves from this outcome through defensive suspension. Under a defensive-suspension clause, a license may be suspended upon the filing of an infringement action against the licensor. This would be a valid exercise of the right to reciprocity. Moreover, many SEP holders possess arsenals of implementation patents that are not subject to FRAND commitments that they may invoke against companies that sue them for infringement.

In comments to the FTC, Qualcomm, whose preferences must reflect the considerable market experience that generates for it billions of dollars annually from licensing,<sup>52</sup> offers two other efficiency-based reasons for using the price of a finished system as the royalty base. It claims that the system price is a better royalty base because of "inefficient costs associated with attempting to calculate revenues from 'smallest saleable components', and with attempting to map individual patents to individual components."<sup>53</sup> Qualcomm does not explain what inefficiency exists in calculating revenues from the smallest saleable component for SEP licenses, such as licenses for telephony SEPs, particularly given that the inventions claimed by SEPs are typically implemented within a single component. The reference to mapping individual patents

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<sup>48</sup> A May 2014 report by ABI Research shows that six companies account for 95 percent of Wi-Fi chipset revenues.

<sup>49</sup> Wi-Fi enabled products include various types of personal computers, tablets, smartphones, eBook readers, gaming consoles, handheld gaming devices, printers, digital cameras, camcorders, network routers, network access points, televisions, set-top boxes, DVD players, Blu-ray players, 3D glasses, digital photo frames, portable music players, network hi-fi systems, speakers, thermostats, home automation products, in-car infotainment systems, and numerous other products.

<sup>50</sup> See, e.g., Anne Layne-Farrar, *Moving Past the SEP RAND Obsession: Some Thoughts on The Economic Implications of Unilateral Commitments and the Complexities of Patent Licensing*, 21 GEO. MASON L. REV. 1093 (2014).

<sup>51</sup> Standard-setting organizations that require FRAND commitments universally allow SEP holders to condition such commitments upon the receipt of a reciprocal license of SEPs for the same standard. See, e.g., ETSI Rules of Procedure at 37 (2014), available at <http://www.etsi.org/images/files/IPR/etsi-ipr-policy.pdf>; IEEE-SA Standards Board Bylaws ¶ 6.2 (2015), available at <http://standards.ieee.org/develop/policies/bylaws/approved-changes.pdf>.

<sup>52</sup> In 2014, Qualcomm earned \$7.9 billion from licensing. Qualcomm Inc., Form 10-K for period ending Sep. 28, 2014, at 36.

<sup>53</sup> Comments of Qualcomm Inc., FTC Patent Standards Workshop, at 36 (June 13, 2011), available at [http://www.ftc.gov/sites/default/files/documents/public\\_comments/request-comments-and-announcement-workshop-standard-setting-issues-project-no.p111204-00011%20A0/00011-60525.pdf](http://www.ftc.gov/sites/default/files/documents/public_comments/request-comments-and-announcement-workshop-standard-setting-issues-project-no.p111204-00011%20A0/00011-60525.pdf).

to individual components also seems fallacious, as the need to demonstrate that a patent is infringed and link the infringement to a product feature exists independently of the royalty base.

Another potential objection to the use of the infringing component's price as the royalty base is that it may undercompensate a SEP holder for the contributions of the SEP to complementary components.<sup>54</sup> For example, a fast telephony standard makes it possible to view high-resolution videos in real time and thus, in a sense, may enhance the value of a high-resolution graphics chip and display. If this is the case, use of the component as the royalty base arguably may prevent efficient price discrimination. But it is difficult to link any given SEP—as opposed to the standard to which it relates—to such an enhancement. As a leading proponent of a system-level royalty concedes, estimating such synergistic contributions would be “unlikely to inspire confidence in the accuracy of its results.”<sup>55</sup>

Moreover, while a standard as a whole may create such synergism, it is highly doubtful that individual SEPs do. When making this synergism argument, proponents of a system-level royalty base tend to conflate SEPs with the standards to which they contribute.<sup>56</sup> In any event, both value-based pricing and price discrimination are inconsistent with the concept of FRAND, which seeks to replicate the outcome of an *ex ante* competition for inclusion in a standard and expressly requires nondiscrimination.<sup>57</sup>

The synergy argument, moreover, ignores the fact that many features of complex products such as PCs or smartphones provide substantial benefits that are independent of standards for other features. This observation leads to the following thought experiment. A decade ago, before the introduction of the iPhone, mobile phones were primarily voice communication devices. Their capabilities corresponded closely to those of the telephony standards that they implemented; a phone was in large measure an embodiment of the standards. Today's mobile phones are complex computing and multimedia devices. The numerous technologies that they incorporate include, among many others, an advanced microprocessor, a graphics processor, flash memory, DRAM, location awareness technology, touch technology, voice recognition, high-definition still and video cameras, video and music replay, power management technology, and an advanced operating system. All of these technologies provide numerous benefits that are independent of a faster telephony connection. Given the evolution of the device, if royalty rates calibrated substantially to the royalty base, one would expect royalties for telephony SEPs to account for a lower percentage of the product's final price than a decade ago, as otherwise the royalties would tax these other unrelated features.

Because patent licenses are typically subject to confidentiality restrictions, publicly available evidence on royalty rates is sparse. The limited evidence that exists suggests that the

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<sup>54</sup> See J. Gregory Sidak, *The Proper Royalty base for Patent Damages*, 10 J. COMP. L. & ECON. 989, 993-95 (2014).

<sup>55</sup> *Id.* at 995. The same proponent concedes that estimating such synergistic contributions “would be cumbersome, prone to disputes, and unlikely to inspire confidence in the accuracy of its results.” *Id.*

<sup>56</sup> See *id.*; Ericsson on FRAND and SEP Litigation, submission to the International Telecommunications Union (Oct. 10, 2012), at 6, available at [www.itu.int/dms\\_pub/itu-t/oth/06/5B/T065B0000340007MSWE.docx](http://www.itu.int/dms_pub/itu-t/oth/06/5B/T065B0000340007MSWE.docx).

<sup>57</sup> See, e.g., Joseph Farrell, John Hayes, Carl Shapiro, & Theresa Sullivan, *Standard Setting, Patents, and Hold-Up*, 74 ANTITRUST L.J. 603 (2007).

system-level percentage rates have not declined.<sup>58</sup> Although this issue cannot be resolved empirically here, it can be tested empirically in any litigation. If a SEP holder seeks the same or similar percentage rate for a smartphone that it sought a decade ago for a dumb phone, it has the burden of explaining why that rate does not impermissibly tax the numerous innovative technologies that have been added to the phone in the intervening time.

## V. CONCLUSION

The insistence of companies with large patent monetization businesses on basing SEP royalties on the price of complete systems confirms that the royalty base matters. Given the existence of transaction cost *inefficiencies* in licensing only complete systems and not standard-practicing components, the conclusion that the royalty base affects the royalty amount is unavoidable.

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<sup>58</sup> See Stasik, *supra* note 40.