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# Reconsidering the Georgia-Pacific Standard for Reasonable Royalty Patent Damages

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## Reconsidering the *Georgia-Pacific* Standard for Reasonable Royalty Patent Damages

Christopher B. Seaman\*

### ABSTRACT

*Determining damages for infringement is one of the most important—and controversial—issues in patent litigation. The current fifteen-factor Georgia-Pacific standard for determining a reasonable royalty has become increasingly difficult for juries to apply in patent disputes involving complex, high-technology products, resulting in unpredictable damage awards that tend to overcompensate patentees.*

*This Article proposes a more manageable alternative to Georgia-Pacific when an acceptable noninfringing substitute for the patented technology exists. Specifically, in a hypothetical bargain for a patent license, both economic and negotiation theory explain that a rational patent licensor would agree to pay only the costs it would incur to adopt and implement a noninfringing substitute technology, plus any lost benefits related to the substitute's use. Indeed, the Federal Circuit already has recognized an analogous limitation on damages in the context of lost profits, although it has defined the universe of alternatives too narrowly by refusing to consider imperfect substitutes for the patented technology.*

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## I. INTRODUCTION

Determining damages for infringement is one of the most important—and controversial—issues in current patent litigation.<sup>1</sup> Jury verdicts of over \$100 million have become almost commonplace in the past few years.<sup>2</sup>

- In February 2007, Lucent was awarded \$1.53 billion against Microsoft as a reasonable royalty for infringement of two patents used in the MP3 audio compression format;<sup>3</sup>
- In February 2008, Dr. Bruce Saffran was awarded \$501 million against Boston Scientific as a reasonable royalty for infringement of a patent covering drug-eluting stent technology;<sup>4</sup>

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1. *See, e.g.*, PETER S. MENELL ET AL., PATENT CASE MANAGEMENT JUDICIAL GUIDE § 7.3.4.7 (2009) (“One of the most vexing issues in patent law today relates to the proper measure of damages.”); Daralyn J. Durie & Mark A. Lemley, *A Structured Approach to Calculating Reasonable Royalties*, 14 LEWIS & CLARK L. REV. 627, 628 (2010) (“The calculation of patent damages has become one of the most contentious issues in all of intellectual property (IP) law.”); Michael H. King & Steven M. Evans, *Selecting an Appropriate Damages Expert in a Patent Case: An Examination of the Current Status of Daubert*, 38 AKRON L. REV. 357, 357 (2005) (“The determination of damages is a critical part of any patent case.”).

2. *See, e.g.*, Jerry A. Hausman, Gregory K. Leonard & J. Gregory Sidak, *Patent Damages and Real Options: How Judicial Characterization of Noninfringing Alternatives Reduces Incentives to Innovate*, 22 BERKELEY TECH. L.J. 825, 827 (2007) (“Jury awards [for patent infringement] exceeding \$100 million were relatively rare before 1990 but now are common.”).

Notably, this list does not include cases settled in the face of potential damage awards of similar magnitude. *See, e.g.*, Press Release, Broadcom.com, Qualcomm and Broadcom Reach Settlement and Patent Agreement (Apr. 26, 2009), *available at* <http://www.broadcom.com/press/release.php?id=s379764> (settlement of \$891 million for patent litigation regarding cellular chips); Press Release, Research in Motion, Ltd., Research in Motion and NTP Sign Definitive Settlement Agreement to End Litigation (Mar. 3, 2006), *available at* <http://press.rim.com/release.jsp?id=981> (settlement for \$612.5 million regarding wireless email patents in the face of a permanent injunction).

3. *Lucent Techs., Inc. v. Gateway, Inc.*, 509 F. Supp. 2d 912 (S.D. Cal. 2007), *aff’d on other grounds*, 543 F.3d 710 (Fed. Cir. 2008). After trial, the district court granted Microsoft’s motion for judgment as a matter of law and/or motion for a new trial regarding damages on several grounds, including misapplication of the so-called “entire market value rule.” *Id.* at 935–40.

4. Final Judgment, *Saffran v. Boston Sci., Corp.*, No. 2:05-CV-547 (TJW) (E.D. Tex. Feb. 2, 2008), *motion for new trial on damages denied*, 2008 U.S. Dist. LEXIS 52561 (E.D. Tex. July 9, 2008).

- In April 2008, Lucent was awarded another \$358 million against Microsoft—raised to \$511 million after prejudgment interest—as a reasonable royalty for infringement of a patent on a date-picking feature utilized by Microsoft Outlook;<sup>5</sup>
- In June 2008, Cornell University was awarded \$184 million against Hewlett-Packard as a reasonable royalty for infringement of a patent regarding computer instruction-processing techniques;<sup>6</sup>
- In April 2009, Uniloc was awarded \$388 million against Microsoft as a reasonable royalty for infringement of a patent about technology designed to deter software piracy;<sup>7</sup>
- In May 2009, i4i Limited Partnership was awarded \$200 million against Microsoft as a reasonable royalty for infringement of a patent regarding custom XML encoding in Microsoft Word,<sup>8</sup> a feature that was “used by only a small fraction of Microsoft’s customers”;<sup>9</sup>
- In June 2009, Centocor, a Johnson & Johnson subsidiary, was awarded \$1.67 billion—including \$504 million as a reasonable royalty—against Abbott Laboratories for infringement of a patent on a drug for autoimmune diseases;<sup>10</sup>
- In August 2009, Versata Software was awarded \$138 million against SAP as a reasonable royalty for infringement of two

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5. Lucent Techs., Inc. v. Gateway, Inc., 580 F. Supp. 2d 1016 (S.D. Cal. 2008), *vacated and remanded*, 580 F.3d 1301 (Fed. Cir. 2009).

6. Cornell Univ. v. Hewlett-Packard Co., 609 F. Supp. 2d 279, 282 (N.D.N.Y. 2009). After trial, the district court reduced the judgment amount to approximately \$53 million. *Id.* at 291–92.

7. Uniloc USA, Inc. v. Microsoft Corp., 640 F. Supp. 2d 150 (D.R.I. 2009), *aff’d in part, rev’d in part, and remanded*, No. 2010-1035, 2011 WL 9738 (Fed. Cir. Jan. 4, 2011). This award was vacated by the district court in September 2009 when it granted judgment as a matter of law of noninfringement for Microsoft. *Id.* at 154, 161–76.

8. i4i Ltd. P’ship v. Microsoft Corp., 670 F. Supp. 2d 568 (E.D. Tex. 2009), *aff’d*, 598 F.3d 831 (Fed. Cir. 2010), *cert. granted*, 79 U.S.L.W. 3128 (U.S. Nov. 29, 2010) (No. 10-290).

9. *i4i*, 598 F.3d at 862.

10. Verdict Form, Centocor Ortho Biotech Inc. v. Abbott Labs., No. 07-CV-139-TWJ (E.D. Tex. June 29, 2009), *available at* <http://thepriorart.typepad.com/files/centocor.abbott.verdict.form.pdf>. The remaining \$1.168 billion was awarded as lost profits. *Id.* This is the largest verdict in the history of U.S. patent litigation. *The Plaintiff’s Hot List*, NAT’L L.J., Oct. 5, 2009, at S8.

patents on methods for pricing products in multilevel product and organization groups;<sup>11</sup>

- In March 2010, VirnetX was awarded \$105 million against Microsoft as a reasonable royalty for infringement of two patents related to virtual private networks (“VPN”) between computers;<sup>12</sup> and
- In October 2010, Mirror Worlds was awarded a total of \$625.5 million as a reasonable royalty against Apple for infringement of three patents—\$208.5 million per patent—by Apple’s computers and mobile devices.<sup>13</sup>

In addition, methods for calculating damages have become a primary stumbling block for patent reform legislation, which has languished in Congress since 2005.<sup>14</sup>

This Article argues that the current “gold standard” for awarding reasonable royalty damages<sup>15</sup>—the so-called *Georgia-Pacific*<sup>16</sup> test—has become increasingly difficult for juries to apply in lengthy and complex patent trials, resulting in unpredictable damage awards.<sup>17</sup>

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11. Verdict Form, *Versata Software, Inc. v. SAP Am.*, No. 2:07-CV-153 (E.D. Tex. Aug. 26, 2009).

12. Verdict Form, *VirnetX Holding Corp. v. Microsoft Corp.*, No. 6:07-CV-80 (E.D. Tex. Mar. 16, 2010). This litigation was subsequently settled for \$200 million in May 2010. Press Release, Microsoft Corp., *Microsoft and VirnetX Settle Patent Infringement Cases* (May 17, 2010), available at <http://www.microsoft.com/presspass/press/2010/may10/05-17newspr.mspx>.

13. Verdict Form, *Mirror Worlds, LLC v. Apple, Inc.*, No. 6:08-CV-88 (E.D. Tex. Oct. 1, 2010).

14. Durie & Lemley, *supra* note 1, at 628; see also *Damages Provisions of the Patent Reform Act*, LAW360, May 28, 2009, <http://www.law360.com/articles/99166> (explaining that “[p]erhaps no effort has been more contentious than that directed toward changing the damages provision of the patent statute”); George Best, Benjamin Berkowitz & Stephen Maebius, *How Damaged Is the Patent Reform Act? Dispute Over How to Calculate Awards Is Just the Latest IP Debate Slowing Down This Bill*, LEGAL TIMES, July 7, 2008, at 16, available at 2008 WLNR 27111257 (noting that the Patent Reform Act “is being held up, in large part, by a dispute over proposed changes to the statute governing damage awards for patent infringement”).

15. Durie & Lemley, *supra* note 1, at 628.

16. *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970).

17. See F. Russell Denton, *Rolling Equilibriums at the Pre-Commons Frontier: Identifying Patently Efficient Royalties for Complex Products*, 14 VA. J.L. & TECH. 48, 83–84 (2009) (arguing that “[t]he myriad of possibilities for parties to . . . cherry-pick [from *Georgia-*

The *Georgia-Pacific* test, developed almost forty years ago by a district court and subsequently adopted by the Federal Circuit,<sup>18</sup> identifies fifteen factors for the jury to consider in a so-called “hypothetical negotiation” between the patentee and the accused infringer.<sup>19</sup> These factors involve a wide variety of technical, financial, licensing, and other issues. Furthermore, they are nonexclusive, meaning that the jury may consider any relevant information that does not fall within a particular factor.<sup>20</sup> Finally, courts have refused to mandate any method for weighing these factors, thus permitting the parties, their damages experts, and the jury to pick and choose which factors they consider more or less important in any given case.<sup>21</sup> As a result, it is unsurprising that *Georgia-Pacific* has been criticized as giving juries “little useful guidance”<sup>22</sup> in determining a reasonable royalty.

Indeed, there is a growing body of evidence that *Georgia-Pacific* has resulted in the systematic overcompensation of patent owners in certain industries.<sup>23</sup> Moreover, the wide latitude given to juries in evaluating the *Georgia-Pacific* factors makes it difficult for courts to review reasonable royalty awards to determine if they are supported

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*Pacific*’s] constellation of fifteen separate factors probably doomed the reproducibility of outcomes from the outset”).

18. *See, e.g.*, *Unisplay, S.A. v. Am. Elec. Sign Co.*, 69 F.3d 512, 517 n.7 (Fed. Cir. 1995) (stating that “[a] comprehensive list of relevant factors in determining a reasonable royalty is set out in *Georgia-Pacific*”); *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1077 (Fed. Cir. 1983) (affirming reasonable royalty award based on trial court’s application of *Georgia-Pacific*).

19. *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1324–25 (Fed. Cir. 2009); *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1554 n.13 (Fed. Cir. 1995) (en banc).

20. *See, e.g.*, *Micro Chemical, Inc. v. Lextron, Inc.*, 317 F.3d 1387, 1393 (Fed. Cir. 2003) (stating that factors considered in the reasonable royalty analysis “include those set out in *Georgia-Pacific*”).

21. *See Georgia-Pacific*, 318 F. Supp. at 1120–21 (“[T]here is no formula by which these [fifteen] factors can be rated precisely in the order of their relative importance or by which their economic significance can be automatically transduced into their pecuniary equivalent.”).

22. S. REP. NO. 110-259, at 11–12 (2008).

23. Mark A. Lemley, *Distinguishing Lost Profits from Reasonable Royalties*, 51 WM. & MARY L. REV. 655, 667 (2009); *see also* H.R. REP. NO. 110-314, at 26 (2008) (finding that “current litigation practices often produce a royalty award substantially in excess of a reasonable royalty”).

by substantial evidence.<sup>24</sup> This is particularly problematic because a reasonable royalty recently has become the most commonly employed method for calculating patent infringement damages, supplementing or replacing the traditional remedy of the patentee's lost profits.<sup>25</sup>

This Article offers an alternative standard for calculating a reasonable royalty when there is an acceptable substitute to the patented technology. Specifically, it proposes that a reasonable royalty for patent infringement should not exceed the accused infringer's expected costs of adopting an acceptable noninfringing substitute. This standard is based on the economic principle of substitutability: a rational actor will not pay more for a particular good or service when a lower-cost replacement is available. This standard is also supported by negotiation theory, which explains that a rational negotiator would not agree to an outcome that would be worse than the next-best available alternative if no deal was reached. As a result, when an acceptable substitute to the patented technology exists, a rational accused infringer would pay only the amount that it would cost to obtain (or internally develop) and implement the substitute technology, as well as any lost profits or other costs incurred due to the substitute's adoption. In fact, the Federal Circuit has already recognized an analogous limitation on damages in the context of lost profits.<sup>26</sup>

Part II of this Article discusses the history of a reasonable royalty prior to *Georgia-Pacific*, including early cases' consideration of acceptable noninfringing substitutes. Part III explains the current regime for calculating patent damages, including the relative decline of lost profits as a basis for recovery compared to a reasonable royalty under the *Georgia-Pacific* standard. Part IV explains why *Georgia-Pacific*'s application in modern patent trials is problematic,

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24. See also Durie & Lemley, *supra* note 1, at 632–35 (finding that overwhelming majority of courts affirm the reasonable royalty number selected by the jury).

25. See ARON LEVKO, 2009 PATENT DAMAGES STUDY: PRELIMINARY RESULTS, slide 9 (Feb. 11, 2009), available at <http://www.ftc.gov/bc/workshops/ipmarketplace/feb11/docs/alevko.pdf> (finding that since 1999, 54% of damages awards were calculated based on a reasonable royalty, compared to 40% based on lost profits).

26. See, e.g., *SmithKline Diagnostics, Inc. v. Helena Labs. Corp.*, 926 F.2d 1161, 1165 (Fed. Cir. 1991) (stating that to recover lost profits, a patentee must establish, *inter alia*, “absence of an acceptable, non-infringing substitute for the patented product” (citing *Panduit Corp. v. Stahl Bros. Fibre Works*, 575 F.2d 1152, 1156 (6th Cir. 1978))).

particularly those involving complex, high-technology products that may practice numerous patents. Finally, Part V contends that the cost of adopting an acceptable noninfringing substitute should serve as a ceiling on a reasonable royalty award. Part V also addresses potential concerns that such a ceiling would result in the undercompensation of patentees by granting a “free option” to infringe.

## II. A BRIEF HISTORY OF REASONABLE ROYALTIES FOR PATENT INFRINGEMENT

### *A. Recognizing Reasonable Royalties as a Measure of Damages*

Before 1915, courts generally rejected the idea of a reasonable royalty for patent infringement.<sup>27</sup> Instead, the “chief measure” of a patentee’s damages was “an established royalty rate from actual licenses” for the patent-in-suit.<sup>28</sup> For example, in *Rude v. Westcott*,<sup>29</sup> the Supreme Court held that damages for infringement did not include a reasonable royalty for the patented technology.<sup>30</sup> In that case, the plaintiffs—assignees of the original patentee<sup>31</sup>—sought royalties for the two patents-in-suit, which claimed an improved drill for seeding machines.<sup>32</sup> The Court rejected plaintiffs’ claim for an

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27. JOHN M. SKENYON, CHRISTOPHER S. MARCHESI & JOHN LAND, PATENT DAMAGES LAW AND PRACTICE § 3:9 (2009).

28. *Id.*; see also *Clark v. Wooster*, 119 U.S. 322, 326 (1886) (“It is a general rule in patent causes that established license fees are the best measure of damages that can be used.”); *Faulkner v. Gibbs*, 199 F.2d 635, 638 (9th Cir. 1952) (“Where an established royalty for a license is proved, this is the best measure of the value of what was taken by the infringement.”).

29. 130 U.S. 152 (1889).

30. *Id.* at 166–67.

31. *Id.* at 162–63.

32. *Id.* at 163–64. The plaintiffs–assignees “waived all claim for [lost] profits arising from the manufacture, use and sale of the patented machines” because “no machines” embodying the patented technology “had been manufactured and put on the market by the patentee[] or . . . his assignees.” *Id.* at 163, 167.

Interestingly, the assignment in *Rude* provided that the patentee granted the plaintiffs–assignees the right to “demand, sue for and receive” licensing fees against “all and any person whomsoever, who may have been, or may be, manufacturing or selling said drills containing the [patented] improvements.” *Id.* at 156. The patentee would receive 25% of the “sales, royalties, or settlements” obtained by the plaintiffs, after deducting litigation and licensing costs. *Id.* at 157–58. Thus, the plaintiffs in *Rude* appear to be an early type of non-practicing entity—also called a “patent troll”—that “purchased or licensed the patents at issue

established royalty, finding that the two licenses identified did not “establish a market price” for the patented technology.<sup>33</sup> In addition, it concluded that the plaintiffs could not recover a “reasonable and fair royalty” for the alleged infringement.<sup>34</sup> During a proceeding before a special master on damages, plaintiffs offered testimony from several witnesses “to estimate the value” of the patents.<sup>35</sup> Defendants, in turn, argued that no royalty should be awarded because there were acceptable noninfringing substitutes for the patented technology.<sup>36</sup> Ultimately, the Court rejected the claim for a reasonable royalty, holding that plaintiffs’ “conjectural estimates” of the patents’ value did not offer a legally cognizable basis for damages.<sup>37</sup>

In 1915, however, the Supreme Court sanctioned a “reasonable royalty” as an appropriate measure of patent infringement damages. In *Dowagiac Manufacturing Co. v. Minnesota Moline Plow Co.*,<sup>38</sup> which involved litigation over a patent for an improved grain drill, the plaintiff was unable to prove any lost profits due to defendants’ infringement.<sup>39</sup> In addition, the Court held “there was no established royalty” because the plaintiff had maintained the patent

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from another . . . solely for the purpose of licensing [the] patented technology.” RICHARD F. CAULEY, *WINNING THE PATENT DAMAGES CASE: A LITIGATOR’S GUIDE TO ECONOMIC MODELS AND OTHER DAMAGE STRATEGIES* 20 (2009); *see also* John R. Allison, Mark A. Lemley & Joshua Walker, *Extreme Value or Trolls on Top? The Characteristics of the Most-Litigated Patents*, 158 U. PA. L. REV. 1, 24 (2009) (describing “nonpracticing entities” as including “licensing companies in the business of buying up and enforcing patents (‘trolls’ by virtually anyone’s definition”).

33. *Rude*, 130 U.S. at 163–65 (“Sales of licenses, made at periods years apart, will not establish any rule on the subject and determine the value of the patent.”).

34. *Id.* at 166.

35. *Id.*

36. *See id.* (offering testimony from defense witnesses—who had examined and used drills embodying the patented technology—“that they did not consider [the patented drills] of any more utility than other seeding drills in use, and that [the patented drills] did not bring any greater price in the market”).

37. *Id.* at 167 (holding that the special master’s reasonable royalty violated “a settled rule of law . . . that actual, not speculative, damages must be shown, and by clear and definite proof, to warrant a recovery for the infringement of a patent”).

38. 235 U.S. 641, 648 (1915).

39. *Id.*

as a “close monopoly” by refusing to license it.<sup>40</sup> Nevertheless, the Court held that in such situations, the plaintiff could “show the value by proving what would have been a reasonable royalty” for the patent.<sup>41</sup> It explained that

[i]f there had been an established royalty, the jury could have taken that sum as the measure of damages. In the absence of such royalty, and in the absence of proof of lost sales or injury by competition, the only measure of damages was such sum as, under all the circumstances, would have been a reasonable royalty for the defendant to have paid.<sup>42</sup>

The *Dowagiac* court concluded that a reasonable royalty should be determined in light of “the nature of the invention, its utility and advantages, and the extent of the use involved.”<sup>43</sup> As John Schlicher has explained, this meant a reasonable royalty “should be based on the utility and advantages this invention provided beyond those available from use of the next best alternative.”<sup>44</sup> Consequently, “[t]he Court was requiring that the royalty measure be set based on the marginal value of the invention” over any substitutes.<sup>45</sup>

In 1922, Congress amended the patent laws<sup>46</sup> to codify the *Dowagiac* decision and authorize the recovery of a reasonable royalty for patent infringement.<sup>47</sup> If a patentee suffered damages that were “not susceptible of calculation and determination with reasonable certainty,” such as lost profits or an established royalty, the 1922 Act

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40. *Id.* (holding that if plaintiff had “grant[ed] licenses to others to deal in articles embodying the invention, the established royalty could have been proved as indicative of the value of what was taken, and therefore as affording a basis for measuring the damages”).

41. *Id.*

42. *Id.* at 649 (quoting *Hunt Bros. Fruit-Packing Co. v. Cassidy*, 64 F. 585, 587 (9th Cir. 1894)); see also *U.S. Frumentum Co. v. Lauhoff*, 216 F. 610 (6th Cir. 1914) (holding that in “instances where no market value [for the patent] existed and where no loss or impairment of sales can be definitely proved,” the patentee can still recover “a ‘reasonable royalty’”).

43. *Dowagiac*, 235 U.S. at 648.

44. John W. Schlicher, *Measuring Patent Damages by the Market Value of Inventions—The Grain Processing, Rite-Hite, and Aro Rules*, 82 J. PAT. & TRADEMARK OFF. SOC’Y 503, 509 (2000).

45. *Id.*

46. Act of Feb. 18, 1922, Pub. L. No. 67-147, § 8, 42 Stat. 389, 392 [hereinafter “1922 Act”].

47. See *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 243 F. Supp. 500, 519–20 (S.D.N.Y. 1965) (“The reasonable royalty was written into the 1922 statute . . .”).

allowed courts to “adjudge and decree the payment by the defendant to the complainant of a reasonable sum as . . . general damages for the infringement.”<sup>48</sup> The 1922 Act also permitted the patentee to present “competent and admissible” evidence in support of a reasonable royalty, including expert and opinion testimony at the court’s discretion.<sup>49</sup>

In 1946, the patent statute was further amended to explicitly declare that “a reasonable royalty” was available to determine damages,<sup>50</sup> aiding a plaintiff who was unable (or unwilling) to establish them by other means, such as lost profits. Specifically, the 1946 Act provided that upon a judgment of infringement, the patentee “shall be entitled to recover general damages which shall be due compensation for making, using, or selling the invention, *not less than a reasonable royalty therefor*, together with such costs, and interest, as may be fixed by the court.”<sup>51</sup> As a result, a reasonable royalty became the minimum measure of damages for infringement.

The 1952 Patent Act,<sup>52</sup> which remains in force today, made only minor changes to the 1946 Act’s damages provisions. The relevant portion of this Act, currently embodied in 35 U.S.C. § 284, provides that a patentee may recover “damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for

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48. § 8, 42 Stat. at 392.

49. *Id.*

50. Act of Aug. 1, 1946, Pub. L. No. 79-587, 60 Stat. 778 (hereinafter “1946 Act”); see also Note, *Recovery in Patent Infringement Suits*, 60 COLUM. L. REV. 840, 848 (1960) (explaining that after the 1946 Act, “[a] reasonable royalty is now always awarded to compensate for the whole or any part of an infringement not compensated by other measures of damages” (footnotes omitted)).

51. 60 Stat. at 778 (emphasis added). The 1946 Act, like the 1922 Act, permitted expert or opinion testimony on the amount of a reasonable royalty. *Id.* The 1946 Act also removed the 1922 Act’s provision that a plaintiff should be entitled to “profits to be accounted for by the defendant”—i.e., disgorgement of the infringer’s own profits due to his misconduct—in addition to the plaintiff’s own damages. Compare § 8, 42 Stat. at 392, with 60 Stat. at 778. The Supreme Court explained the distinction between “profits” and “damages” for patent infringement by stating that “[i]n patent nomenclature[,] what the infringer makes is ‘profits’; what the owner of the patent loses by such infringement is ‘damages.’” *Duplace Corp. v. Triplex Safety Glass Co.*, 298 U.S. 448, 451 (1936) (quoting *Diamond Stone-Sawing Mach. Co. v. Brown*, 166 F. 306 (2d Cir. 1908)). The elimination of “profits” in the 1946 Act was intended “to eliminate the recovery of [the infringer’s] profits as such and allow recovery of damages only.” *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 377 U.S. 476, 505 (1964).

52. Act of July 19, 1952, Pub. L. No. 82-593, 66 Stat. 812.

the use made of the invention by the infringer.”<sup>53</sup> The legislative history of the 1952 Act indicates that no substantive changes were intended by this alteration in language.<sup>54</sup>

*B. Noninfringing Substitutes Before Georgia-Pacific*

In calculating a reasonable royalty, several pre-*Georgia-Pacific* decisions considered the value of the patented technology in light of potential noninfringing substitutes. These decisions explained that courts must evaluate the “utility and advantages” of an invention over existing products or methods for accomplishing the same objective.<sup>55</sup> For instance, in *B.F. Goodrich Co. v. Consolidated Rubber Tire Co.*,<sup>56</sup> the Seventh Circuit affirmed the district court’s reasonable royalty for infringement of a patent for improved rubber tires, based in large part on widespread recognition that the patented tire had become the “standard rubber tire” and was superior to any available alternative.<sup>57</sup>

Likewise, in *Activated Sludge, Inc. v. Sanitary District of Chicago*,<sup>58</sup> the district court extensively considered the “character of the inventions, their utility, their history, [and] their practicability and advantages,” including the patent’s “usefulness and commercial value reflected by their advantages over other devices or processes,”

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53. *Id.* The following sentence was added at the end of the second paragraph by Pub. L. No. 106-113, § 1000(a)(9): “Increased damages under this paragraph shall not apply to provisional rights under section 154(d) of this title.” 35 U.S.C. § 284 (2000). This amendment has no relevance to this Article’s analysis.

54. *See* S. REP. NO. 82-1979 (1952); H.R. REP. NO. 82-1923 (1952); 98 CONG. REC. 9097 (1952); *see also* *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 243 F. Supp. 500, 521 (S.D.N.Y. 1965) (“[T]he 1952 codification was not intended to make substantive modifications in the provisions relating to recovery . . .”).

55. *See, e.g.*, *Enter. Mfg. Co. v. Shakespeare Co.*, 141 F.2d 916, 920 (6th Cir. 1944); *Dunkley Co. v. Cent. Cal. Canneries*, 7 F.2d 972 (9th Cir. 1925); *see also* *Hartford Nat’l Bank & Trust Co. v. E.F. Drew & Co.*, 188 F. Supp. 353, 359 (D. Del. 1960) (considering the “nature of the invention, its utility, [and] its novelty over and advance in the art” as relevant factors in determining a reasonable royalty).

56. 251 F. 617 (7th Cir. 1918).

57. *See id.* at 623 (recounting testimony that “[f]ew patents have received such immediate and well-nigh unanimous recognition. It is the standard rubber tire of today,” that the patented tire “has been accepted as the termination of the struggle for a completely successful tire,” and that it “established, and has ever since maintained, its supremacy over all other rubber tires”).

58. 64 F. Supp. 25 (N.D. Ill. 1946).

in determining a reasonable royalty.<sup>59</sup> The patent at issue, which claimed an activated sludge process for treating and purifying sewage, was identified as the “most desirable” and “‘best adapted’ type of artificial sewage treatment” available, and that “no method has been found . . . which is as well suited to the requirements of the sewage treatment problem as the [patented] activated sludge process.”<sup>60</sup> After an extensive analysis, the district court found that the available alternative identified by defendant was “inferior to that of activated sludge” and that the “undisputed advantages” of the patented process were “beyond question” and “must enter into the determination by this court of what is just compensation for invasion of plaintiffs’ rights.”<sup>61</sup>

### III. THE CURRENT DAMAGES REGIME

This Part explains how lost profits, once the dominant method for determining patent damages, has become less common than a reasonable royalty award based on a so-called “hypothetical negotiation” between the patentee and infringer for a license to the patented technology. Today, nearly all reasonable royalty awards are based on the fifteen-factor test adopted in the district court’s 1970 decision in *Georgia-Pacific Corp. v. United States Plywood Corp.*<sup>62</sup> As explained below, however, the *Georgia-Pacific* case dramatically differs from modern patent infringement litigation in several important ways.

#### *A. The Relative Decline of Lost Profits*

As previously explained, under the current patent damages statute, 35 U.S.C. § 284, a patentee shall recover “damages adequate to compensate for the infringement, but in no event less than a reasonable royalty” for the defendants’ infringing use. Courts have interpreted this language to conclude that patent damages can be determined using several different methods.

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59. *Id.* at 27.

60. *Id.* at 30.

61. *Id.* at 30–31; *see also id.* at 29–30 (describing the alternative “Imhoff trickling filter process”).

62. 318 F. Supp. 1116 (S.D.N.Y. 1970).

The first method is lost profits, which is a remedy for patent owners who can establish that the infringement deprived them of profits that they otherwise would have earned.<sup>63</sup> From an economic perspective, “the purpose of a lost profits damages award in a patent case is to compensate the patent holder for the profits on sales that it lost as a result of the infringement.”<sup>64</sup> The classic example of lost profits is diverted sales—that is, profits the patentee would have made from sales of goods or services but for the infringer’s wrongful conduct.<sup>65</sup> Lost profits may also arise from price erosion, where competition by the infringer causes the patentee to reduce its prices and thus earn less profit on the goods or services that it did sell.<sup>66</sup> Other potential theories of recovery under the umbrella of lost profits can include increased expenditures in advertising or marketing to correct the harm to the patentee’s market position caused by the infringement;<sup>67</sup> future lost profits due to the continuing harm caused by past infringement;<sup>68</sup> and—more controversially—damages for so-called “convoyed sales,” which are lost sales of goods that are not

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63. See SKENYON ET AL., *supra* note 27, § 1.7 (“The patent owner may recover its lost profits . . . if the patent owner can prove that the infringement caused the patent owner to lose profits that it otherwise would have made.”); see also *BIC Leisure Prods., Inc. v. Windsurfing Int’l, Inc.*, 1 F.3d 1214, 1218 (Fed. Cir. 1993) (“[A] patent owner must prove a causal relation between the infringement and its loss of profits.”).

64. Hausman, Leonard & Sidak, *supra* note 2, at 833.

65. See, e.g., *Micro Chem., Inc. v. Lextron, Inc.*, 318 F.3d 1119, 1124 (Fed. Cir. 2003); *State Indus., Inc. v. Mor-Flo Indus., Inc.*, 883 F.2d 1573, 1578 (Fed. Cir. 1989).

66. *Lam, Inc. v. Johns-Manville Corp.*, 718 F.2d 1056, 1065 (Fed. Cir. 1983); SKENYON ET AL., *supra* note 27, § 2.4 (“Price erosion damages are awarded when the patent owner establishes that its sales during the infringing period were made at prices below what they would have been absent infringement.”); see also *Yale Lock Mfg. Co. v. Sargent*, 117 U.S. 536, 551 (1886) (“Reduction of prices, and consequent loss of profits, enforced by infringing competition, is a proper ground for awarding damages.”) (quoting *Sargent v. Yale Lock Mfg. Co.*, 21 F. Cas. 507, 508 (C.C.S.D.N.Y. 1879) (No. 12,366)).

67. *Lam*, 718 F.2d at 1065; see also *Scripto-Tokai Corp. v. Gillette Co.*, 788 F. Supp. 439, 444 (C.D. Cal. 1992) (explaining that “increased expenses for advertising and promotion” can be part of lost profits).

68. *Oiness v. Walgreen Co.*, 88 F.3d 1025, 1031 (Fed. Cir. 1996); see also Christopher S. Marchese, *Patent Infringement and Future Lost Profits Damages*, 26 ARIZ. ST. L.J. 747 (1994). *But see* *Brooktree Corp. v. Adv. Micro Devices, Inc.*, 977 F.2d 1555, 1581 (Fed. Cir. 1992) (rejecting the patentee’s claim of future lost profits due to “the uncertainties of future pricing, future competition, and future markets” in the “fast-moving field” of semiconductors).

covered by the patent-in-suit, but that are typically sold in connection with the patented good or service.<sup>69</sup>

The most common way to establish lost profits under § 284 is the four-factor test first articulated by the Sixth Circuit in *Panduit Corp. v. Stablin Brothers Fibre Works, Inc.*<sup>70</sup> “To recover lost profits under the *Panduit* test, ‘the patent owner must prove (1) a demand for the patented product, (2) an absence of acceptable noninfringing substitutes, (3) the manufacturing and marketing capability to exploit the demand, and (4) the amount of profit the patent owner would have made.’”<sup>71</sup>

However, successful claims for lost profits are becoming less common as “courts have insisted on strict standards of proof for entitlement to lost profits.”<sup>72</sup> Moreover, lost profits are unavailable unless the patentee directly competes with the infringer, such as by selling its own product that practices the patent.<sup>73</sup> As a result, nonpracticing entities—which file a substantial number of infringement suits<sup>74</sup>—generally cannot recover damages for lost profits because they do not manufacture or sell their own products.<sup>75</sup>

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69. *See* *Am. Seating Co. v. USSC Group, Inc.*, 514 F.3d 1262, 1268 (Fed. Cir. 2008) (“A patentee may recover lost profits on unpatented components sold with a patented item, a conveyed sale, if both the patented and unpatented products ‘together were considered to be components of a single assembly or parts of a complete machine, or they together constituted a functional unit.’”) (quoting *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1550 (Fed. Cir. 1995) (en banc)); *see also* Roger D. Blair & Thomas F. Cotter, *Rethinking Patent Damages*, 10 TEX. INTEL. PROP. L.J. 1, 85–93 (2001) (critically evaluating the economic basis for recovering lost profits damages for unpatented complementary goods).

70. 575 F.2d 1152 (6th Cir. 1978); *see also* *Rite-Hite*, 56 F.3d at 1545 (stating that the *Panduit* test has “since been accepted” by the Federal Circuit “as a useful, but non-exclusive, way for a patentee to prove entitlement to lost profits damages”).

71. *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1373 (Fed. Cir. 2008) (quoting *Standard Havens Prods., Inc. v. Gencor Indus., Inc.*, 953 F.2d 1360, 1373 (Fed. Cir. 1991)).

72. Lemley, *supra* note 23, at 655–56, 658 (explaining that “[c]ourts take [the *Panduit*] requirements seriously and quite often reject claims for lost profits”).

73. *Id.*; *see also* *Trell v. Marlee Elecs. Corp.*, 912 F.2d 1443, 1445 (Fed. Cir. 1990) (holding that “[b]ecause [the patentee] did not sell its invention in the United States, [it] could not seek damages on the basis of lost profits”).

74. *See* Allison, Lemley & Walker, *supra* note 32, at 3 (concluding that the most-litigated patents are “disproportionately owned by nonpracticing entities”); *see also* PRICEWATERHOUSECOOPERS, 2009 PATENT LITIGATION STUDY: PATENT LITIGATION TRENDS AND THE INCREASING IMPACT OF NONPRACTICING ENTITIES 19, chart 9 (2010), available at <http://www.pwc.com/us/en/forensic-services/publications/assets/2009-patent-litigation-study.pdf> (finding that nonpracticing entities brought between 10% and 46%

Recent empirical data demonstrate that lost profits is declining as a basis for recovery for patent infringement.<sup>76</sup> In a 2009 report, PriceWaterhouseCoopers found that during the 1980s and 1990s, a reasonable royalty was the basis for a minority of patent damages awards—44% and 45%, respectively—compared to 55% and 51% for lost profits.<sup>77</sup> In the 2000s, however, these numbers were reversed, with 54% of patent damages awards calculating using a reasonable royalty, while only 40% were calculated as lost profits.<sup>78</sup>

### *B. Reasonable Royalty and the Hypothetical Negotiation*

The Federal Circuit has held that a reasonable royalty is the “minimum permissible measure of damages” for patent infringement.<sup>79</sup> In other words, it is “the floor below which damages shall not fall.”<sup>80</sup> While a reasonable royalty traditionally has served as a “backstop for those who cannot prove that they have lost profits as a result of infringement,”<sup>81</sup> more recently some patentees who may have been able to prove lost profits instead have elected to

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of patent lawsuits from 1995 through 2008 that resulted in a judgment on the merits in the 18 district courts with the largest number of patent suits).

In fact, the PriceWaterhouseCoopers study may underestimate the percentage of patent litigation cases filed by nonpracticing entities, since such entities often seek early settlements. See, e.g., Joe Mullin, *Patent Litigation Weekly: Lessons of the Patent Troll Tracker*, IP L. & BUS., Jan. 31, 2010, available at <http://www.law.com/jsp/article.jsp?id=1202439670830> (explaining that nonpracticing entities often seek to “su[e] a broad swath of companies for patent infringement, then settl[e] with each defendant for less than the cost of fighting such a suit”).

75. See PRICEWATERHOUSECOOPERS, *supra* note 74, at 11 (explaining that nonpracticing entities “are generally not entitled to lost profits”).

76. See S. REP. NO. 110-259, at 11 (2008) (“Historically, the considerable majority of infringement cases were lost profits cases. However, in recent years . . . an increasing number of cases require the calculation of an appropriate reasonable royalty.” (footnote omitted)).

77. LEVKO, *supra* note 25, at slide 9. These figures do not include 1% and 3% due to price erosion in the 1980s and 1990s, respectively. *Id.*

78. *Id.* These figures do not include 6% due to price erosion. *Id.*

79. Deere & Co. v. Int’l Harvester Co., 710 F.2d 1551, 1558 (Fed. Cir. 1983).

80. Lucent Techs., Inc. v. Gateway, Inc., 580 F.3d 1301, 1324 (Fed. Cir. 2009) (quoting Bandag, Inc. v. Gerrard Tire Co., 704 F.2d 1578, 1583 (Fed. Cir. 1983)); see also Lemley, *supra* note 23, at 655 (describing a reasonable royalty as a “fallback remedy”).

81. Lemley, *supra* note 23, at 655 (referring to 35 U.S.C. § 284 (2006)).

pursue a reasonable royalty, potentially obtaining a greater recovery in the process.<sup>82</sup>

Section 284 does not contain explicit guidance on how courts or juries should determine what royalty is “reasonable.” However, courts frequently have attempted to answer this question using a legal fiction: creating a hypothetical bargain between the parties for use of the patented technology.<sup>83</sup> This methodology, often “called 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 a[] [licensing] agreement just before infringement began.”<sup>84</sup> As the Federal Circuit recently explained: “The hypothetical negotiation tries, as best as possible, to recreate the *ex ante* licensing negotiation scenario and to describe the resulting agreement. In other words, if infringement had not occurred, willing parties would have executed a license agreement specifying a certain royalty payment scheme.”<sup>85</sup> Consequently, this approach attempts to approximate a market for the patented technology as it would have developed absent infringement.<sup>86</sup>

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82. *See, e.g.*, *Monsanto Co. v. McFarling*, 488 F.3d 973, 978–81 (Fed. Cir. 2007) (affirming a jury award of reasonable royalty damages of \$40 per bag of soybean seed, which was more than six times greater than plaintiff’s lost profits).

83. *Lucent*, 580 F.3d at 1324. Another, less common alternative method is the “analytical approach,” which focuses on the infringer’s projected profit from the infringing product. *Id.* Under this methodology, a reasonable royalty is calculated through a profit-sharing approach, where the infringer would share a substantial portion of its anticipated profits from infringement with the patentee. *See, e.g.*, *TWM Mfg. Co. v. Dura Corp.*, 789 F.2d 895, 899–900 (Fed. Cir. 1986) (affirming special master’s award of 30% royalty rate for accused product with anticipated net profit of 37%–42%, after subtracting industry standard net profit of 6.5%–12.5%). As one district court has explained:

The analytical method is based on the premise that any rate of return in excess of a normal rate of return can be attributed to the patent. This method takes the profits of the infringer, subtracts the infringer’s normal profit, and awards some portion of the remainder to the patent owner.

*Fresenius Med. Care Holdings, Inc. v. Baxter Int’l, Inc.*, No. 03-1431, 2006 WL 1390416, at \*7 (N.D. Cal. May 18, 2006) (quoting Am. Inst. of Certified Pub. Accountants, *Calculating Intellectual Property Damages*); *see also* SKENYON ET AL., *supra* note 27, § 3:4.

84. *Lucent*, 580 F.3d at 1324.

85. *Id.* at 1325.

86. *Riles v. Shell Exploration & Prod. Co.*, 298 F.3d 1302, 1311 (Fed. Cir. 2002).

Interestingly, the idea of a hypothetical negotiation predates the *Georgia-Pacific* test by several decades. For instance, in 1938, the Sixth Circuit held:

In fixing damages on a royalty basis against an infringer, the sum allowed should be reasonable and that which would be accepted by a prudent licensee who wished to obtain a license but was not so compelled and a prudent patentee, who wished to grant a license but was not so compelled. In other words, the sum should be that amount which a person desiring to use a patented machine and sell its product at a reasonable profit would pay.<sup>87</sup>

Similarly, the Ninth Circuit explained in 1952 that

[a] reasonable royalty is an amount which a person, desiring to use a patented article, as a business proposition, would be willing to pay as a royalty and yet be able to use the patented article at a reasonable profit. The primary inquiry, often complicated by secondary ones, is what the parties would have agreed upon, if both were reasonably trying to reach an agreement.<sup>88</sup>

The hypothetical negotiation framework has been subject to significant criticism, most notably for its premise that both parties to the negotiation would assume the asserted claims were both valid and infringed—issues that are often contested in both real-life licensing negotiations and litigation.<sup>89</sup> This is not a trivial assumption, since a significant percentage of patents are found either invalid or not infringed during litigation.<sup>90</sup> In addition, the

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87. *Horvath v. McCord Radiator & Mfg. Co.*, 100 F.2d 326, 335–36 (6th Cir. 1938); see also *Recovery in Patent Suits*, *supra* note 50, at 849 (“A reasonable royalty may be defined as the amount that a person desiring to use a patent would be willing to pay for its use and a patent owner desiring to license the patent would be willing to accept.”).

88. *Faulkner v. Gibbs*, 199 F.2d 635, 639 (9th Cir. 1952) (footnote omitted).

89. See, e.g., Brian J. Love, *The Misuse of Reasonable Royalty Damages as a Patent Infringement Deterrent*, 74 MO. L. REV. 909, 914 (2009). But see Blair & Cotter, *supra* note 69, at 41 (asserting that this assumption “nevertheless makes economic sense, because an award that reflected the parties’ uncertainty at the time of the hypothetical negotiations in effect would require the plaintiff to bear the risk of uncertainty twice: first, at the time of those negotiations, and second when deciding whether to proceed to trial”).

90. See Paul M. Janicke & LiLan Ren, *Who Wins Patent Infringement Cases?*, 34 AIPLA Q.J. 1, 3–6 (2006) (finding that less than 25% of patent owners prevailed to judgment in patent litigation in 2002–2004). Another study found that approximately half (46%) of patents litigated to judgment are invalid. John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 205 (1998); see also Jay P. Kesan &

hypothetical negotiation unrealistically assumes a state of perfect information—that each side knows all of the facts available to the other side at the time of the negotiation.<sup>91</sup>

Finally, the hypothetical negotiation is potentially unrealistic because it assumes that the parties could have reached an agreement to license the patent at all. As the Federal Circuit has recognized, in a normal licensing negotiation, the potential licensee has three alternatives: (1) agree to a royalty payment; (2) infringe the patent and risk litigation; or (3) forego use of the patented invention entirely.<sup>92</sup> The hypothetical negotiation assumes the first alternative, when in reality the second actually occurred.<sup>93</sup>

An economically realistic hypothetical negotiation, however, must also account for the third alternative: that the potential licensee would not have used the patented technology at all. For example, faced with an exorbitant licensing demand for the patented technology, a rational licensee would explore reasonable alternatives, such as developing or licensing a substitute technology.<sup>94</sup> In other words, a rational actor would consider the “best alternative to a

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Gwendolyn G. Ball, *How Are Patent Cases Resolved? An Empirical Examination of the Adjudication and Settlement of Patent Disputes*, 84 WASH. U. L. REV. 237, 275–76 (2006) (estimating based on empirical data that “on the order of 300 improvidently granted patents were invalidated each year in the mid-1990s”).

91. *See, e.g.*, *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1122 (S.D.N.Y. 1970) (explaining that the hypothetical negotiation “contemplate[s] a marshaling of all of the pertinent facts which, like cards dealt face up, are for all to see”). In certain circumstances, however, “factual developments occurring after the date of the hypothetical negotiation can inform the damages calculation.” *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1333 (Fed.Cir. 2009) (quoting *Sinclair Ref. v. Jenkins Petroleum Process Co.*, 289 U.S. 689, 698 (1933)); *see also* *Fromson v. W. Litho Plate & Supply Co.*, 853 F.2d 1568, 1575 (Fed. Cir. 1988) (holding that the hypothetical negotiation “permits and often requires a court to look to events and facts that occurred thereafter and that could not have been known to or predicted by the hypothesized negotiators”). For example, the Federal Circuit has suggested that evidence regarding the accused infringer’s post-infringement usage of the patented technology is permissible in a *Georgia-Pacific* analysis. *Lucent*, 580 F.3d at 1333–34.

92. *Fromson*, 853 F.2d at 1576.

93. *Id.*

94. *See, e.g.*, *Novozymes A/S v. Genencor Int’l, Inc.*, 474 F. Supp. 2d 592, 607 (D. Del. 2007) (holding that “the parties in a hypothetical negotiation would consider available, or soon to be available, alternatives to the infringing product”); *Fresenius Med. Care Holdings, Inc. v. Baxter Int’l, Inc.*, No. 03-01431, 2006 WL 1646113, at \*1 (N.D. Cal. June 12, 2006) (“[A] key part of the reasonable royalty determination under *Georgia Pacific* is whether the accused infringer had acceptable non-infringing alternatives available to it at the time of the hypothetical negotiation.”).

negotiated agreement” (BATNA).<sup>95</sup> Thus, in a hypothetical licensing scenario, if a licensor insisted on a royalty that exceeded the expected cost of a substitute, then the licensee would simply forego use of the patent and switch to the substitute.<sup>96</sup>

Despite these shortcomings, however, the hypothetical negotiation provides a useful framework for a reasonable royalty analysis. It recognizes that the determination of a royalty involves a zero-sum game, and focuses on the parties’ relative bargaining strengths at the time infringement began.<sup>97</sup> Both parties are assumed to behave as rational and prudent businesspeople—or, as one court put it, the negotiation involves the parties’ “perfectly reasonable avatars.”<sup>98</sup> They bargain in the face of shared information about key facts, such as the infringer’s anticipated profits for the accused product<sup>99</sup> and whether and at what cost the infringer could have switched to a noninfringing substitute.<sup>100</sup> Some versions of the hypothetical negotiation also sensibly recognize that the royalty amount cannot prevent the hypothetical licensee from making a reasonable profit<sup>101</sup>—otherwise, a rational licensee would have

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95. See ROGER FISHER, WILLIAM URY & BRUCE PATTON, GETTING TO YES: NEGOTIATING AGREEMENT WITHOUT GIVING IN 104–06 (1981).

96. See *infra* Part V.A.

97. See, e.g., *Procter & Gamble Co. v. Paragon Trade Brands, Inc.*, 989 F. Supp. 547, 606 (D. Del. 1997) (explaining that a “hypothetical negotiation” involves arm’s length bargaining between the potential licensor and licensee) (citing *Unisplay, S.A. v. Am. Elec. Sign Co.*, 69 F.3d 512, 517 (Fed. Cir. 1995)).

98. *Uniloc USA, Inc. v. Microsoft Corp.*, 632 F. Supp. 2d 147, 150 (D.R.I. 2009).

99. *Trans-World Mfg. Corp. v. Al Nyman & Sons, Inc.*, 750 F.2d 1552, 1568 (Fed. Cir. 1984).

100. See *Zygo Corp. v. Wyko Corp.*, 79 F.3d 1563, 1571–72 (Fed. Cir. 1996) (holding that availability of a noninfringing substitute “is a factor relevant to the determination of a proper royalty during hypothetical negotiations” and that the accused infringer “would have been in a stronger position to negotiate for a lower royalty rate knowing it had a competitive noninfringing device ‘in the wings’”).

101. See, e.g., *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 435 F.3d 1356, 1361 (Fed. Cir. 2006) (stating that a reasonable royalty is the amount that a hypothetical licensee “would be willing to pay as a royalty and yet be able to make, use, or sell the patented article, in the market, at a reasonable profit” (quoting *Trans-World Mfg. Corp.*, 750 F.2d at 1568 (internal brackets omitted))); *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1081 (Fed. Cir. 1983) (holding that “a reasonable royalty would leave an infringer with reasonable profit” (quoting *Square Liner 360°, Inc. v. Chisum*, 691 F.2d 362, 377 (8th Cir. 1982))); *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1122 (S.D.N.Y. 1970) (“[T]he very definition of a reasonable royalty assumes that, after payment, the infringer will be left with a profit.” (internal quotations and citation omitted)). *But see* *Monsanto Co. v.*

pursued the third alternative described above and foregone use of the patented invention. As a result, while far from perfect, the hypothetical negotiation is a useful heuristic for a jury to determine what royalty would “fulfill[] the statutory mandate of being ‘reasonable.’”<sup>102</sup>

### C. *The Rise of Georgia-Pacific*

For four decades, the calculation of a reasonable royalty has been heavily influenced by the fifteen-factor test first articulated by the district court in *Georgia-Pacific Corp. v. United States Plywood Corp.*<sup>103</sup> This test was subsequently adopted by the Federal Circuit shortly after its inception,<sup>104</sup> as well as one of its predecessor courts, the Court of Claims.<sup>105</sup> *Georgia-Pacific* has been called the “gold standard” and “universally accepted test” for determining reasonable royalty damages.<sup>106</sup> A brief review of the *Georgia-Pacific* case, however, helps illuminate the test’s somewhat surprising and case-specific origins.

The dispute between Georgia-Pacific and its rival in the plywood market, United States Plywood, began in 1955, when Georgia-Pacific introduced plywood panels that were striated, or grooved, for decorative effect.<sup>107</sup> Striation prevented the plywood from tending to expand and shrink under changing moisture conditions, which resulted in cracks over a period of time. In addition, it made the plywood more aesthetically pleasing.<sup>108</sup> Georgia-Pacific’s striated

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Ralph, 382 F.3d 1374, 1384 (Fed. Cir. 2004) (holding that “the law does not require that an infringer be permitted to make a profit”).

102. CAULEY, *supra* note 32, at 24.

103. 318 F. Supp. 1116 (S.D.N.Y. 1970).

104. *Hanson*, 718 F.2d at 1077.

105. *See* *Tektronix, Inc. v. United States*, 552 F.2d 343, 349 (Ct. Cl. 1977) (concluding that “the best method of computing compensation in this case is to adopt the approach of establishing a reasonable royalty . . . exemplified by the *Georgia-Pacific* case”). After its creation, the Federal Circuit adopted previous decisions of the Court of Claims as binding precedent. *South Corp. v. United States*, 690 F.2d 1368 (Fed. Cir. 1982).

106. Durie & Lemley, *supra* note 1, at 628–29; *see also* PAUL M. JANICKE, MODERN PATENT LITIGATION 56 (2d ed. 2006) (explaining that *Georgia-Pacific* “still is the most often cited source . . . about determining a ‘reasonable royalty’”).

107. *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 258 F.2d 124, 126–29 (2d Cir. 1958).

108. *Id.* at 126–27.

plywood competed with U.S. Plywood's own striated plywood product, Weldtex, which practiced a patent issued in 1942 to Deskey and assigned to U.S. Plywood.<sup>109</sup>

For unknown reasons, Georgia-Pacific delivered a sample of its new striated plywood to U.S. Plywood shortly after introducing it on the market.<sup>110</sup> Immediately afterwards, U.S. Plywood's president sent a short letter to Georgia-Pacific, asserting that Weldtex was protected by several U.S. patents<sup>111</sup> and stating that U.S. Plywood would take "vigorous action to protect our patent rights."<sup>112</sup> Georgia-Pacific then filed a declaratory judgment action in the Southern District of New York for invalidity and noninfringement.

A case of almost Dickensian proportion ensued.<sup>113</sup> In October 1956, the district court found the Deskey patent invalid and not infringed by Georgia-Pacific.<sup>114</sup> On appeal, however, the Second Circuit reversed, holding in 1958 that claim 1 of the Deskey patent was valid and infringed by Georgia-Pacific, and remanded for a determination on damages.<sup>115</sup> The district court then referred the case to a special master to calculate damages.<sup>116</sup> After receiving testimony and briefing over a three-year period, the special master filed a report in 1961 awarding \$685,837 in damages to U.S. Plywood based on disgorgement of Georgia-Pacific's ill-gotten profits.<sup>117</sup> However, the special master rejected U.S. Plywood's claim for its own lost profits under § 284, finding that it had failed to adequately establish the quantity of product and amount of profit lost due to Georgia-Pacific's infringement.<sup>118</sup>

Both parties filed objections to the special master's report, and in 1965—ten years after the case started—the district court held in a lengthy opinion that a reasonable royalty, not Georgia-Pacific's

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109. *Id.*

110. *Id.* at 127.

111. Two other plywood-related patents, called the Bailey patents, were referenced in the dispute, but the Second Circuit held that these patents "were never in issue in the district court." *Id.* at 126.

112. *Id.* at 127.

113. *See generally* CHARLES DICKENS, BLEAK HOUSE (1853).

114. 148 F. Supp. 846 (S.D.N.Y. 1956).

115. 258 F.2d 124 (2d Cir. 1958).

116. 243 F. Supp. 500, 502 (S.D.N.Y. 1965).

117. *Id.* at 512–13.

118. *Id.* at 513.

profits, was the proper measure of damages.<sup>119</sup> From 1967 through 1969, the district court held multiple hearings and received extensive briefing on the issue of an appropriate reasonable royalty.<sup>120</sup> But the assigned judge (Judge William B. Herlands) died in August 1969 before he could issue an opinion.<sup>121</sup> Judge Herlands, however, had “substantially completed” a draft opinion, which the newly-assigned judge, Judge Charles H. Tenney, considered and adopted in May 1970 “with minor amendment[s].”<sup>122</sup>

First, the district court explained that “[a] comprehensive list of evidentiary facts relevant, in general, to the determination of a reasonable royalty for a patent license may be drawn from a conspectus of the leading cases.”<sup>123</sup> Rather than including a “comprehensive” list of factors, however, the opinion identified only “some of the factors *mutatis mutandis*”<sup>124</sup> that were “seemingly more pertinent to the issue herein.”<sup>125</sup> The first factor related to a so-called established royalty:

1. The royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty.<sup>126</sup>

Factors 2 through 13 addressed a wide variety of considerations at issue in the case, including the relationship of the licensing parties; the type of license they likely would agree upon; comparable licenses made by the licensee and in the relevant industry more generally; the nature, benefits, extent of use, and alternatives to the patented technology; and the value of features unrelated to the patent:

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119. *Id.* at 503, 514–46.

120. *See* *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1118 (S.D.N.Y. 1970).

121. *Id.*

122. *Id.* at 1118–19 & n.3.

123. *Id.* at 1120.

124. “*Mutatis mutandis*” is a Latin phrase that means “[a]ll necessary changes having been made” or “with the necessary changes.” BLACK’S LAW DICTIONARY 858 (8th ed. 2004). Use of this phrase in the *Georgia-Pacific* decision “strongly suggests to future readers that this particular list in its form may not be suitable or appropriate for application in future cases.” Nathaniel C. Love, Comment, *Nominal Reasonable Royalties for Patent Infringement*, 75 U. CHI. L. REV. 1749, 1754 n.28 (2008).

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

126. *Id.*

2. The rates paid by the licensee for the use of other patents comparable to the patent in suit.
3. The nature and scope of the license, as exclusive or non-exclusive; or as restricted or non-restricted in terms of territory or with respect to whom the manufactured product may be sold.
4. The licensor's established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly.
5. The commercial relationship between the licensor and licensee, such as, whether they are competitors in the same territory in the same line of business; or whether they are inventor and promoter.
6. The effect of selling the patented specialty in promoting sales of other products of the licensee; that existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales.
7. The duration of the patent and the term of the license.
8. The established profitability of the product made under the patent; its commercial success; and its current popularity.
9. The utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results.
10. The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention.
11. The extent to which the infringer has made use of the invention; and any evidence probative of the value of that use.
12. The portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions.
13. The portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the

manufacturing process, business risks, or significant features or improvements added by the infringer.<sup>127</sup>

Factor 14 restated the longstanding rule, first codified in the 1922 Act,<sup>128</sup> that expert testimony could be offered regarding an appropriate reasonable royalty:

14. The opinion testimony of qualified experts.<sup>129</sup>

Finally, Factor 15 adopted the hypothetical negotiation framework that had been previously articulated by the Sixth and Ninth Circuits:<sup>130</sup>

15. 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; that is, the amount which a prudent licensee—who desired, as a business proposition, to obtain a license to manufacture and sell a particular article embodying the patented invention—would have been willing to pay as a royalty and yet be able to make a reasonable profit and which amount would have been acceptable by a prudent patentee who was willing to grant a license.<sup>131</sup>

Surprisingly, the district court's list of factors did not include any citations to previous case law.<sup>132</sup>

Explaining that “there is no formula by which . . . [they] can be rated precisely in the order of their relative importance or by which their economic significance can be automatically transduced into their pecuniary equivalent,” the district court declined to explain how it balanced these factors.<sup>133</sup> Rather, the court said that it would exercise “judicial discretion”<sup>134</sup> to consider “all pertinent factors” based on the evidence.<sup>135</sup>

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127. *Id.*

128. *See supra* note 49 and accompanying text.

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

130. *See supra* text accompanying notes 87–88.

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

132. *See id.*

133. *Id.* at 1120–21.

134. *Id.* at 1120 (quoting *Gen. Motors Corp. v. Dailey*, 93 F.2d 938, 942 (6th Cir. 1937)).

135. *Id.* at 1120–21.

Similar to most current patent infringement litigation, the parties in *Georgia-Pacific* proffered widely diverging royalty calculations. Georgia-Pacific claimed that an appropriate royalty was between \$1.50 and \$3 per thousand square feet of plywood. U.S. Plywood, however, asserted that the royalty should be at least an order of magnitude greater—\$50 per thousand square feet.<sup>136</sup>

In its decision, the district court placed particular emphasis on several of the above-listed factors in attempting to set a reasonable royalty. First, it relied heavily on Factor 8—in particular, that before Georgia-Pacific’s infringement, U.S. Plywood had enjoyed large profits on Weldtex (on average, approximately \$48 per thousand square feet).<sup>137</sup> It also considered Factors 4 and 5 at length, emphasizing that U.S. Plywood had a policy of maintaining its patent monopoly on striated plywood in the United States and was unwilling to license this technology to a powerful competitor like Georgia-Pacific.<sup>138</sup> Third, the court put significant weight on Factor 13, holding that the patented technology—and not other features—caused Weldtex and Georgia-Pacific’s own striated plywood product to be highly profitable.<sup>139</sup> In contrast, the court placed little or no weight on other factors, such as foreign licenses granted under the patent and other, plywood-related licenses entered into by Georgia-Pacific (Factors 2 and 12). Ultimately, the district court concluded that U.S. Plywood’s proposed royalty of \$50 per thousand square feet of plywood represented “a fair and reasonable royalty” and entered judgment in the amount of \$800,000.<sup>140</sup>

Most accounts of *Georgia-Pacific* end with the district court opinion.<sup>141</sup> On appeal, however, the Second Circuit rebalanced some of the factors considered and significantly reduced the district court’s

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136. *Id.* at 1119.

137. *Id.* at 1127–29.

138. *See id.* at 1123–25.

139. *See id.* at 1134 (holding that “[t]here is no basis for [Georgia-Pacific]’s argument that the value of striated fir plywood is significantly attributable to elements other than the Deskey patent” and that “the commercial success of Weldtex was the result of deep striation of the face, Deskey’s invention, which created a new type of plywood panel”).

140. *Id.* at 1143.

141. *See, e.g.,* Durie & Lemley, *supra* note 1, at 631 (“[I]t is the district court’s opinion that has become gospel in the patent damages world.”).

award.<sup>142</sup> While the Second Circuit sustained all of the district court's basic factual findings,<sup>143</sup> it held that the lower court erred in not giving sufficient weight to Factor 15—that in a hypothetical negotiation, the “reasonable ‘royalty must be fixed so as to leave the infringer, or suppositious licensee, a reasonable profit.’”<sup>144</sup> Specifically, it explained that the district court found that at the time infringement began, Georgia-Pacific reasonably expected to earn profits similar to U.S. Plywood, calculated at about \$48 per thousand square feet. But the awarded royalty of \$50 per square feet would “gobble[] up all of [Georgia-Pacific]'s expected profit.”<sup>145</sup> Based on this, the Second Circuit adjusted the reasonable royalty rate downward to \$35.65, lowering Georgia-Pacific's total damages by nearly one-third.<sup>146</sup>

The *Georgia-Pacific* case differs from many current patent infringement cases in several important ways. First, it involved two direct competitors with highly similar products. This is unlike a substantial portion of current patent litigation, which involves nonpracticing entities that do not offer products or services in competition with the accused infringer.<sup>147</sup>

Second, the accused product in *Georgia-Pacific*—striated plywood—was relatively simple, and the patented technology accounted for most, if not all, of the product's value. In contrast, many modern patent cases involve complex products containing dozens or even hundreds of features, of which the patented technology may be a relatively small part.<sup>148</sup> Further, *Georgia-Pacific* involved a product covered by a single patent (or at most a handful

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142. *Georgia-Pacific Corp. v. U.S. Plywood-Champion Papers Inc.*, 446 F.2d 295 (2d Cir. 1971).

143. *Id.* at 297.

144. *Id.* at 299 (quoting *Georgia-Pacific*, 318 F. Supp. at 1122).

145. *Id.* The Second Circuit also noted that the district court's total award of \$800,000 exceeded the amount that the special master found to be Georgia-Pacific's actual profits from the infringement (\$685,837). *Id.*

146. *Id.* at 300.

147. *See supra* Part III.A.

148. *See, e.g., infra* note 160 and accompanying text (explaining that Apple has been sued for alleged infringements of more than 120 patents relating to the iPhone and that the iPhone has also licensed many more patents through various standards).

of U.S. Plywood patents). Today, however, many accused high-technology products practice numerous patents.<sup>149</sup>

Finally—and perhaps most significantly—damages in the *Georgia-Pacific* case, like most patent infringement litigation at that time, were tried to and determined by a judge, who had the time and expertise to consider complicated financial and technological evidence and prepare a detailed opinion explaining the court's findings and conclusions.<sup>150</sup> In contrast, today most patent litigation is tried before a jury,<sup>151</sup> which often has less time and expertise than a judge, and which cannot be required to make detailed written findings for scrutiny in post-trial review.<sup>152</sup> The cumulative impact of these differences will be discussed in the following section.

#### IV. THE PROBLEMATIC APPLICATION OF *GEORGIA-PACIFIC* IN MODERN PATENT LITIGATION

“Determining a fair and reasonable royalty . . . seem[s] often to involve more the talents of a conjurer than those of a judge.”<sup>153</sup>

As explained below, application of the forty-year-old *Georgia-Pacific* test in modern patent infringement litigation is often problematic and may lead to overcompensation of the patentee. Indeed, the *Georgia-Pacific* test is particularly inappropriate in cases involving complex products incorporating a wide array of high-tech components or features. Even when the accused product is less complex, *Georgia-Pacific* gives juries little guidance on how to weigh the numerous factors and reach a decision on an appropriate royalty. Finally, the amorphous, “black box” nature of *Georgia-Pacific* makes it difficult for courts to review a jury award in post-trial proceedings to determine if it is supported by substantial evidence.

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149. This phenomenon is called “royalty stacking.” See *infra* Part IV.A.

150. Douglas G. Smith, *Structural and Functional Aspects of the Jury: Comparative Analysis and Proposals for Reform*, 48 ALA. L. REV. 441, 489–95 (1997).

151. See, e.g., Kimberly A. Moore, *Judges, Juries, and Patent Cases—An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365, 366 (2000) (finding that from 1968–1970, juries tried only 2.8% of patent cases; in “contrast, from 1997–1999, 59% of all patent trials were tried to juries”).

152. See *infra* Part IV.D (recounting scholarly criticism about the comparative competency of decision-making by juries compared to judges in complex, lengthy litigation).

153. *ResQNet.com, Inc. v. Lansa, Inc.*, 594 F.3d 860, 869 (Fed. Cir. 2010) (quoting *Fromson v. W. Litho Plate & Supply Co.*, 853 F.2d 1568, 1574 (Fed. Cir. 1988)).

*A. Royalty Stacking*

One major issue with *Georgia-Pacific* is that it does not effectively address royalty stacking. Royalty stacking exists when a single, technologically complex product potentially practices numerous patents, and thus “may bear multiple royalty burdens.”<sup>154</sup> As the Senate Judiciary Committee has recently explained, “[l]ong past is the day in which the typical invention is a *sui generis* creation.”<sup>155</sup> This was the case in *Georgia-Pacific* itself, where a single patent covered the entire product.<sup>156</sup> Rather, “today’s patents are often combinations, and many products . . . [practice] dozens, if not hundreds or even thousands of patents, and the infringed patent may well be one smaller part of a much larger whole.”<sup>157</sup>

Royalty stacking “reflects the fact that, from the perspective of the firm making the product in question, all of the different claims for royalties must be added or ‘stacked’ together to determine the total royalty burden borne by the product.”<sup>158</sup> This is a particularly difficult issue in the information technology, electronics, and telecommunications industries, where a single integrated product may include hundreds of separate components.<sup>159</sup> As a result, a complex product could potentially infringe—and thus require licensing agreements for—scores of patents owned by numerous different entities. For example, Apple’s iPhone has been accused of infringing over 120 separate patents held by dozens of plaintiffs.<sup>160</sup>

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154. Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1993 (2007); see also Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in 1 INNOVATION POLICY AND THE ECONOMY 119, 123–24 (Adam B. Jaffe, Josh Lerner & Scott Stern eds., 2001), available at <http://faculty.haas.berkeley.edu/shapiro/thicket.pdf>.

155. S. REP. NO. 110-259, at 12 (2008).

156. *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1132 (S.D.N.Y. 1970); see also *id.* (“[T]he contribution of the [patented] invention cannot be isolated as a separate physical part. The invention permeated the [accused Georgia-Pacific] plywood panel to such a degree that it should be considered as covering the article as a whole.”).

157. S. REP. NO. 110-259, at 12.

158. Lemley & Shapiro, *supra* note 154, at 1993.

159. See Mark A. Lemley, *Ignoring Patents*, 2008 MICH. ST. L. REV. 19, 19.

160. Plaintiff VirnetX Inc.’s Original Complaint at 7–10, *VirnetX Inc. v. Cisco Sys., Inc.* No. 6:10-cv-00417-LED (E.D. Tex. Aug. 11, 2010) (asserting that the iPhone infringes two U.S. patents); Complaint for Patent Infringement at 2–3, *Emblaze Ltd. v. Apple Inc.*, No. 1:10-cv-05713-PKC (S.D.N.Y. July 28, 2010) (asserting that the iPhone infringes U.S. Patent No. 6,389,473, which claims methods for real-time broadcasting over a network); Third

Amended Complaint for Patent Infringement at 15–18, *MONKEYmedia, Inc. v. Apple, Inc.*, No. 1:10-cv-00319-SS (W.D. Tex. July 19, 2010) (asserting that iOS 4, which is the current version of the iPhone operating system, infringes two U.S. patents); Complaint for Patent Infringement at 12–23, *NTP, Inc. v. Apple, Inc.*, No. 3:10-cv-00467-JRS (E.D. Va. July 8, 2010) (asserting that the iPhone infringes eight U.S. patents regarding wireless email); Complaint for Patent Infringement at 11, 25, 39–40, *Keranos, LLC v. Analog Devices, Inc.*, No. 2:10-cv-00207-TJW (E.D. Tex. June 23, 2010) (asserting that the iPhone infringes three U.S. patents involving “integrated circuits using embedded flash memory”); Complaint for Patent Infringement at 10–11, 19–20, *UO! IP of Del., LLC v. ABBYY USA Software House, Inc.*, No. 1:10-cv-00445-LPS (D. Del. May 27, 2010) (asserting that iPhone infringes two U.S. patents involving language translation software); Complaint for Patent Infringement at 17–21, *Golden Bridge Tech., Inc. v. AT&T, Inc.*, No. 1:10-cv-00428-SLR (D. Del. May 21, 2010) (asserting that the iPhone infringes two U.S. patents); Complaint for Patent Infringement at 2–3, *SoftView LLC v. Apple, Inc.*, No. 1:10-cv-00389-LPS (D. Del. May 10, 2010) (asserting that the iPhone infringes U.S. Patent No. 7,461,353, entitled “Scalable Display of Internet Content on Mobile Devices”); Complaint for Patent Infringement at 1, *Nokia Corp. v. Apple Inc.*, No. 3:10-cv-00249-wmc (W.D. Wis. May 7, 2010) (asserting that the iPhone infringes five Nokia patents); Complaint for Patent Infringement and Demand for Jury Trial at 2, *NetAirus Techs. LLC v. Apple Inc.*, No. 2:10-cv-03257-GAF-E (C.D. Cal. Apr. 30, 2010) (asserting that the iPhone infringes U.S. Patent No. 7,103,380); Complaint for Patent Infringement at 6–17, *MobileMedia Ideas LLC v. Apple Inc.*, No. 1:10-cv-00258-SLR (D. Del. Mar. 31, 2010) (asserting that the iPhone infringes thirteen U.S. patents); Complaint for Patent Infringement at *passim*, *Microunity Sys. Eng’g, Inc. v. Acer, Inc.*, No. 2:10-cv-00091-TJW-CE (E.D. Tex. Mar. 16, 2010) (asserting that the iPhone infringes twelve U.S. patents regarding microprocessor technology); Complaint at 7, *ADC Tech. Inc. v. LG Elecs. Mobilecomm U.S.A., Inc.*, No. 1:10-cv-01456 (N.D. Ill. Mar. 4, 2010) (asserting that the iPhone infringes 3 U.S. patents); Complaint at 8–12, *Affinity Labs of Tex., LLC v. Nike, Inc.*, No. 2:10-cv-00054-DF-CE (E.D. Tex. Feb. 16, 2010) (asserting that the iPhone, in conjunction with the Nike+ line of products, infringes U.S. Patent Nos. 7,062,225, 7,251,454, and 7,519,327); Complaint at 2–4, *Intellect Wireless, Inc. v. Apple, Inc.*, No. 1:10-cv-00586 (N.D. Ill. Jan. 28, 2010) (asserting that the iPhone infringes U.S. Patent Nos. 7,310,416 and 7,266,186); Complaint and Jury Claim at 2–4, *Eastman Kodak Co. v. Apple, Inc.*, No. 6:10-cv-06021-MAT-JWF (W.D.N.Y. Jan. 14, 2010) (asserting that the iPhone infringes U.S. Patent Nos. 6,292,218 and 5,493,335); Complaint for Patent Infringement at 2, 6, *St. Clair Intellectual Prop. Consultants, Inc. v. Apple, Inc.*, No. 1:09-cv-00804-LPS (D. Del. Oct. 26, 2009) (asserting infringement of four U.S. patents by the iPhone’s digital camera); Complaint for Patent Infringement and Declaratory Judgment at 1, *Nokia Corp. v. Apple, Inc.*, No. 1:09-cv-00791-GMS (D. Del. Oct. 22, 2009) (asserting that the iPhone violates ten patents for wireless transmission technologies); Fifth Amended Complaint for Patent Infringement at 6–7, *EMG Tech., LLC v. Apple, Inc.*, No. 6:08-cv-00447-LED (E.D. Tex. Oct. 20, 2009) (asserting infringement of U.S. Patent Nos. 7,020,845 and 7,441,196); Second Amended Complaint and Application for Permanent Injunction at 7–9, *Bandspeed, Inc. v. Sony Elecs. Inc.*, No. 1:09-cv-00593-LY (W.D. Tex. Oct. 9, 2009) (asserting, *inter alia*, infringement of U.S. Patent Nos. 7,027,418 and 7,570,614); Complaint for Patent Infringement at 42, *Xpoint Techs. v. Microsoft Corp.*, No. 1:09-cv-00628-SLR (D. Del. Aug. 21, 2009) (asserting, *inter alia*, that the iPhone infringes U.S. Patent No. 5,913,028); First Amended Complaint for Patent Infringement at 9, 11–12, *Shared Memory Graphics LLC v. Apple, Inc.*, No. 5:09-cva-05128-BSM (W.D. Ark. Aug. 17, 2009) (asserting infringement of U.S. Patent Nos. 5,712,664 and 6,081,279 by, *inter alia*, the iPhone); Second Amended

And this figure does not include the hundreds or thousands of patents licensed by Apple as part of the iPhone's use of the Wi-Fi and 3G data transmission standards.<sup>161</sup> Royalty stacking is also a potential issue in the biotechnology field, where a “dense web of

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Complaint for Patent Infringement at 2, 7–8, *MSTG, Inc. v. Research In Motion Ltd.*, No. 1:08-cv-07411 (N.D. Ill. July 30, 2009) (asserting, *inter alia*, that the iPhone infringes three U.S. patents); Original Complaint at 6, 9, 12, 15, 18, *BTG Int'l Inc. v. Apple Inc.*, No. 2:09-cv-00223-TJW-CE (E.D. Tex. July 20, 2009) (asserting, *inter alia*, that the iPhone infringes five U.S. patents); Complaint for Patent Infringement at 1, 4–6, *Pers. Audio, LLC v. Apple, Inc.*, No. 9:09-cv-00111-RC (E.D. Tex. June 25, 2009) (asserting infringement of U.S. Patent Nos. 6,199,076 and 7,509,178); Complaint for Patent Infringement at 1, 5–6, *SPH Am., LLC v. Nokia Corp.*, No. 1:09-cv-00701-GBL-TCB (E.D. Va. filed June 25, 2009) (asserting infringement of U.S. Patent No. RE 40,385 by, *inter alia*, the iPhone); Complaint for Patent Infringement at 1–3, *Elan Microelectronics Corp. v. Apple, Inc.*, No. 5:09-cv-01531-RS (N.D. Cal. Apr. 7, 2009) (asserting infringement of U.S. Patent No. 5,825,352); Plaintiff's First Amended Complaint for Patent Infringement at 1, 3, *Accolade Sys. LLC v. Micron Tech., Inc.*, No. 2:09-cv-00086-TJW-CE (E.D. Tex. Mar. 24, 2009) (asserting, *inter alia*, that the iPhone infringes U.S. Patent No. 7,463,298); Complaint at 2–5, *Affinity Labs of Tex., LLC, v. Apple, Inc.*, No. 9:09-cv-00047-RC (E.D. Tex. Mar. 24, 2009) (asserting infringement of U.S. Patent Nos. 7,187,947, 7,440,772, and 7,486,926); Complaint for Patent Infringement at 2–3, *MONEC Holding AG v. Apple, Inc.*, No. 1:09-cv-00312-LMB-JFA (E.D. Va. Mar. 23, 2009) (asserting infringement of U.S. Patent No. 6,335,678); Plaintiff's Third Amended Complaint for Patent Infringement at 5–6, *Typhoon Touch Techs., Inc. v. Dell, Inc.*, No. 6:07-cv-00546-LED (E.D. Tex. Mar. 6, 2009) (asserting, *inter alia*, that the iPhone infringes U.S. Patent Nos. 5,379,057 and 5,675,362); Complaint at 2–3, *Picxel (Research) Ltd. v. Apple, Inc.*, No. 1:09-cv-00100-SLR (D. Del. Feb. 13, 2009) (asserting infringement of U.S. Patent No. 7,009,626); Complaint for Patent Infringement at 3, *Cygnus Sys., Inc. v. Microsoft Corp.*, No. 2:08-cv-02337-NVW (D. Ariz. Dec. 23, 2008) (asserting, *inter alia*, that the iPhone infringes U.S. Patent No. 7,346,850); Complaint at 9–22, *WiAV Solutions LLC v. Research In Motion Ltd.*, No. 3:08-cv-00627-REP (E.D. Va. Sept. 26, 2008) (asserting, *inter alia*, that the iPhone infringes ten U.S. patents); First Amended Complaint at 6–9, *Saxon Innovations, LLC v. Apple, Inc.*, No. 6:08-cv-00265-JDL (E.D. Tex. Aug. 21, 2008) (asserting, *inter alia*, infringement of U.S. Patent Nos. 5,530,597 and 5,247,621); Amended Complaint at 3, *Figa v. Apple, Inc.*, No. 1:08-cv-10304-NG (D. Mass. Mar. 21, 2008) (asserting infringement of U.S. Patent No. 4,924,496); Original Complaint at 3–5, *Mirror Worlds LLC v. Apple, Inc.*, No. 6:08-cv-00088-LED (E.D. Tex. Mar. 14, 2008) (asserting infringement by iPhone of three U.S. patents); Complaint and Demand for Jury Trial at 2–3, *Minerva Indus., Inc. v. Apple, Inc.*, No. 2:08-cv-00019-CE (E.D. Tex. Jan. 22, 2008) (asserting infringement of U.S. Patent No. 7,321,783); Complaint for Patent Infringement at 4–5, *Klausner Techs. Inc. v. Apple, Inc.*, No. 2:07-cv-00525-LED-JDL (E.D. Tex. Dec. 3, 2007) (asserting infringement of U.S. Patent Nos. 5,572,576 and 5,283,818); Complaint for Patent Infringement at 2, *SP Techs., LLC v. Apple, Inc.*, No. 6:07-cv-00367-JDL (E.D. Tex. Aug. 2, 2007) (asserting infringement of U.S. Patent No. 6,784,873). Notably, this tally does not include allegations of infringement that have not resulted in litigation.

161. See *infra* note 167 and accompanying text (explaining that the wireless 3G standard may implicate thousands of patents).

overlapping intellectual property rights” may require companies to obtain numerous licenses.<sup>162</sup>

Royalty stacking can also present a problem for industry standards, such as those for consumer electronics or telecommunications networks. This problem has been partially addressed in some cases by pooling the “essential” patents held by multiple parties together and assigning a single entity to handle licensing for the entire patent pool.<sup>163</sup> For example, the pool of patents covering the DVD standard offers nonexclusive licenses for 210 “essential” patents on behalf of three separate firms.<sup>164</sup> But if a standard becomes popular, and a patent reading on the standard is not licensed as part of a pool, the patent can confer significant market power to its owner.<sup>165</sup> As the Third Circuit recently explained in an antitrust case:

A [standard-setting organization] may complete its lengthy process of evaluating technologies and adopting a new standard, only to discover that certain technologies essential to implementing the standard are patented. When this occurs, the patent holder is in a position to “hold up” industry participants from implementing the standard. Industry participants who have invested significant resources developing products and technologies that conform to the standard will find it prohibitively expensive to abandon their

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162. Vincent J. Napoleon, *Impact of Global Patent and Regulatory Reform on Patent Strategies for Biotechnology*, 9 U. PITT. J. TECH. L. & POL’Y 3, 25 (2008) (quoting Shapiro, *supra* note 154, at 120). *But see* John P. Walsh et al., *Effects of Research Tool Patents and Licensing on Biomedical Innovation*, in PATENTS IN THE KNOWLEDGE-BASED ECONOMY 285 (Wesley M. Cohen & Stephen A. Merrill eds., 2003) (disputing the anticommons problem and concluding that “drug discovery has not been substantially impeded” by overlapping patent rights in biotechnology); Richard A. Epstein & Bruce N. Kuhlik, *Is There a Biomedical Anticommons?*, REG., Summer 2004, at 54 (arguing that “Heller and Eisenberg have overstated the case against patent protection at both the theoretical and empirical levels”). *See generally* Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCI. 698 (May 1, 1998).

163. *See* Shapiro, *supra* note 154, at 134 (“A patent pool involves a single entity . . . that licenses the patents of two or more companies to third parties as a package.”). Some patent pools have an “independent patent expert” that “determine[s] whether a patent in the pool is in fact essential.” *Id.* at 134–35.

164. Letter from Joel I. Klein, Assistant Attorney General, U.S. Dep’t of Justice, to Garrard R. Beeney, Esq., Sullivan & Cromwell 4 (Dec. 16, 1998), <http://www.justice.gov/atr/public/busreview/2121.pdf>.

165. Shapiro, *supra* note 154, at 136.

investment and switch to another standard. They will have become “locked in” to the standard.<sup>166</sup>

For complex technologies like the 3G wireless standard, where literally thousands of patents may be implicated,<sup>167</sup> the royalty stacking issue is readily apparent: if each patentee claimed only a few percentage points of an accused product’s price as a “reasonable” royalty, the licensing costs would quickly swallow up the product’s profit margin. And this is not merely a hypothetical problem, as Microsoft learned in its MP3 patent litigation with Lucent—the jury awarded Lucent a \$1.53 billion royalty for infringement of two MP3-related patents, even though Microsoft had already licensed other “essential” patents for the MP3 standard for significantly less.<sup>168</sup>

While one *Georgia-Pacific* factor theoretically can address the problem of royalty stacking—Factor 13 (the portion of profit that should be credited to the patented technology)—several practical difficulties prevent it from effectively doing so. First, under *Georgia-Pacific*, royalty rates are often calculated as a percentage of the entire product’s sales price or profitability, which serves to obscure the value of other technologies in the accused product. For example, in *Cornell University v. Hewlett-Packard Co.*,<sup>169</sup> plaintiff Cornell University (“Cornell”) prevailed at trial on its claim that Hewlett-Packard’s (“HP”) CPU bricks<sup>170</sup> for computer servers and workstations infringed Cornell’s patent for an improved method and apparatus for issuing multiple “computer processor instructions in a single machine clock cycle.”<sup>171</sup> After trial, however, Federal Circuit Judge Rader, sitting by designation, granted HP’s motion for judgment as a matter of law against Cornell’s proffered royalty calculation because Cornell’s claimed royalty base—the CPU

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166. *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297, 310 (3d Cir. 2007).

167. See Lemley & Shapiro, *supra* note 154, at 2025–28.

168. *Lucent Techs. Inc. v. Gateway, Inc.*, 509 F. Supp. 2d 912 (S.D. Cal. 2007); see also Douglas Heingartner, *Patent Fights Are a Legacy of MP3’s Tangled Origins*, N.Y. TIMES, Mar. 5, 2007, at C3.

169. 609 F. Supp. 2d 279 (N.D.N.Y. 2009).

170. “CPU bricks” are modules that contain a central processing unit (“CPU”) “combined with a temperature controlling thermal solution, external cache memory, and a power converter.” *Id.* at 283.

171. *Id.*

bricks—“incorporated much more [technology] than the claimed invention.”<sup>172</sup> As a result, Judge Rader concluded that Cornell had impermissibly sought “economic entitlement to damages based on technology beyond the scope” of the patented invention.<sup>173</sup>

Second, in the context of royalty stacking, *Georgia-Pacific*’s emphasis on royalty rates for comparable licenses may conflict with economic reality. Factor 12 instructs the jury to consider customary industry licensing rates for similar technology.<sup>174</sup> While this appears sensible at first glance, it presents significant problems for complex products that practice numerous patents. Frequently, patent holders claim that they should be awarded a royalty rate at least as high as those prevalent in the same field of technology, which may range from 1% to over 10%, depending on the industry.<sup>175</sup> These arguments are often successful, as patentees frequently receive reasonable royalties in excess of 10% at trial.<sup>176</sup> This is generally not a problem for cases where, like *Georgia-Pacific* itself, the accused product is covered by a single patent. However, such royalty rates are economically unsustainable for complex products that practice numerous patents. Even if a product has a high profit margin—say 50%<sup>177</sup>—a few such licenses would either consume the product’s

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172. *Id.* at 284.

173. *Id.* at 284–85; *see also id.* at 283 (criticizing Cornell’s damages expert for basing Cornell’s royalty claim on Hewlett-Packard’s “servers and systems [that] include vast amounts of technology beyond the infringing part of the processors”).

174. *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970).

175. *See, e.g.*, *Boston Sci. Corp. v. Johnson & Johnson*, No. C02-00790 SI, 2009 WL 975424, at \*6–7 (N.D. Cal. Apr. 9, 2009) (offering evidence that infringer entered into eight prior licensing agreements with royalty rates of 3.7% to 4.6%, and that the royalty rates for the industry are between 2% to 6%; the court ultimately awarded a royalty rate of 5.1%); *Novozymes A/S v. Genencor Int’l, Inc.*, 474 F. Supp. 2d 592, 601, 607 (D. Del. 2007) (relying on reports that industry licenses range from 4.7% to 11.9% for the chemical industry and 7.3% to 9.6% for biotechnology to claim—and receive—a royalty rate of 20% from the court); *Hynix Semiconductors, Inc. v. Rambus, Inc.*, No. CV-00-20905 RMW, 2006 WL 1991760, at \*3 (N.D. Cal. July 14, 2006) (relying on stated median royalty rate of 3.2% for the electronics industry to calculate proposed damages).

176. Mark Lemley and Carl Shapiro have found that the average royalty rate in all reasonable royalty cases is 13.1% of the infringing product’s price. Lemley & Shapiro, *supra* note 154, at 2032.

177. For example, one estimate has pegged the profit margin on Apple’s iPhone at approximately 58%. Turley Muller, *Apple Inc. (AAPL): iPhone’s Substantial Impact on Gross*

entire profit or produce a Cournot complements effect,<sup>178</sup> whereby the aggregate impact of multiple, above-market royalty agreements would cause the producer to raise prices on the accused product, leading to an economically inefficient outcome.<sup>179</sup> This result would be contrary to the requirement that a reasonable royalty must permit the licensee “to make, use, or sell the patented article, in the market, at a reasonable profit.”<sup>180</sup>

Third, the royalty stacking issue can be compounded by application of the so-called “rule of thumb.” The “rule of thumb” suggests that a patent licensee should pay a royalty of 25%<sup>181</sup> of the expected profit from the product incorporating the patent.<sup>182</sup> According to some proponents, the “rule of thumb” represents an easily-applied method to apportion a technology’s value between the

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*Margin*, FINANCIAL ALCHEMIST, July 29, 2009, <http://financial-chemist.blogspot.com/2009/07/apple-inc-aapl-iphones-substantial.html> (July 29, 2009).

178. As Mark Lemley and Carl Shapiro have explained, the Cournot complements effect occurs “when multiple input owners each charge more than marginal cost for their input, thereby raising the price of the downstream product and reducing sales of that product.” Lemley & Shapiro, *supra* note 154, at 2013. *See generally* AUGUSTIN COURNOT, RESEARCHES INTO THE MATHEMATICAL PRINCIPLES OF THE THEORY OF WEALTH (W.J. Ashley ed., Nathaniel T. Bacon trans., MacMillan Company 1897) (1838).

179. Lemley & Shapiro, *supra* note 154, at 2013, 2015–16.

180. *Applied Med. Res. Corp. v. U.S. Surgical Corp.* 435 F.3d 1356, 1361 (Fed. Cir. 2006) (quoting *Trans-World Mfg. Corp. v. Al Nyman & Sons, Inc.*, 750 F.2d 1552, 1568 (Fed. Cir. 1984) (internal brackets omitted)); *see also* *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1081 (Fed. Cir. 1983) (explaining that it “is implicit” that “a reasonable royalty would leave an infringer with a reasonable profit” (internal quotations and citation omitted)); *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1122 (S.D.N.Y. 1970) (noting that “the very definition of a reasonable royalty assumes that, after payment, ‘the infringer be left with a profit’”) (quoting *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 243 F. Supp. 500, 539 (S.D.N.Y. 1965)). *But see* *Mars, Inc. v. Coin Acceptors, Inc.*, 527 F.3d 1359, 1374 (Fed. Cir. 2008) (holding that “the law does not require that an infringer be permitted to make a profit” (quoting *Monsanto Co. v. Ralph*, 382 F.3d 1374, 1384 (Fed. Cir. 2004))).

181. Some versions of the “rule of thumb” describe the royalty as a range from 25% to 33% of expected profits that may be adjusted upwards or downwards. *See, e.g.*, *Novozymes A/S v. Genencor Int’l, Inc.*, 474 F. Supp. 2d 592, 606 (D. Del. 2007); *Std. Mfg. Co., Inc. v. United States*, 42 Fed. Cl. 748, 766 (1999); *see also* RUSSELL PARR, INTELLECTUAL PROPERTY INFRINGEMENT DAMAGES: A LITIGATION SUPPORT HANDBOOK (1999) (asserting that the rule of thumb “calculates a royalty as 25% to 33 1/3% of the gross profit, before taxes, from the enterprise operations in which the licensed intellectual property is used”).

182. *See, e.g.*, Ted Hagelin, *Valuation of Patent Licenses*, 12 TEX. INTELL. PROP. L.J. 423, 425 (2003–2004).

licensor and licensee.<sup>183</sup> Several *Georgia-Pacific* factors are implicated by the “rule of thumb,” including Factors 8 (profitability and commercial success of the product practicing the patent) and 12 (portion of profit customary in the industry to use the invention).

Although the “rule of thumb” has been utilized by patentees as part of the *Georgia-Pacific* analysis,<sup>184</sup> it has been justly criticized for numerous reasons.<sup>185</sup> For example, it sets an arbitrary value for the patented technology (25%) without considering either the benefits it provides over the prior art or the level of its expected use in the accused product.<sup>186</sup> In addition, it fails to consider the availability of potential substitutes to the patented technology and the impact such substitutes would have on the parties’ hypothetical negotiations.<sup>187</sup> Furthermore, application of the “rule of thumb” is particularly problematic in the context of royalty stacking. For complex products covered by dozens or hundreds of patents, if each potential licensor demanded a 25% share of the product’s projected profits, four such

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183. Ted Hagelin, *A New Method to Value Intellectual Property*, 30 AIPLA Q.J. 353, 370 (2002). See generally Robert Goldscheider, John Jarosz & Carla Mulhern, *Use of the 25 Percent Rule in Valuing IP*, LES NOUVELLES 123 (Dec. 2002), available at <http://www.bu.edu/otd/files/2009/11/goldscheider-25-percent-rule.pdf>.

184. See, e.g., *i4i Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 853–54 (Fed. Cir. 2010) (declining to find plaintiff’s damages expert’s use of 25% rule of thumb unreliable under *Daubert*); *Uniloc USA, Inc. v. Microsoft Corp.* 632 F. Supp. 2d 147, 150 (D.R.I. 2009), *rev’d in relevant part*, \_\_\_ No. 2010-1035, 2011 WL 9738, at \*16-22 (Fed. Cir. Jan. 4, 2011) (recognizing that “the rule of thumb calculation” is “widely accepted”); *Civix v. Expedia*, No. 03 C 3792, 2005 WL 5961023, at \*3 (N.D. Ill. Oct. 25, 2005) (permitting the patentee’s damages expert to use the “rule of thumb” as a methodology to calculate damages); *W.L. Gore & Assocs., Inc. v. Int’l Med. Prosthetics Res. Assocs., Inc.*, No. CIV 84-559 PHX CLH, 1990 WL 180490, at \*23 (D. Ariz. July 9, 1990) (“As a general rule of thumb, a royalty of 25 percent of net profits is used in license negotiations.”).

185. A detailed criticism of the “rule of thumb” is outside the scope of this Article. For a summary of previous criticism, see Amy L. Landers, *Let the Games Begin: Incentives to Innovation in the New Economy of Intellectual Property Law*, 46 SANTA CLARA L. REV. 307, 332–35 (2006).

186. See, e.g., Paul E. Schaafsma, *An Economic Overview of Patents*, 79 J. PAT. & TRADEMARK OFF. SOC’Y 241, 251–52 (1997) (explaining that the “rule of thumb” represents “an arbitrary fraction” and “does not relate to the value and degree to which the patent can exclude substitute products and therefore command a patent profit”); Lauren Johnston Stiroh & Richard T. Rapp, *Modern Methods for the Valuation of Intellectual Property*, 532 PLI/Pat 817, 823–24 (1998); Roy J. Epstein, *Modeling Patent Damages: Rigorous and Defensible Calculations* 6 (2003) (unpublished manuscript), available at [http://www.royepstein.com/epstein\\_aipla\\_2003\\_article\\_website.pdf](http://www.royepstein.com/epstein_aipla_2003_article_website.pdf) (asserting that the rule of thumb is “essentially arbitrary” and “divorced from economic analysis”).

187. Hagelin, *supra* note 182, at 426.

licenses would consume the entire profit derived from the product. No “economically rational” licensee would agree to enter into patent licenses where the combined costs would exceed the product’s projected profits.<sup>188</sup> Recently, in *Uniloc USA, Inc. v. Microsoft Corp.*, the Federal Circuit agreed with these criticisms, holding that the 25% “rule of thumb” was “arbitrary,” “unreliable,” and a “fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation.”<sup>189</sup>

### *B. Apportionment*

A related problem is the difficulty of assessing the patented technology’s value in a complex, high-tech product as compared to other, noninfringing features. This inquiry, called apportionment, limits damages to the patent holder “to only the losses that are attributable to the patented invention.”<sup>190</sup> The goal of apportionment is to prevent the overcompensation of patent holders by precluding recovery of damages for features that go beyond the scope of the patent’s exclusive rights.<sup>191</sup>

Apportionment has deep roots in patent law<sup>192</sup> and is embodied in *Georgia-Pacific* Factor 13, which provides that the jury must consider “[t]he portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer.”<sup>193</sup> While a good idea in theory, apportionment has proven difficult to implement properly in practice. As a practical matter, at trial, juries hear

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188. *Id.* at 427.

189. \_\_\_ F.3d \_\_\_, No. 2010-1035, 2011 WL 9738, at \*19,\*22 (Fed. Cir. Jan. 4, 2011).

190. Tim Carlton, Note, *The Ongoing Royalty: What Remedy Should a Patent Holder Receive When a Permanent Injunction is Denied?*, 43 GA. L. REV. 543, 553 (2009).

191. See Eric E. Bensen, *Apportionment of Lost Profits in Contemporary Patent Damages Cases*, 10 VA. J.L. & TECH. 8 ¶¶ 18–20 (2005).

192. See, e.g., *Garretson v. Clark*, 111 U.S. 120, 121 (1884) (“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[s] and the unpatented features.” (internal citations omitted)); see also Bensen, *supra* note 191, ¶ 3 (“[B]etween 1853 and 1915, the Supreme Court addressed apportionment more than thirty-five times in patent damages decisions, sometimes in two or three decisions in the same year.”).

193. *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970).

extensive evidence from the patent holder regarding the critical importance of the patented invention but often receive little or no information regarding “all the other things that contribute to the success” of the accused product, such as other inventions and the contributions of defendants’ own technology and marketing efforts.<sup>194</sup> Indeed, it would be virtually impossible to explain the importance of all the other, noninfringing components and features contained in complex products like computer operating systems or smartphones—such a presentation likely would take weeks or months of highly technical testimony, which few judges would allow (and few jurors would want to endure).<sup>195</sup> As a result, juries often come away from a trial “with an inflated sense of the relative value of [the patented] invention” and consequently award a disproportionately high royalty.<sup>196</sup>

The apportionment problem is aptly illustrated by *Lucent v. Gateway*,<sup>197</sup> one of the most recent Federal Circuit cases applying the *Georgia-Pacific* standard. In *Lucent*, the patented invention was a graphical date-picking feature embodied in Microsoft Outlook.<sup>198</sup> At trial, the jury awarded Lucent approximately \$358 million in reasonable royalty damages.<sup>199</sup> On appeal, however, the Federal Circuit vacated the damages award, in part because the jury failed to properly consider the value of the patented technology relative to the rest of the accused product.<sup>200</sup> Although “[t]he parties presented little evidence relating to” this *Georgia-Pacific* factor, the court held

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194. DAN L. BURK & MARK A. LEMLEY, *THE PATENT CRISIS AND HOW COURTS CAN SOLVE IT* 29–30 (Univ. of Chicago Press, 2009); see also *i4i Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 852–53, 855 (Fed. Cir. 2010) (recounting the argument by plaintiff’s damages expert that “the infringing custom XML editor was critical to Microsoft’s sales” of Microsoft Word, even though a survey revealed that only 1.9% of all copies of Word “were used in an infringing manner”).

195. For example, during the January 2007 release of the original iPhone, CEO Steve Jobs said that Apple had filed over 200 patent applications related to it. Lev Grossman, *The Apple of Your Ear*, TIME, Jan. 22, 2007, at 48, 54. In addition, a proper apportionment analysis would have to take Apple’s highly successful marketing campaign for the iPhone into consideration. See, e.g., Ellis Booker, *Apple’s Masterful Marketing of iPhone*, BTOB, June 17, 2007, at 8, available at 2007 WLNR 13901677.

196. BURK & LEMLEY, *supra* note 194, at 30.

197. 580 F.3d 1301 (Fed. Cir. 2009).

198. *Id.* at 1317.

199. *Id.* at 1325.

200. *Id.* at 1332, 1338.

that “the only reasonable conclusion is that most of the realizable profit [from Microsoft Outlook] must be credited to non-patented elements.”<sup>201</sup> It found that the accused product was “an enormously complex software program comprising hundreds, if not thousands or even more, [of] features” and that the infringing technology was a “tiny feature of one part of a much larger software program.”<sup>202</sup> In addition, it held that numerous features other than the patented technology accounted for the “overwhelming majority of the consumer demand,” and the portion of the profit attributable to the date-picking feature was “exceedingly small.”<sup>203</sup> As a result, it appears that juries have great difficulty properly apportioning the value of the patented technology under *Georgia-Pacific* when this technology is only one part of a much larger product.

### C. Entire Market Value Rule

A third problematic issue is application of the “entire market value rule” in conjunction with the *Georgia-Pacific* analysis.<sup>204</sup> Although not part of the *Georgia-Pacific* test itself, the entire market value rule is often invoked by patentees to calculate the royalty base for a reasonable royalty award.

The entire market value rule permits a patentee to recover damages based on an entire product when the patentee can establish that the patented technology “constitutes the basis for customer demand.”<sup>205</sup> Thus, “[t]he ‘entire market value’ rule is the corollary of apportionment”<sup>206</sup>—the patentee can recover damages for an

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201. *Id.* at 1332.

202. *Id.*

203. *Id.* at 1333.

204. Although the entire market value rule is not expressly listed as part of the *Georgia-Pacific* test, similar considerations are implicated by numerous factors, including Factor 8 (commercial success and popularity of the product made under the patent), Factor 10 (nature and benefits of the patented invention), Factor 11 (extent and value of use of the patented invention in the accused product), and Factor 13 (portion of profit from the accused product that should be credited to the patented invention).

205. *Lucent*, 580 F.3d at 1336 (quoting *TWM Mfg., Inc. v. Dura Corp.*, 789 F.2d 895, 901 (Fed. Cir. 1986)); *see also* *Rite-Hite Corp. v. Kelley Co., Inc.*, 56 F.3d 1538, 1549 (Fed. Cir. 1995) (en banc) (“We have held that the entire market value rule permits recovery of damages based on the value of a patentee’s entire apparatus containing several features when the patent-related feature is the basis for customer demand.” (internal quotations omitted)).

206. H.R. REP. NO. 110-314, at 64 (2007).

entire product's value if the patent is the cause for customers to demand the product.

The entire market value rule originated in Supreme Court cases involving equitable claims for accounting of an infringer's profits, which were available prior to the 1946 Act. For example, in *Garretson v. Clark*,<sup>207</sup> the Court held that

[w]hen a patent is for an improvement, and not for an entirely new machine or contrivance, the patentee must show in what particulars his improvement has added to the usefulness of the machine or contrivance. He must separate its results distinctly from those of the other parts, so that the benefits derived from it may be distinctly seen and appreciated. . . . The patentee . . . must . . . show, by equally reliable and satisfactory evidence, 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>208</sup>

The Federal Circuit first adopted the entire market value rule for damages based on lost profits.<sup>209</sup> Although the entire market value rule awards a patentee at least some profits due to unpatented contributions, Mark Lemley has explained that its application “nonetheless makes a certain amount of sense in lost profits cases because, if most of the value of the defendant's product is attributable to the patentee's technology, it is reasonable to conclude that, but for the infringement, the defendant's customers would have bought the product from the [patentee] instead.”<sup>210</sup>

However, in *Rite-Hite Corp. v. Kelley Co.*,<sup>211</sup> the Federal Circuit, sitting en banc, asserted that the entire market value rule also extended to reasonable royalties,<sup>212</sup> a view it has reaffirmed in

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207. 111 U.S. 120 (1884).

208. *Id.* at 121 (emphasis added), *quoted in Lucent*, 580 F.3d at 1337.

209. *See, e.g.*, *Paper Converting Mach. Co. v. Magna-Graphics Corp.*, 745 F.2d 11, 22 (Fed. Cir. 1984).

210. Lemley, *supra* note 23, at 663; *see also* Thomas F. Cotter, *Patent Holdup, Patent Remedies, and Antitrust Responses*, 34 J. CORP. L. 1151, 1178 n.137 (2009) (arguing that “if the patentee can prove that the defendant's infringement caused it to lose sales,” the patentee should “recover the profits it would have earned on those lost sales”).

211. 56 F.3d 1538 (Fed. Cir. 1995) (en banc).

212. *Id.* at 1554–55.

subsequent cases.<sup>213</sup> This extension to royalties for complex products does not make economic sense because a successful claim under the entire market value means that the patentee is obtaining a royalty based in part on the “unpatented components of a device . . . that are part of the same machine.”<sup>214</sup> As recent studies have demonstrated, this leads to an overcompensation of the patentee.<sup>215</sup>

The entire market value rule is also problematic in cases in which a reasonable royalty is calculated based on a running royalty. For a running royalty, the factfinder must determine “two variables: the royalty base and the royalty rate.”<sup>216</sup> The royalty base is the value base of the products to which the royalty rate is applied.<sup>217</sup> Under the entire market value rule, however, the patentee can claim *any* group of products containing the patented technology, no matter how small a feature or component—for example, an automobile containing patented windshield wipers<sup>218</sup> or a computer containing a software program with an infringing feature<sup>219</sup>—as the royalty base.<sup>220</sup> Consequently, a massive damages award can result when a large royalty base is combined with a royalty rate of “only” a few percentage points.<sup>221</sup> As several prominent high-tech companies, including Intel, Palm, SAP, and Yahoo!, argued in a recent brief,

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213. See, e.g., *Lucent*, 580 F.3d at 1336–37.

214. *Rite-Hite*, 56 F.3d at 1549; see also Brian J. Love, Note, *Patentee Overcompensation and the Entire Market Value Rule*, 60 STAN. L. REV. 263 (2007) (explaining that “[s]ince *Rite-Hite*, courts have frequently applied the entire market value rule to award damages for components that are unconnected to the infringing element of the accused device, yet which nevertheless function together with the accused device and are sold or marketed in conjunction with the infringing article”).

215. Lemley, *supra* note 23, at 663–64; Love, *supra* note 214, at 272–84; see also Cotter, *supra* note 210, at 1179 n.137 (arguing “that in reasonable royalty cases, the entire market value rule is conceptually inappropriate”).

216. *Lucent*, 580 F.3d at 1339 (quoting RAYMOND T. NIMMER & JEFF DODD, MODERN LICENSING LAW § 7:5 (2008–2009 ed. 2008)).

217. NIMMER & DODD, *supra* note 216, at § 7:7.

218. *Kearns v. Chrysler Corp.*, 32 F.3d 1541, 1543 (Fed. Cir. 1994).

219. *Lucent*, 580 F.3d at 1338.

220. *Id.* at 1338–39; see also *Bose Corp. v. JBL, Inc.*, 274 F.3d 1354, 1361 (Fed. Cir. 2001) (“We have held that the entire market value rule permits recovery of damages based on the value of a patentee’s entire apparatus containing several features when the patent-related feature is the basis for customer demand.” (internal quotations and citation omitted)).

221. See, e.g., *Lucent*, 580 F.3d at 1309, 1338–40 (finding that the royalty rate of 8% on all copies of Microsoft Outlook led to \$358 million damages award by the jury).

[B]y permitting evidence of the total sales of a complex, multi-component product, the entire market value rule invites juries to start their damages calculation with a very large number, which biases juries toward overcompensatory damages awards. . . . The likely scenario in such a case is then this: A jury, when presented with portfolio licensing exemplars under which royalties may be as high as 5–8% of the licensee’s revenues, will combine these high rates with evidence showing total sales of a successful, complex product and reach a conclusion on damages that bears no reasonable relationship to the value of an individual patented component.<sup>222</sup>

Several recent cases illustrate the flaw of applying the entire market value rule as part of a *Georgia-Pacific* reasonable royalty analysis. In *Lucent v. Gateway*, the patentee’s damages expert claimed that, under the entire market value rule, the parties would have agreed to a 1% royalty on the sale of all “infringing computers” loaded with the software (Microsoft Outlook) that purportedly contained the patented date-picking feature.<sup>223</sup> After the trial court excluded computer sales as the proper royalty base, the patentee’s expert changed his opinion to contend that the royalty base should be the price of the allegedly infringing software but that the royalty rate should be increased to 8%.<sup>224</sup> The jury apparently agreed and awarded a \$358 million royalty for “a very small component of a much larger software program.”<sup>225</sup> On appeal, the Federal Circuit overturned the verdict, holding that it was not supported by substantial evidence because there was no evidence that the patented feature was “*the* basis—or even a substantial basis—of the consumer demand for” the software program.<sup>226</sup>

Similarly, in *Uniloc USA, Inc. v. Microsoft*, the patentee claimed damages relating to nearly \$20 billion in sales of Microsoft’s software products, including Windows XP and Microsoft Office, which

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222. Brief for Ten *Amici Curiae* Technology-Based Companies in Support of Appellant Microsoft Corp. at 17–18, *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301 (Fed. Cir. 2009) (No. 2008-1485), 2008 WL 5550592.

223. *Lucent*, 580 F.3d at 1338.

224. *Id.*

225. *Id.* at 1336–37.

226. *Id.* at 1337 (emphasis added); *see also id.* (“Lucent did not carry its evidentiary burden of proving that anyone purchased Outlook because of the patented method.”).

contained the allegedly infringing product activation system.<sup>227</sup> The patentee's damages expert opined that a reasonable royalty for the patented technology was \$564 million, and supported this with a reasonableness "check" that his royalty figure was approximately 3% of the accused products' total sales dollar volume.<sup>228</sup> Ultimately, the jury awarded \$388 million as a reasonable royalty.<sup>229</sup> During post-trial motions, the district court granted Microsoft's request for a new trial on damages, finding that the expert's opinion was an end-run around the entire market value rule. It noted that the patentee "conceded customers do not buy Office or Windows because of" the allegedly infringing product activation feature, and thus could not base its proposed royalty—even as a check—on the "market value of the products."<sup>230</sup>

#### *D. Balancing the Factors*

Furthermore, *Georgia-Pacific's* absence of guidance for balancing the various factors contributes to a lack of certainty and predictability in reasonable royalty awards. This unpredictability is partially due to the test's lengthy list of fifteen nonexclusive factors. Such broad, multifactor tests have been criticized as being poorly designed and containing duplicative or overlapping factors, which can lead to unpredictable results.<sup>231</sup>

Indeed, there is increasing sentiment among intellectual property scholars that the *Georgia-Pacific* test provides juries with inadequate

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227. 640 F. Supp. 2d 150, 156, 184 (D.R.I. 2009). Microsoft's Product Activation ("PA") system is a feature "contained in software products sold through retail distribution" that attempts to prevent software piracy by limiting the number of computers on which software can be installed in accordance with the software's end user license agreement. *Id.* at 156–57. Plaintiff Uniloc claimed that Microsoft's PA system infringed U.S. Patent No. 5,490,216, which claimed a particular "method of reducing unlicensed use of software through casual copying." *Id.* at 155.

228. *Id.* at 184–85.

229. *Id.* at 185. On appeal, the Federal Circuit affirmed the district court's order of a new trial on damages, explaining that "[t]his case provides a good example of the danger of admitting consideration of the entire market value of the accused where the patented component does not create the basis for customer demand." No. 2010-1035, 2011 WL 9738, at \*24 (Fed. Cir. Jan. 4, 2011).

230. *Id.* at 184–85.

231. Chris Guthrie, Jeffrey J. Rachlinski & Andrew J. Wistrich, *Blinking on the Bench: How Judges Decide Cases*, 93 CORNELL L. REV. 1, 41 (2007).

instruction on how to determine a reasonable royalty. John R. Thomas recently explained that

[e]xperience suggests that the *Georgia-Pacific* factors are difficult to apply consistently. Although *Georgia-Pacific* provides a long list of ingredients, it offers no recipe—that is to say, no principles for deciding whether one of the seemingly randomly ordered elements should be weighed more heavily than another in a given determination. The laundry list of *Georgia Pacific* factors . . . cannot plausibly be considered to provide a “standard” for setting reasonable royalty rates at all.<sup>232</sup>

Similarly, John Schlicher has contended that the key problem with a reasonable royalty is that “juries are not given useful guidance on how to apply the so-called *Georgia-Pacific* factors.”<sup>233</sup> And Mark Lemley and Daralyn Durie argue that *Georgia-Pacific*’s “non-exclusive fifteen-factor test that requires balancing and consideration of the interactions between the factors is likely to give little or no practical guidance to a jury.”<sup>234</sup>

Similar criticisms were made to the Federal Trade Commission during a series of hearings in 2009 entitled *The Evolving IP Marketplace*. Paul Janicke explained that in practice, *Georgia-Pacific* leads to “erratic results” because the test is like a “grab bag” where “the judge throws the grab bag with all the factors to the jury and says, ‘Do what you think is right.’”<sup>235</sup> As a result, he concluded the test should be abandoned.<sup>236</sup> Likewise, Tom Cotter has observed that the *Georgia-Pacific* factors “can be so easily manipulated by the trier of fact to reach virtually any outcome.”<sup>237</sup>

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232. *The Patent Reform Act of 2009: Hearing on H.R. 1260 Before the H. Comm. on the Judiciary*, 111th Cong. 4 (2009) (statement of Prof. John R. Thomas, Georgetown Univ.), available at <http://judiciary.house.gov/hearings/pdf/Thomas090430.pdf>.

233. John W. Schlicher, *Patent Damages, the Patent Reform Act, and Better Alternatives for the Courts and Congress*, 91 J. PAT. & TRADEMARK OFF. SOC’Y 19, 22 (2009).

234. Durie & Lemley, *supra* note 1, at 631.

235. Fed. Trade Comm’n, *Hearing on: The Evolving IP Marketplace*, Matter No. P093900, at 15 (Feb. 11, 2009) (testimony of Prof. Paul M. Janicke, Univ. of Hous. L. Ctr.), available at <http://www.ftc.gov/bc/workshops/ipmarketplace/feb11/090211transcript.pdf>.

236. *Id.*

237. *Id.* at 39 (testimony of Prof. Thomas F. Cotter, Univ. of Minn. L. Sch.).

A little-noted point about *Georgia-Pacific* is that the test was initially created for application by a court, not a jury.<sup>238</sup> The district court's opinion in that case noted that a "proper conclusion[.] . . . concerning the amount of a reasonable royalty" required "the exercise of *judicial discretion*."<sup>239</sup> Like most patent litigation at the time, *Georgia-Pacific* was tried by a court. But today, most patent issues—including damages—are decided by juries instead.<sup>240</sup> The competency of juries to decide complex, lengthy cases has long been questioned, particularly for difficult scientific and economic issues.<sup>241</sup> In contrast, judges are generally perceived as being better trained, more experienced, and having more time to decide such complex issues.<sup>242</sup> While an assessment of juror competency in patent litigation is outside the scope of this Article,<sup>243</sup> it seems likely that a lengthy, multifactor test with little instruction on how to balance the relevant factors, like *Georgia-Pacific*, would exacerbate the potential juror competency issue.

In addition, as Mark Lemley and Daralyn Durie have explained, the imprecise nature of *Georgia-Pacific* makes it difficult to exclude expert testimony on a reasonable royalty, even if it seems grossly disproportionate to the relative value of the patented invention.<sup>244</sup> Under *Daubert v. Merrell Dow Pharmaceuticals*<sup>245</sup> and its progeny, courts have the duty to act as a "gatekeeper" for proposed expert

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238. See, e.g., Durie & Lemley, *supra* note 1, at 631–32 (explaining that *Georgia-Pacific* was decided at a time when nearly all patent cases were tried before a judge).

239. *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120–21 (S.D.N.Y. 1970) (emphasis added).

240. Moore, *supra* note 151, at 366.

241. See, e.g., Smith, *supra* note 150, at 489–95; Martin H. Redish, *Seventh Amendment Right to Jury Trial: A Study in the Irrationality of Rational Decisionmaking*, 70 NW. U. L. REV. 486 (1975); Note, *The Jury's Capacity to Decide Complex Cases*, 110 HARV. L. REV. 1489 (1997).

242. Smith, *supra* note 150, at 489–95.

243. For previous scholarly work on this issue, see generally Jennifer F. Miller, *Should Juries Hear Complex Patent Cases?*, 2004 DUKE L. & TECH. REV. 4 (2004); Kimberly A. Moore, *Juries, Patent Cases, & A Lack of Transparency*, 39 HOUS. L. REV. 779, 780–82 (2002); Davin M. Stockwell, *A Jury of One's (Technically Competent) Peers?*, 21 WHITTIER L. REV. 645 (2000).

244. See Durie & Lemley, *supra* note 1, at 632 ("The breadth of the available [*Georgia-Pacific*] factors also means that it is difficult to exclude evidence or expert testimony espousing virtually any theory of reasonable royalty damages, no matter how outlandish.").

245. 509 U.S. 579 (1993).

testimony to determine if it is sufficiently reliable for admission.<sup>246</sup> But because *Georgia-Pacific* permits the factfinder to consider virtually all potentially relevant evidence and give it whatever weight it deems appropriate, it is difficult to establish that an expert's reasonable royalty methodology is unreliable, so long as the expert professes some semblance of adherence to the *Georgia-Pacific* framework.<sup>247</sup> Thus, experts often "run down the list [of fifteen *Georgia-Pacific* factors] and identify some factors that support 'high' royalty rates, while others identify those factors that support 'low' royalty rates, whichever seems to benefit them most."<sup>248</sup> As a result, the *Georgia-Pacific* factors easily can be cherry-picked and manipulated to justify a large range of potential awards.<sup>249</sup>

For example, in *Cornell University v. Hewlett Packard Co.*, discussed above,<sup>250</sup> the parties' damages experts offered widely diverging opinions regarding an appropriate royalty award. At trial, Cornell's damages expert opined that in a hypothetical negotiation, the parties would have agreed to a 2.5% royalty rate on the \$23 billion market for HP's servers and workstations containing computer chips that practiced the patented technology, for a total

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246. See *id.* at 589 ("[T]he trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable."); see also *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 147 (1999) (holding that the district court's "gatekeeping obligation" under *Daubert* extends "to all expert testimony," scientific or otherwise). See generally FED. R. EVID. 702.

247. See, e.g., *Micro Chem., Inc. v. Lextron, Inc.*, 317 F.3d 1387, 1391–93 (Fed. Cir. 2003) (holding that plaintiff's damages expert's testimony was reliable because he "properly applied the accepted *Georgia-Pacific* methodology to [plaintiff's] version of the disputed facts, explaining the effect each factor would have on a negotiated royalty"); *Bowling v. Hasbro, Inc.*, No. 05-229S, 2008 WL 717741, at \*3 (D.R.I. Mar. 17, 2008) ("[T]he *Georgia-Pacific* rubric is presumptively reliable in both principle and methodology.").

248. William Choi & Roy Weinstein, *An Analytical Solution to Reasonable Royalty Rate Calculations*, 41 IDEA 49, 51 (2001).

249. See Roy J. Epstein & Alan J. Marcus, *Economic Analysis of the Reasonable Royalty: Simplification and Extension of the Georgia-Pacific Factors*, 85 J. PAT. & TRADEMARK OFF. SOC'Y 555, 555 (2003) ("The overriding problem is that the [*Georgia-Pacific*] factors typically can be used to justify a very wide range of outcomes."); see also *Hearing on H.R. 1260*, *supra* note 232, at \*4 (asserting that the result of *Georgia-Pacific* "has been a potpourri of factors that experts may apply with virtually unlimited discretion").

250. 609 F. Supp. 2d 279 (N.D.N.Y. 2009); see also *supra* notes 169–73 and accompanying text.

royalty award of \$575 million.<sup>251</sup> In support of this opinion, Cornell's expert relied on numerous *Georgia-Pacific* factors, including the royalty rates of other licenses entered into by HP (Factor 2), the profitability of HP's servers and workstations (Factor 8), and the claimed advantages of the patented technology (Factors 9–11).<sup>252</sup> In contrast, HP's damages expert offered an opinion that in a hypothetical negotiation, the parties would have agreed to a royalty two orders of magnitude lower: approximately \$2 million.<sup>253</sup> HP's expert's opinion was based in significant part on a lump-sum royalty payment in another patent license HP had entered into for microprocessor technology (Factor 2).<sup>254</sup> Ultimately, the jury's verdict "split the baby" and awarded Cornell \$184 million as a reasonable royalty, which it calculated by applying a 0.8% royalty rate to the \$23 billion royalty base for HP's servers and workstations.<sup>255</sup>

#### *E. Judicial Review*

Last—but not least—the amorphous nature of the *Georgia-Pacific* test makes it difficult for a jury's reasonable royalty award to be adequately reviewed during post-trial motions or on appeal.<sup>256</sup> First, juries are almost never required to identify which *Georgia-Pacific* factors supported their verdict, nor must they explain what weight was given to any particular factor. Rather, juries are usually instructed to either (1) identify the applicable royalty rate and total royalty award<sup>257</sup> or (2) simply state the "sum of money" that "would

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251. Trial Tr. vol. IV, at 65, May 23, 2008, Cornell Univ. v. Hewlett-Packard Co., No. 01-CV-01974 (N.D.N.Y.) (testimony of Dr. Marion J. Stewart).

252. *Id.* at 53–59. Cornell's expert also claimed that he considered Cornell's willingness to license the patent (Factor 4), the remaining duration of patent protection (Factor 7), and contributions made by HP to the servers and workstations that were not related to the patented technology (Factor 13). *Id.* at 55–58.

253. Trial Tr. vol. VIII, at 154–55, May 28, 2008, Cornell Univ. v. Hewlett-Packard Co., No. 01-CV-01974 (N.D.N.Y.) (testimony of John Ostendorf).

254. *Id.* at 150–55.

255. *Cornell Univ.*, 609 F. Supp. 2d at 282. As previously discussed, after trial, Judge Rader granted Hewlett-Packard's motion for judgment as a matter of law on Cornell's claim that it was entitled to a royalty on the entire \$23 billion market for HP servers and workstations, and reduced Cornell's royalty award to approximately \$53 million. *Id.* at 287–93; *see also supra* notes 169–73 and accompanying text.

256. *See Durie & Lemley, supra* note 1, at 632.

257. *See, e.g.,* Revolution Eyewear, Inc. v. Aspex Eyewear, Inc., No. 02-CV-1087-VAP, 2008 WL 6873809, at \*2–3 (C.D. Cal. Apr. 24, 2008); Special Verdict Form at 9, Kowalski v.

fairly and reasonably compensate” the patentee for the infringement.<sup>258</sup>

Second, jury instructions that recite the potpourri of *Georgia-Pacific* factors tend to make effective post-trial review of reasonable royalty awards more difficult. During final jury instructions, the district court typically explains the concept of a reasonable royalty<sup>259</sup> and then lists all of the *Georgia-Pacific* factors, leaving it up to the jury to evaluate and weigh the evidence and the factors.<sup>260</sup> For example, the official commentary to the Seventh Circuit’s model instructions emphasizes that the district court “should be sensitive not to highlight one or more of the [*Georgia-Pacific*] factors in the instructions, to avoid any implication that the Court has endorsed certain of the evidence.”<sup>261</sup> Finally, some jury instructions include a

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Momma Gina Tuna Res., Nos. 05-00679-BMK et al. (D. Haw. Dec. 12, 2008) (on file with author); Special Verdict Form at 8–9, Lucent Techs., Inc. v. Gateway, Inc., Nos. 02-CV-2060 B (CAB) (S.D. Cal. Feb. 22, 2007), *available at* 2007 WL 892887; *see also* NAT’L JURY INSTRUCTION PROJECT, MODEL PATENT JURY INSTRUCTIONS, Verdict Form A (requesting the jury identify the royalty rate and total dollar amount of royalty damages), *available at* <http://www.nationaljuryinstructions.org/documents/NationalPatentJuryInstructions.pdf>.

258. *See, e.g.*, Verdict Form at 2, i4i Ltd. P’ship v. Microsoft Corp., No. 6:07-CV-113 (E.D. Tex. May 20, 2009) (on file with author); Verdict Form at 31, Creative Internet Adver. Corp. v. Yahoo! Inc., No. 6:07-CV-354 (E.D. Tex. May 15, 2009) (on file with author); *see also* Stephen S. Korniczky & Don W. Martens, *Verdict Forms – A Peek Into the “Black Box,”* 23 AIPLA Q.J. 617, 621 (1995) (explaining that “most federal, jury-tried, civil cases are resolved by a general verdict,” which “commonly appears as a single statement in a form similar to the following: ‘We, the jury in the above-entitled action find for the plaintiff and against the defendant in the amount of \$\_\_\_\_\_ dollars’”).

259. *See* NAT’L JURY INSTRUCTION PROJECT, *supra* note 257, § 6.6 (2009); AM. INTEL. PROP. LAW ASS’N, AIPLA MODEL PATENT JURY INSTRUCTIONS § 12.15 (2008), *available at* [http://www.aipla.org/Content/ContentGroups/Publications1/Publications\\_available\\_for\\_viewing1/2008\\_03\\_27\\_AIPLA\\_Model\\_Jury\\_Instructions.pdf](http://www.aipla.org/Content/ContentGroups/Publications1/Publications_available_for_viewing1/2008_03_27_AIPLA_Model_Jury_Instructions.pdf); COMM. ON PATTERN JURY INSTRUCTIONS OF THE SEVENTH CIRCUIT, FEDERAL CIVIL JURY INSTRUCTIONS OF THE SEVENTH CIRCUIT § 11.4.4 (2009), *available at* [http://www.ca7.uscourts.gov/Pattern\\_Jury\\_Instr/7th\\_civ\\_instruc\\_2009.pdf](http://www.ca7.uscourts.gov/Pattern_Jury_Instr/7th_civ_instruc_2009.pdf).

260. *See* AIPLA MODEL PATENT JURY INSTRUCTIONS, *supra* note 259, § 12.16 (“In determining the value of a reasonable royalty, you may consider evidence on any of the following [*Georgia-Pacific*] factors . . . .”); Charge of the Court at 25–27, Creative Internet Adver. Corp. v. Yahoo! Inc., No. 6:07-CV-354 (E.D. Tex. May 15, 2009) (same). The Northern District of California’s model patent instruction is a notable exception, as it does not list any of the *Georgia-Pacific* factors. MODEL PATENT JURY INSTRUCTIONS FOR THE NORTHERN DISTRICT OF CALIFORNIA § 5.7 (2007), *available at* <http://www.cand.uscourts.gov>.

261. FEDERAL CIVIL JURY INSTRUCTIONS OF THE SEVENTH CIRCUIT, *supra* note 259, § 11.4.4 cmt. 2.

“sixteenth factor” that instruct the jury to consider “any other economic factor that a normally prudent business person would . . . take into consideration” during the hypothetical negotiation.<sup>262</sup> Based on these broad instructions, it is very difficult for the district court to determine the factual basis for the jury’s royalty award after a verdict has been entered. As a result, the court “may be inclined to simply give up and defer to whatever the jury awards.”<sup>263</sup>

For example, in the *Lucent v. Gateway* MP3 litigation, the district court partially denied Microsoft’s motion for a new trial on damages after the parties had introduced a plethora of evidence and damages models under *Georgia-Pacific*. It held that “absent a view into the ‘black-box’ of the jury’s decision making process, the Court cannot say that the jury’s verdict was inconsistent or without the support of sufficient evidence.”<sup>264</sup> Likewise, in *Revolution Eyewear, Inc. v. Aspex Eyewear, Inc.*, the district court rejected the infringer’s claim that the jury’s verdict was unsupported by substantial evidence because the jury could have considered a wide variety of evidence relevant to the *Georgia-Pacific* factors.<sup>265</sup> It concluded that “[a]lthough the precise method by which the jury decided the amount of damages [the patentee] suffered remains unknown . . . there is sufficient evidence to support the damages awarded.”<sup>266</sup>

Third, the Federal Circuit’s highly deferential standard of review toward a jury’s reasonable royalty award means that relatively few awards are overturned on appeal. The determination of damages based on a reasonable royalty is a question of fact,<sup>267</sup> and the Federal Circuit has admitted that jury’s reasonable royalty award necessarily involves some approximation and uncertainty.<sup>268</sup> On appeal, a jury’s damages award “must be upheld unless the amount is grossly

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262. AIPLA MODEL PATENT JURY INSTRUCTIONS, *supra* note 259, § 12.16; NAT’L JURY INSTRUCTION PROJECT, *supra* note 257, § 6.6.

263. Durie & Lemley, *supra* note 1, at 632.

264. *Lucent Techs, Inc. v. Gateway, Inc.*, 509 F. Supp. 2d 912, 940 (S.D. Cal. 2007).

265. *Revolution Eyewear, Inc. v. Aspex Eyewear, Inc.*, No. 02-CV-01087-VAP, 2008 WL 6873809, at \*10 (C.D. Cal. Apr. 24, 2008).

266. *Id.*

267. *SmithKline Diagnostics, Inc. v. Helena Lab. Corp.*, 926 F.2d 1161, 1164 (Fed. Cir. 1991); *see also Monsanto Co. v. McFarling*, 488 F.3d 973, 981 (Fed. Cir. 2007) (“In reviewing damages awards in patent cases, we give broad deference to the conclusions reached by the finder of fact.”).

268. *Monsanto*, 488 F.3d at 981.

excessive or monstrous, clearly not supported by the evidence, or based only on speculation or guesswork.”<sup>269</sup> Under this permissive standard, then, it is unsurprising that only a small fraction of reasonable royalty awards determined under *Georgia-Pacific* have been overturned on appeal.<sup>270</sup>

Recently, however, the Federal Circuit has shown more interest in scrutinizing the factual support for reasonable royalty awards, which may result in less deference to juries’ damage determinations. For example, in September 2009, the Federal Circuit vacated a \$511 million award in the *Lucent v. Gateway* litigation involving Microsoft Outlook and remanded for a new trial on damages, concluding that “the jury’s damages award is not supported by substantial evidence, but is based mainly on speculation or guesswork.”<sup>271</sup> In particular, the court found that many of the previous patent licenses Lucent relied upon for its proffered royalty calculation were “radically different from the hypothetical agreement under consideration for the [patents-in-suit],”<sup>272</sup> and that the infringing feature was only “a tiny feature of one part of a much larger software program.”<sup>273</sup> Similarly, in *Wordtech Systems, Inc. v. Integrated Network Solutions, Inc.*,<sup>274</sup> decided in June 2010, the Federal Circuit held that previous licenses to the patents-in-suit could not support the jury’s award of \$250,000—which equated to a 26.3% effective royalty rate—to the plaintiff because some licenses contained insufficient information on how they were calculated, and the remaining ones had much lower

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269. *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1310 (Fed. Cir. 2009) (quoting *Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1580 (Fed. Cir. 1992)); see also *i4i Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 857 (Fed. Cir. 2010) (“Asking whether a damages award is ‘reasonable,’ ‘grossly excessive or monstrous,’ ‘based only on speculation or guesswork,’ or ‘clearly not supported by the evidence,’ are simply different ways of asking whether the jury’s award is supported by the evidence.” (citations omitted)).

270. See *Lucent*, 580 F.3d at 1336 (“Most jury [patent] damages awards reviewed on appeal have been held to be supported by substantial evidence.”); Duric & Lemley, *supra* note 1, at 633–34 (finding a 72% to 77% affirmance rate by the Federal Circuit for reasonable royalty damage awards).

271. *Lucent*, 580 F.3d at 1332, 1335.

272. *Id.* at 1327. Indeed, Lucent conceded on appeal that “none of the real world licenses introduced at trial arose from circumstances identical to those presumed to prevail in the hypothetical royalty negotiation.” *Id.* at 1329 (citation omitted).

273. *Id.* at 1332.

274. 609 F.3d 1308 (Fed. Cir. 2010).

running royalty rates of 3–6%.<sup>275</sup> This increased scrutiny of jury awards is a welcome trend, but it is unlikely to solve the inherent malleability of the *Georgia-Pacific* standard by itself.

V. THE COST OF AN ACCEPTABLE NONINFRINGEMENT SUBSTITUTE SHOULD SERVE AS A CEILING ON A REASONABLE ROYALTY AWARD

In lieu of *Georgia-Pacific*, this Article proposes that courts should adopt an alternative standard for imposing a reasonable royalty: when an acceptable noninfringing substitute for the patented technology exists, the cost of that substitute should serve as a “ceiling” on a reasonable royalty.

A. *The Role of Acceptable Noninfringing Substitutes in the Hypothetical Negotiation*

As the Supreme Court explained in *Aro Manufacturing Co. v. Convertible Top Replacement Co.* (“*Aro IP*”),<sup>276</sup> the proper measure of “damages” under § 284 is “the difference between [the patentee’s] pecuniary condition after the infringement, and what his condition would have been if the infringement had not occurred.”<sup>277</sup> This “but for” inquiry “requires a reconstruction of the market, as it would have developed absent the infringing product, to determine what the patentee would have made.”<sup>278</sup>

A key consideration in this *ex ante* market reconstruction is what “alternative actions the infringer foreseeably would have undertaken had he not infringed.”<sup>279</sup> As previously explained, in the hypothetical negotiation framework, the hypothetical licensee would have three options—to infringe, to take a license to the patent, or to forego use of the patented technology.<sup>280</sup> The hypothetical negotiation assumes

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275. *Id.* at 1319–21; *see also* ResQNet.com, Inc. v. Lansa, Inc., 594 F.3d 860, 868 (Fed. Cir. 2010) (vacating and remanding a district court’s reasonable royalty award because it relied on “speculative and unreliable evidence divorced from proof of economic harm linked to the claimed invention”).

276. 377 U.S. 476 (1964).

277. *Id.* at 507 (quoting *Yale Lock Mfg. Co. v. Sargent*, 117 U.S. 536, 552 (1886)) (quotation marks omitted).

278. *Grain Processing Corp. v. Am. Maize-Prods. Co.*, 185 F.3d 1341, 1350 (Fed. Cir. 1999) (internal quotations, citation, and ellipses omitted).

279. *Id.* at 1350–51.

280. *See supra* Part III.B.

the second option—that the licensee would agree to a license. However, the third option looms large in determining the outer bounds of what the hypothetical licensee would have agreed to pay for such a license.

In a hypothetical negotiation, a rational prospective licensee would consider the “Best Alternative To a Negotiated Agreement” (BATNA)—that is, the best result that can be obtained if the negotiation fails to reach an agreement.<sup>281</sup> A licensee’s BATNA represents its “walk-away value”: the maximum it would be willing to pay for a license to the patented technology.<sup>282</sup> Thus, a hypothetical negotiation necessarily “occurs in the shadow of the alternative.”<sup>283</sup> In many cases, in lieu of paying for a license, the best alternative may be adoption of a substitute noninfringing technology.

For example, in *Grain Processing Corp. v. American Maize-Products Co.*, the Federal Circuit explained that “an accurate reconstruction of the hypothetical ‘but for’ market” should “take[] into account any [noninfringing] alternatives” to the patented technology that would be “available to the infringer.”<sup>284</sup> In that case, the patentee, Grain Processing, owned a patent that claimed a type of maltodextrins—a family of food additives made from starch—and processes for producing them.<sup>285</sup> The defendant, American Maize-Products, was accused of infringing Grain Processing’s patented process for over a decade using three different manufacturing processes.<sup>286</sup> After being informed that its third process allegedly infringed the patent, American Maize-Products implemented a new process, called Process IV, within two weeks (a period called

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281. FISHER, URY & PATTON, *supra* note 95, at 99–100.

282. See Lisa B. Bingham, *Control Over Dispute-System Design and Mandatory Commercial Arbitration*, 67 L. & CONTEMP. PROBS., Winter/Spring 2004, at 221, 233.

283. *Id.*; see also Eric Keller, *Time-Varying Compulsory License: Facilitating License Negotiation for Efficient Post-Verdict Patent Infringement*, 16 TEX. INTELL. PROP. L.J. 427, 440 (2008) (“The value that a patentee can demand in licensing negotiations is limited by the cost of the infringer’s Best Alternative To a Negotiated Agreement, or BATNA.”).

284. *Grain Processing*, 185 F.3d at 1351.

285. *Id.* at 1343–44. Although not a commonly known ingredient, the market for maltodextrins is quite large—the Federal Circuit noted that commercial food manufacturers use hundreds of millions of pounds of maltodextrins annually in a wide variety of food products, including drinks, syrups, frostings, cereals, and frozen foods. *Id.*

286. *Id.* at 1345–47.

“practically instantaneous” for large-scale production by the district court).<sup>287</sup>

In litigation, Grain Processing asked for lost profits or, alternatively, a reasonable royalty. The district court rejected the lost profits claims, finding that the alternative noninfringing process implemented by American Maize-Products meant Grain Processing could not recover lost profits under the *Panduit* test.<sup>288</sup> Grain Products appealed this determination, and the Federal Circuit affirmed, holding that Process IV was an acceptable, noninfringing substitute during the entire damages period.<sup>289</sup> The Federal Circuit explained that a comparison of the “patented invention to its next-best available alternative(s)—regardless of whether the alternative(s) were actually produced and sold during the infringement”—would permit the factfinder to discern “the market value of the patent owner’s exclusive right.”<sup>290</sup> Thus, “[t]he availability of substitutes invariably will influence the market forces defining this ‘but for’ marketplace.”<sup>291</sup>

Although lost profits were at issue in the *Grain Processing* decision, its logic is equally applicable in the reasonable royalty context.<sup>292</sup> As the district court decision in *Georgia-Pacific* explained, a hypothetical negotiation for a reasonable royalty must account for “the realities of the bargaining table.”<sup>293</sup> Confronted with an “unreasonably high license fee for patented technology,” a rational

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287. *Id.* at 1346.

288. *Grain Processing Corp. v. Am. Maize-Prods. Co.*, 893 F. Supp. 1386, 1390–93 (N.D. Ind. 1995), *aff’d in part, vacated in part* by 108 F.3d 1392 (Fed. Cir. 1997). The district court also rejected Grain Processing’s proposed royalty of 28% of American Maize-Products’ revenue from sales of the infringing product, awarding a 3% royalty due to its costs savings from the patented technology. *Id.* at 1392–93.

289. 185 F.3d at 1352–55.

290. *Id.* at 1351.

291. *Id.* at 1356.

292. *See, e.g.*, Ned L. Conley, *An Economic Approach to Patent Damages*, 15 AIPLA Q.J. 354, 384 (1987) (“[T]he existence or non-existence of a non-infringing alternative is as important a factor in determining the amount of a reasonable royalty as it is in determining whether lost profits will be awarded.”).

293. *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1122 (S.D.N.Y. 1970).

licensee would “ordinarily opt for [a] noninfringing alternative[.]”<sup>294</sup> Thus, when both parties are aware—as required by the rules of the hypothetical negotiation—that the prospective licensee can “walk away” from the bargaining table and adopt a substitute at a lower cost than the royalty demanded by the patentee, this threat can be a powerful one. In such a hypothetical negotiation, “the defendant will have a good argument as to why it would not pay much to license a patent . . . the defendant could simply ‘go across the street’ and use that technology, rather than [the] plaintiff’s.”<sup>295</sup>

Several Federal Circuit decisions suggest that it might extend *Grain Processing* to reasonable royalties, although it has not expressly done so.<sup>296</sup> For example, in *Zygo Corp. v. Wyko Corp.*,<sup>297</sup> the Federal Circuit vacated and remanded a lost profits award in light of the defendant’s claim that an acceptable noninfringing alternative existed.<sup>298</sup> The court also vacated and remanded for determination of a reasonable royalty on similar grounds, explaining that in a hypothetical negotiation, the accused infringer “would have been in a stronger position to negotiate for a lower royalty rate knowing it had a competitive noninfringing device ‘in the wings.’”<sup>299</sup> Likewise, in *Riles v. Shell Exploration & Production Co.*,<sup>300</sup> the Federal Circuit vacated a reasonable royalty award for damages associated with an infringing method of anchoring an offshore drilling platform without using mud mats. It held that the patentee’s damages expert’s model was flawed because it attempted to claim a royalty on the entire offshore platform, rather than the incremental benefit of anchoring offshore oil rigs without mud mats.<sup>301</sup> It explained that “in the hypothetical negotiation that characterizes the reasonable royalty calculation, [the accused infringer] may have had non-infringing

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294. *Total Containment, Inc. v. Environ Prods., Inc.*, 1997 WL 16032, at \*7 (Fed. Cir. 1997) (citing *State Indus., Inc. v. Mor-Flo Indus., Inc.*, 883 F.2d 1573, 1581 (Fed. Cir. 1989) (en banc)).

295. CAULEY, *supra* note 32, at 104.

296. *Micro Chem., Inc. v. Lextron, Inc.*, 317 F.3d 1387, 1393 (Fed. Cir. 2003).

297. 79 F.3d 1563 (Fed. Cir. 1996).

298. *Id.* at 1571–72.

299. *Id.*

300. 298 F.3d 1302 (Fed. Cir. 2002).

301. *Id.* at 1312.

alternatives to installing with temporary pilings.”<sup>302</sup> Thus, the Federal Circuit held, “under the constraints of the hypothetical negotiation, the market could not award [the patentee] a royalty for his method divorced of all relation to a potential noninfringing alternative method. The economic relationship between the patented method and noninfringing alternative methods, of necessity, would limit the hypothetical negotiation.”<sup>303</sup>

*B. What is an “Acceptable” Substitute?*

One key issue under this Article’s proposed standard is whether a potential substitute constitutes an “acceptable” replacement for the patented technology. If there is no acceptable noninfringing substitute for the patented technology, at least for some customers, then the hypothetical licensee cannot negotiate a lower royalty rate by threatening to forego a license and switch to another technology.

The Federal Circuit’s decisions on acceptable noninfringing alternatives in the lost profits context provide some guidance on this question. As previously explained, to recover lost profits under the *Panduit* test, the patentee must establish “an absence of acceptable noninfringing substitutes.”<sup>304</sup> For this requirement, the Federal Circuit has held that “[c]onsumer demand defines the relevant market and relative substitutability among products therein.”<sup>305</sup> Important facts relevant to this determination include the “similarity of physical and functional attributes of the patentee’s product” to the alleged substitute, “consumers’ intended use for the patentee’s product,” and the price of the alleged substitute compared to the patented technology.<sup>306</sup> These requirements “ensure[] that any proffered alternative competes in the same market for the same customers as the infringer’s product.”<sup>307</sup>

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302. *Id.*

303. *Id.* (citing *Grain Processing Corp. v. Am. Maize-Prods. Co.*, 185 F.3d 1341, 1347 (Fed. Cir. 1999)).

304. *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1373 (Fed. Cir. 2008) (quoting *Standard Havens Prods., Inc. v. Gencor Indus., Inc.*, 953 F.2d 1360, 1373 (Fed. Cir. 1991)).

305. *Grain Processing*, 185 F.3d at 1355.

306. *Id.* (citing *Fonar Corp. v. Gen. Elec. Co.*, 107 F.3d 1543, 1553 (Fed. Cir. 1997)).

307. *BIC Leisure Prods., Inc. v. Windsurfing Int’l, Inc.*, 1 F.3d 1214, 1219 (Fed. Cir. 1993).

Some Federal Circuit decisions go even further, however, and attempt to draw a bright line between acceptable and non-acceptable substitutes. Under these decisions, to be “acceptable,” “the alleged alternative ‘must not have a disparately higher price than or possess characteristics significantly different from the patented’” technology.<sup>308</sup> A common refrain is that “[a] product lacking the advantages of that patented can hardly be termed a substitute ‘acceptable’ to the customer who wants those advantages.”<sup>309</sup>

The latter definition of an “acceptable” substitute is likely too narrow to be useful, because unpatented substitutes often do not have the exact attributes or qualities as validly patented inventions.<sup>310</sup> Rather, “[i]n real markets for actual products, substitution is a matter of degree” because “[s]ome, but not all, customers will substitute a product without the patented technology for one with the technology.”<sup>311</sup> Moreover, the bright-line approach is inconsistent with economic theory, which explains that even imperfect substitutes can constrain the exercise of market power by a patentee. As Judge Easterbrook has explained, “[c]ompetition is not an all-or-none process. There are degrees of substitutability.”<sup>312</sup> Thus, the value of “[p]atented items in an imperfect, but still competitive, market will be restrained . . . depending on the degree to which substitutes are functionally equivalent.”<sup>313</sup> When there are “close substitutes for the patented product, competition from these substitutes would restrain the patent holder’s potential . . . royalty he

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308. *Id.* (quoting *Kaufman Co., Inc. v. Lantech, Inc.*, 926 F.2d 1136, 1142 (Fed. Cir. 1991)).

309. *TWM Mfg. Co., Inc. v. Dura Corp.*, 789 F.2d 895, 901–02 (Fed. Cir. 1986) (quoting *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1162 (6th Cir. 1978)); *see also Stryker Corp. v. Intermedics Orthopedics, Inc.*, 96 F.3d 1409, 1418 (Fed. Cir. 1996) (holding that a “product on the market which lacks the advantages of the patented product can hardly be termed a[n] [acceptable] substitute” (quoting *Standard Havens*, 953 F.2d at 1373)).

310. Paul M. Janicke, *Contemporary Issues in Patent Damages*, 42 AM. U. L. REV. 691, 701 (1993).

311. Vincent E. O’Brien, *Economics and Key Patent Damages Cases*, 9 U. BALT. INTELL. PROP. L.J. 1, 6 (2000).

312. *In re Mahurkar Double Lumen Litig.*, 831 F. Supp. 1354, 1389–90 (N.D. Ill. 1993), *aff’d*, 71 F.3d 1573 (Fed. Cir. 1995).

313. Sean Flynn et al., *An Economic Justification for Open Access to Essential Medicine Patents in Developing Countries*, 37 J.L. MED. & ETHICS 184, 186 n.13 (2009).

could charge.”<sup>314</sup> Thus, competition from imperfect substitutes is weak enough to “allow the patent holder to raise price above cost or charge some royalty, but strong enough so the patent holder’s optimal price or royalty is less than the monopoly price or royalty.”<sup>315</sup> The price and capabilities of the imperfect substitute play an important role in determining the premium that a patent holder can charge for its own product.<sup>316</sup> In sum, a “bright-line” test for substitutability ignores the reality that often “product substitution is a matter of degree and occurs across a spectrum.”<sup>317</sup>

For an example of imperfect substitutes, consider the various versions of the iPhone. The first iPhone, released in mid-2007, supported Internet access over either a local Wi-Fi network or a wide area cellular network using GSM or EDGE, both second-generation (2G) wireless data technologies.<sup>318</sup> The iPhone 3G, introduced in 2008, included support for third-generation (3G) wireless data,<sup>319</sup> with a download speed up to ten times faster than 2G.<sup>320</sup> Its successor, the iPhone 3GS, includes (among other things) an enhanced version of the 3G standard<sup>321</sup> and a processor that is purportedly up to two times faster than the one in the iPhone 3G.<sup>322</sup> And finally, the most recent model, the iPhone 4, included an

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314. John D. Culbertson & Roy Weinstein, *Product Substitutes and the Calculation of Patent Damages*, 70 J. PAT. & TRADEMARK OFF. SOC’Y 749, 750 (1988).

315. *Id.* at 749–50.

316. See ROGER D. BLAIR & THOMAS F. COTTER, INTELLECTUAL PROPERTY: ECONOMIC AND LEGAL DIMENSIONS OF RIGHTS AND REMEDIES 214 (2005) (“Whether one product substitutes for another depends not only upon the function of the two products, but also upon the prices at which they are offered to the public.”).

317. O’Brien, *supra* note 311, at 7.

318. Wikipedia, *iPhone*, (Jan. 8, 2011 4:47 AM), <http://en.wikipedia.org/wiki/IPhone>.

319. *Id.*

320. See Macworld, *The iPhone 3G: What You Need To Know*, June 17, 2008, available at <http://www.macworld.com/article/133988/2008/07/iphone3gfaqs.html> (last modified July 9, 2008, 1:13 PM) (stating that iPhone 3G has “typical download speeds as high as 1.4Mbps versus average data speeds between 75Kbps and 135Kpbs on its EDGE network”).

321. Wikipedia, *List of iPhone and iPod Touch Models*, (Jan. 7, 2011, 10:30 AM) [http://en.wikipedia.org/wiki/List\\_of\\_iPhone\\_and\\_iPod\\_Touch\\_models](http://en.wikipedia.org/wiki/List_of_iPhone_and_iPod_Touch_models) (iPhone 3GS supported 7.2 Mbps HSDPA standard).

322. Apple, Inc., *iPhone – View All the Features of the new iPhone 3GS*, <http://www.apple.com/iphone/iphone-3gs> (last visited Jan. 7, 2011).

improved display and a high-definition (HD) video camera for video calling, among other features.<sup>323</sup>

In reality, some customers would consider the older version(s) of the iPhone to be an “acceptable” substitute to the new iPhone 4, particularly when an older model is offered at half the cost (or less).<sup>324</sup> Under the Federal Circuit’s rigid definition of substitutes, however, the earlier iPhone models could not be considered “acceptable” because they did not offer all the same advantages as the iPhone 4—even though the older models are capable of performing many of the same functions, such as retrieving and reading email, surfing the Internet, playing music and video, and using apps, just at a lower speed. Thus, for a reasonable royalty, imperfect substitutes should be evaluated as potentially “acceptable” alternatives as well.

### *C. The Costs of Adopting an Acceptable Noninfringing Substitute*

The cost to acquire an acceptable noninfringing substitute, along with any relevant “changeover” costs such as implementation costs and lost profits due to delay, represents the maximum royalty a rational licensee would agree to pay for the patented technology.<sup>325</sup>

As discussed above, the hypothetical negotiation must consider alternatives to infringement, including the licensee’s potential adoption of a noninfringing substitute. A rational licensee would not agree to pay more to use an infringing technology than the costs (including lost profits) it would expect to incur by using the next

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323. Apple, Inc., *iPhone 4 – Video Calls, Multitasking, HD Video, and More*, <http://www.apple.com/iphone> (last visited Jan. 7, 2011). Some features of the iPhone 4, such as multitasking, are available on older versions of the iPhone through an update to iPhone’s operating system. *Id.*

324. See Apple, Inc., *iPhone – Compare iPhone 4S and iPhone 3GS*, <http://www.apple.com/iphone/compare-iphones> (last visited Jan. 7, 2011) (\$99 list price for iPhone 3GS (8 GB storage) with two-year service agreement, compared to \$199 (16 GB storage) or \$299 (32 GB storage) for iPhone 4); see also BLAIR & COTTER, *supra* note 316, at 214 (explaining that “an infringer who could have used an alternative that *some* consumers would have viewed as an adequate substitute for the patented invention would have siphoned off *some* sales from the patent owner”).

325. See Blair & Cotter, *supra* note 69, at 59 (explaining that in a real negotiation, “the infringer would have agreed to a royalty equal to no more than the amount he could have expected to earn from using a non-infringing alternative”).

best noninfringing alternative. As explained by John Schlicher, a reasonable royalty

requires consideration of the extent to which the potential licensee had available to it an alternative noninfringing product that it could make and sell without a license, and the profits the licensee could make using that alternative. No prudent potential licensee would pay for a license an amount greater than the difference between the profits it could earn employing the licensed invention and the profits it could earn employing the next best noninfringing alternative to it, and a prudent licensor will recognize this aspect of the relative bargaining positions of the parties.<sup>326</sup>

For a substitute that confers the same benefits as the patented technology, this cost is expressed mathematically below, where  $L_p$  represents the licensing fee for the patented technology,  $C_A$  represents the costs to acquire or obtain the noninfringing substitute, and  $C_s$  represents the “switching” costs related to adopting the noninfringing substitute:

$$L_p \leq C_A + C_s$$

$C_A$  varies depending on the nature of the noninfringing substitute. For technology that is already available in the public domain—for example, because patent protection was never obtained or has expired, or the technology is not patentable because it is an obvious improvement over the prior art<sup>327</sup>—the acquisition cost usually will be minimal.<sup>328</sup> Some substitutes, however, may be patented or otherwise protected (for instance, copyrighted software) by a third party and thus might require a substantial licensing fee to the rights-holder.<sup>329</sup>

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326. JOHN W. SCHLICHER, PATENT LAW, LEGAL AND ECONOMIC PRINCIPLES § 1:96 (2d ed. 2009).

327. For a discussion of the various uses of the public domain in intellectual property law, see Edward Lee, *The Public's Domain: The Evolution of Legal Restraints on the Government's Power to Control Public Access Through Secrecy or Intellectual Property*, 55 HASTINGS L.J. 91, 100–19 (2003).

328. See, e.g., *Sears, Roebuck & Co. v. Stiffel Co.*, 376 U.S. 225, 231 (1964) (“[An] unpatentable article, like an article on which the patent has expired, is in the public domain and may be made and sold by whoever chooses to do so.”).

329. See, e.g., *Spectralytics, Inc. v. Cordis Corp.*, 650 F. Supp. 2d 900, 907–08 (D. Minn. 2009) (defendant asserted that a reasonable royalty should be capped at \$1.688 million,

A third possibility is a substitute developed, or easily able to be developed, by the alleged infringer. In this situation, the acquisition costs would be the accused infringer's cost to develop the substitute.<sup>330</sup> For example, in *Grain Processing*, American Maize developed a noninfringing substitute (Process IV) to the patented process in a relatively short time period (two weeks).<sup>331</sup> Similarly, in *Zygo Corp. v. Wyko Corp.*, before introducing the accused interferometer, the defendant, Wyko, had sold an allegedly acceptable noninfringing alternative.<sup>332</sup> Wyko argued that in the "but for" market, it would have continued to sell the noninfringing alternative.<sup>333</sup>

$C_s$  represents the "switching" costs associated with the accused infringer's switch to a noninfringing substitute shortly before the time of first infringement. For example, "the defendant might have substantial 'retooling' costs" associated with implementing the noninfringing substitute.<sup>334</sup> In addition, it might lose expected profits for the time that it switches to a new product. For instance, if the defendant in *Grain Processing* had required \$2 million in expenditures and a two-month delay to implement its new, noninfringing substitute manufacturing process, the "switching" costs would include both the \$2 million and the lost profits from sales of maltodextrin during the delay.

In addition, a third variable may be involved if the noninfringing substitute does not confer all of the same benefits as the patented technology. For instance, if a noninfringing substitute required a

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which represented the cost of a modified machine offered by a third party as a noninfringing alternative); *see also* *Pall Corp. v. Micron Separations, Inc.*, 66 F.3d 1211, 1222–23 (Fed. Cir. 1995) (holding that a licensed product is an acceptable noninfringing alternative to patented technology).

330. *See* Culbertson & Weinstein, *supra* note 314, at 756 ("In determining the appropriate royalty rate, it is also necessary to consider the cost of designing around the patent, since no competitor is likely to negotiate a royalty rate that produces payments substantially greater than the design-around cost.").

331. *Grain Processing Corp. v. Am. Maize-Prods. Co.*, 185 F.3d 1341, 1346–47 (Fed. Cir. 1999).

332. *Zygo Corp. v. Wyko Corp.*, 79 F.3d 1563, 1571 (Fed. Cir. 1996).

333. *Id.*

334. CAULEY, *supra* note 32, at 105; *see also* Hausman, Leonard & Sidak, *supra* note 2, at 832 ("An important consideration is whether there exist any noninfringing 'design-arounds' and the costs of implementing and using those design-arounds as compared to using the patented technology.").

2.3% greater marginal cost of production compared to the patented technology,<sup>335</sup> this represents an additional cost to the hypothetical licensee that it would be willing to hypothetically pay for the patented technology. Thus, accounting for the incremental benefit of the patented invention compared to the noninfringing substitute—which is represented by  $B_p$ —would be expressed as follows:

$$L_p \leq C_A + C_s + B_p$$

Thus, a reasonable royalty award should be effectively “capped” by the sum of the cost to acquire an acceptable noninfringing substitute ( $C_A$ ); the costs associated with implementing the substitute ( $C_s$ ); and the marginal benefit, if any, conferred by the patented technology over the substitute ( $B_p$ ).

As an illustration, assume that in a hypothetical negotiation, the patentee (P) demanded a lump-sum royalty of \$25 million for indefinite use of the patented technology. Shortly before first infringement, however, the accused infringer (AI) could internally develop an acceptable substitute for a cost of \$3 million ( $C_A$ ) in one month. This one-month delay, however, would push back the introduction of AI’s new product, resulting in projected lost profits of \$6 million. In addition, AI would incur a cost of an additional \$1 million to implement the substitute technology in its new products, resulting in  $C_s = \$7$  million. If the substitute technology offered the same benefits as the patent technology (and thus  $B_p = 0$ ), the rational licensee would offer only \$10 million ( $C_A + C_s$ ) as a royalty in the hypothetical negotiation. Knowing that AI had an equally-good substitute that it could adopt for \$10 million, P would have no choice but to accept this amount as a royalty.

If it is further assumed that the noninfringing alternative is an imperfect substitute for the patented technology, however, this also must be taken into account. For example, assume that because it is incorporating an imperfect substitute, AI must charge a slightly lower price for its new product, resulting in projected lost profits of

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335. See, e.g., *Grain Processing Corp.*, 893 F. Supp. at 1354 (affirming the district court’s finding that the patented technology conferred approximately a 2.3% reduction in costs compared to the noninfringing Process IV).

an additional \$10 million over the product's lifespan ( $B_p$ ). As a result, AI would be willing to pay P a total of \$20 million ( $C_A + C_S + B_p$ ) as a lump sum license.

Recently, in *Mars, Inc. v. Coin Acceptors, Inc.*,<sup>336</sup> the Federal Circuit suggested that reasonable royalty damages should not be capped at the cost of a noninfringing alternative. This decision, however, is unconvincing. In *Mars*, the plaintiff brought an action against defendant Coin Acceptors ("Coinco") for infringement of two patents covering vending machine coin changers.<sup>337</sup> On the reasonable royalty issue, the district court imposed a 7% blended royalty rate for both patents during the damages period.<sup>338</sup> Coinco challenged this royalty on several grounds, including "that the district court erred by awarding a reasonable royalty rate higher than the cost to Coinco of implementing acceptable noninfringing alternatives."<sup>339</sup> The Federal Circuit held that "no available and acceptable noninfringing alternative" to the patents existed at the time of the hypothetical negotiation.<sup>340</sup>

In a brief paragraph of dicta following this holding, the court also stated that "even if Coinco had shown that it had an acceptable noninfringing alternative at the time of the hypothetical negotiation, Coinco is wrong as a matter of law to claim that reasonable royalty damages are capped at the cost of implementing the cheapest available, acceptable, noninfringing alternative."<sup>341</sup> Citing *Monsanto Co. v. Ralph*,<sup>342</sup> the court summarily stated that it had "previously considered and rejected such an argument."<sup>343</sup> However, the *Monsanto* decision did not involve consideration of noninfringing alternatives. Instead, in *Monsanto*, the court merely refused to overturn the jury's award based on the *Georgia-Pacific* factors, finding that it was not "grossly excessive or monstrous, clearly not supported by the evidence, or based only on speculation or

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336. 527 F.3d 1359 (Fed. Cir. 2009).

337. *Id.* at 1362–63.

338. *Id.* at 1372.

339. *Id.*

340. *Id.* at 1373.

341. *Id.*

342. 382 F.3d 1374 (Fed. Cir. 2004).

343. *Mars, Inc.*, 527 F.3d at 1373.

guesswork.”<sup>344</sup> Moreover, the *Mars* decision did not refer to the Federal Circuit’s previous ruling in *Grain Processing*, the leading authority on noninfringing alternatives, nor did it mention *Riles*, which strongly suggested that noninfringing alternatives also played a critical role in the reasonable royalty context.

Subsequent courts should decline to follow the *Mars* decision’s dicta on noninfringing substitutes. It is inconsistent with the Supreme Court’s decision in *Aro II*—which has been repeatedly relied upon by the Federal Circuit—that “the statutory measure of ‘damages’ is ‘the difference between [the patent owner’s] pecuniary condition after the infringement, and what his condition would have been if the infringement had not occurred.’”<sup>345</sup> As explained in *Grain Processing*, this requires an analysis based on “sound economic proof” and “likely outcomes with infringement factored out of the economic picture,” including the adoption of “any alternatives available to the infringer.”<sup>346</sup> As explained above, no rational hypothetical licensee would agree to pay more than the expected cost of an acceptable noninfringing substitute for the patent—especially in the face of an unreasonably high licensing demand. The Federal Circuit’s dicta in *Mars* thus flies in the face of sound economic analysis and could result in overcompensation of patentees.

*D. A Ceiling Based on Acceptable Noninfringing Substitutes Will Not Undercompensate Patentees by Granting a “Free Option” to Infringe*

One potential criticism of this Article’s proposed approach to calculating reasonable royalty damages is that it may result in the undercompensation of patentees. Specifically, proponents of the *status quo* may argue that it gives a “free option” to the infringer, where the infringer has the choice to use the patented technology and risk litigation. If found to infringe, the infringer can then argue “that it would have switched to the noninfringing technology in the

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344. 382 F.3d at 1383 (quoting *Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1580 (Fed. Cir. 1992)).

345. *See, e.g.*, *Riles v. Shell Exploration & Prod. Co.*, 298 F.3d 1302, 1311 (Fed. Cir. 2002) (alteration in original) (quoting *Aro II*, 377 U.S. 476, 507 (1964)).

346. *Grain Processing Corp. v. Am. Maize-Prods. Co.*, 185 F.3d 1341, 1350–51 (Fed. Cir. 1999).

but-for world, thereby effectively making the switch retroactively.”<sup>347</sup> The infringer would then pay no more than the cost than it would have incurred if it had decided to originally implement the substitute.<sup>348</sup> In this situation, “[t]he infringer would have nothing to lose, and everything to gain if he could count on paying only the normal, routine royalty noninfringers might have paid. As said by this court in another context, the infringer would be in a ‘heads-I-win, tails-you-lose’ position.”<sup>349</sup> According to this argument, this “free option” for infringement “reduces the deterrent effect of litigation and thereby encourages infringement.”<sup>350</sup>

In reality, however, undercompensation of patentees due to a “free option” for infringement is unlikely for several reasons. First, when an infringer knows about a patent and then deliberately decides to infringe it, there is a significant possibility that the infringer will be held liable for willful infringement, resulting in enhanced damages.<sup>351</sup> Section 284 grants the district court discretion to “increase the damages up to three times the amount found or assessed” by the jury or court.<sup>352</sup> “A finding of willful infringement is a prerequisite to the award of enhanced damages.”<sup>353</sup> Under *In re Seagate*,<sup>354</sup> to recover enhanced damages, the patentee must establish that (1) the accused infringer was aware of the patent, (2) the accused infringer acted despite an “objectively high likelihood” that its actions infringed a valid patent, and (3) this “objectively high likelihood” was either known or should have been obvious to the accused infringer.<sup>355</sup> In the preceding scenario, requirement (1) is easily met because the infringer had actual knowledge of the patent. Requirements (2) and (3) also may be satisfied because the patentee had actual knowledge that it was practicing the patent’s claims,

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347. Hausman, Leonard & Sidak, *supra* note 2, at 830 (emphasis omitted).

348. *Id.* at 830–31.

349. *Stickle v. Heublein, Inc.*, 716 F.2d 1550, 1563 (Fed. Cir. 1983) (citing *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1158 (6th Cir. 1978)).

350. Hausman, Leonard & Sidak, *supra* note 2, at 831.

351. *See Love*, *supra* note 89, at 926 (explaining that “an infringer making the deliberate decision to misappropriate patented technology and force litigation rather than paying for an ex ante license [] would almost certainly qualify as a willful infringer”).

352. 35 U.S.C. § 284 (2000).

353. *i4i Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 858 (Fed. Cir. 2010).

354. *In re Seagate Techs., LLC*, 497 F.3d 1360 (Fed. Cir. 2007) (en banc).

355. *Id.* at 1370–72.

although the infringer could still argue that there was not an “objectively high likelihood” because, for example, it had an opinion from counsel that the patent was invalid.<sup>356</sup> The threat of triple damages is thus a significant deterrent to an infringer’s decision to exercise a “free option” to infringe.

Second, in addition to a willfulness finding, the accused infringer may also be held liable for attorney’s fees. Under § 285, “[t]he court in exceptional cases may award reasonable attorney fees to the prevailing party.”<sup>357</sup> A case may be considered “exceptional” when the infringer’s conduct was willful.<sup>358</sup> This authorization for attorneys’ fees is intended to serve as a “deterrent[] to blatant, blind, willful infringement of valid patents,”<sup>359</sup> such as the “free option” described above. This deterrent can be quite substantial as well—a recent study found that when the amount at risk was between \$1 million and \$25 million, the average cost of patent litigation was approximately \$3.1 million.<sup>360</sup> When the amount at risk exceeded \$25 million, the average cost of litigation jumped to \$6.25 million.<sup>361</sup>

Third, if the patentee offers (or has attempted to introduce) a competing product for sale against the infringer’s product, then it may obtain an alternative measure of relief, rather than relying on a reasonable royalty award. As previously explained, lost profits are available if the patentee can demonstrate that it would have lost sales but for the defendant’s infringement under the *Panduit* test.<sup>362</sup> Furthermore, a patentee may be able to obtain injunctive relief under § 283.<sup>363</sup> Under *eBay Inc. v. MercExchange*,<sup>364</sup> a patentee who

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356. *See, e.g.*, *Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1339 (Fed. Cir. 2008) (holding that “a ‘competent opinion of counsel’ concluding either that [the accused infringer] did not infringe the [] patent *or* that [the patent] was invalid would provide a sufficient basis for [the accused infringer] to proceed without engaging in objectively reckless behavior”).

357. 35 U.S.C. § 284 (2000).

358. *E.g.*, *Brooks Furniture Mfg., Inc. v. Dutailier Int’l, Inc.*, 393 F.3d 1378, 1381 (Fed. Cir. 2005).

359. *Mathis v. Spears*, 857 F.2d 749, 754 (Fed. Cir. 1988).

360. AM. INTELL. PROP. L. ASS’N, REPORT OF THE ECONOMIC SURVEY 2009 at I-129 (2009).

361. *Id.*

362. *See supra* Part III.A.

363. 35 U.S.C. § 283 (2000).

prevails in an infringement suit is no longer automatically entitled to a permanent injunction. Rather, a permanent injunction is within the discretion of the district court and depends on a number of equitable factors, including whether the patentee has suffered an irreparable injury, whether other remedies are inadequate to compensate for the infringement, whether the balance of hardships in granting the injunction favors the patentee, and whether the public interest would be disserved by an injunction.<sup>365</sup> But even after *eBay*, studies have shown that permanent injunctions have been granted in a majority of cases when they have been requested by a patentee in a successful infringement suit.<sup>366</sup> In fact, “[t]here is a strong, almost perfect, correlation between competition between the parties and injunctive relief.”<sup>367</sup> Thus, lost profits and injunctive relief are also significant deterrents to a “free option” to infringe in many cases.

## VI. CONCLUSION

After almost forty years, the *Georgia-Pacific* test for determining reasonable royalty damages has outlived its usefulness. The assortment of nonexclusive factors in the test have proven difficult for juries to apply, particularly in the context of sophisticated products like computers, smartphones, and other items that embody a variety of technology. In addition, *Georgia-Pacific* prevents judges from effectively performing their “gatekeeping” role under *Daubert* to screen out unreliable—and even unreasonable—proposed expert testimony regarding a reasonable royalty, as well as adequately reviewing jury awards to determine if they are truly supported by the evidence. Ultimately, a standard that grants the jury almost limitless discretion to award damages, as *Georgia-Pacific* does, is really no meaningful standard at all.

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364. 547 U.S. 388 (2006).

365. *Id.* at 391–92.

366. See Benjamin Peterson, *Injunctive Relief in the Post-eBay World*, 23 BERKELEY TECH. L.J. 193, 196–97 (2008) (finding that permanent injunctions were granted in 24 of 33 cases in the two years after *eBay*); Docket Navigator, *Success Rates for Permanent Injunctions after eBay v. MercExchange* (Nov. 20, 2009, 3:33 PM), <http://docketreport.blogspot.com/2009/11/success-rates-for-permanent-injunction.html> (finding that from Jan. 2008 to Nov. 2009, district courts granted permanent injunctions in 58 out of 93 requests).

367. Peterson, *supra* note 365, at 194.

When there is an acceptable noninfringing substitute to the patented technology, a more economically appropriate royalty would be based on the costs of the substitute. Specifically, the cost to the infringer of adopting and implementing an acceptable noninfringing substitute, plus any incremental benefit provided by the patented technology vis-à-vis the substitute, represents the true economic value of the patent over the prior art. As a result, the cost of the noninfringing substitute represents the maximum amount a rational licensee would have agreed to pay in a hypothetical negotiation.

