NOTE

Lost Profits Damages for Multicomponent Products: Clarifying the Debate

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Abstract. In *Mentor Graphics Corp. v. EVE-USA, Inc.*, the Federal Circuit determined that the "but for" compensatory damages test applies to the calculation of lost profits damages in patent infringement cases involving multicomponent products. The court rejected defendant Synopsys's argument that because multicomponent products necessarily have many important features beyond the one or two that are infringing, the plaintiff should only be awarded the portion of the compensatory damages apportionable to the infringing features. Although some scholars have supported the decision, many believe that the *Mentor Graphics* rule will overcompensate patentees, and that an apportionment rule is preferable.

This Note offers a comprehensive economic framework for implementing the *Mentor Graphics* "but for" compensatory damages scheme in scenarios that were not before the court in *Mentor Graphics* but which will arise in the future. By exploring the implications of this framework, this Note provides needed clarity to the *Mentor Graphics* debate. First, it shows that a properly constructed compensatory damages rule and the apportionment rule advocated for by Synopsys and many scholars operate far more similarly than commentators currently believe.

Second, this Note shows that if the proposed framework is adopted, then each of the concerns expressed by scholars over the *Mentor Graphics* rule would either be alleviated, overstated, or in need of some revision. It concludes by clarifying exactly what might still remain concerning about the *Mentor Graphics* rule.

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Introduction

The application of patent law to multicomponent products has never been as important as it is now. Although single-component products were more common up until the 1990s,[1] multicomponent products have become the norm over the last two decades.[2] To provide just one example, it has been estimated that there are over 250,000 active patents that impact smartphones.[3]

In *Mentor Graphics Corp. v. EVE-USA, Inc.*, the Federal Circuit determined that the "but for" compensatory damages test applies to calculate lost profits damages in patent infringement cases involving multicomponent products.[4] In *Mentor Graphics*, Mentor proved that Synopsys infringed one of Mentor's essential patents—that is, Synopsys infringed one of Mentor's patents covering a technology that the buyer in the market demanded and which could not be satisfied by any noninfringing alternatives.[5] The court determined that damages should equal the profits the patent owner would have earned "but for" the infringement.[6] Because Mentor's patented technology was absolutely essential to the buyer in the market, Mentor was entitled to damages equal to the sales it would have made had it excluded Synopsys from the market and sold the technology directly to the buyer (that is, monopoly profits).[7] The court rejected Synopsys's argument that because only two of the products' thousands of features were infringing, the damages award should be apportioned between

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1. *See* Mark A. Lemley, *Ten Things to Do About Patent Holdup of Standards (and One* Not *To)*, 48 B.C. L. REV. 149, 150-51 (2007) (explaining that multicomponent products covered by numerous patents are prevalent in newer fields of technology); *see also* John R. Allison & Mark A. Lemley, *The Growing Complexity of the United States Patent System*, 82 B.U. L. REV. 77, 93 (2002) ("Mechanical patents accounted for more than half of all patents issued in the 1976-1978 period, but less than a third of those issued twenty years later.").

2. *See* Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1992 (2007); Brian J. Love, Note, *Patentee Overcompensation and the Entire Market Value Rule*, 60 STAN. L. REV. 263, 264 (2007); *see also* Robert P. Merges, *Intellectual Property Rights and the New Institutional Economics*, 53 VAND. L. REV. 1857, 1859 (2000) ("Complex, multi-component products are the norm in many industries (e.g., autos and consumer electronics), and individual patents often cover only a single component or sub-component.").

3. *See* Mike Masnick, *There Are 250,000 Active Patents That Impact Smartphones; Representing One in Six Active Patents Today*, TECHDIRT (Oct. 18, 2012, 8:28 AM), https://perma.cc/CQY8-WL2P.

4. *See* 851 F.3d 1275, 1288, 1290 (Fed. Cir. 2017).

5. *See id.* at 1288.

6. *See id.* at 1290.

7. *See id.*

the infringing and noninfringing features; in the court's view, the "but for" damages test "ensures that damages are commensurate with the value of the patented features."[8]

Scholars have hotly debated whether patentees in such cases should receive all damages incurred due to the infringement or a smaller, apportioned award.[9] At first blush, there appear to be particularly forceful arguments on both sides of this debate. On one side, scholars correctly argue that patent law provides patentees with the right to prevent infringement, and that only a "but for" compensatory damages structure adequately compensates patentees when their essential patents are infringed.[10] On the other side, scholars argue that any single feature of a product with thousands of components can only account for a portion of the product's total value, even if it is essential to the buyer in the market.[11] And scholars on both sides agree that the two rules would generally produce drastically different damages awards.[12] I discuss these arguments in greater detail in Part I of this Note,[13] after offering an introduction to the law of patent damages[14] and a deeper dive into the *Mentor Graphics* decision.[15]

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8. *See id.* at 1287-88. The court's decision is analyzed in more detail in Part I.B below.

9. *Compare, e.g.,* Roger D. Blair & Thomas F. Cotter, *An Economic Analysis of Damages Rules in Intellectual Property Law*, 39 WM. & MARY L. REV. 1585, 1590 (1998) (supporting damages awards of all profits attributable to infringement), *and* Thomas F. Cotter, Response, *Make No Little Plans: Response to Ted Sichelman, Purging Patent Law of "Private Law" Remedies*, 92 TEX. L. REV.: SEE ALSO 25, 27 (2014) [hereinafter Cotter, *Make No Little Plans*] (responding to Ted Sichelman, *Purging Patent Law of "Private Law" Remedies*, 92 TEX. L. REV. 517 (2014)) (same), *with, e.g.,* Eric E. Bensen, *Apportionment of Lost Profits in Contemporary Patent Damages Cases*, VA. J.L. & TECH., Summer 2005, no. 8, at 45-46 (opposing nonapportioned compensatory damages in patent law), Bernard Chao, *Lost Profits in a Multicomponent World*, 59 B.C. L. REV. 1321, 1323 (2018) (same), Sichelman, *supra*, at 528, 554-60 (same), *and* Love, *supra* note 2, at 265 (same). For an early perspective on these issues, see Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031, 1065 (2005) ("Economic theory tells us that we must . . . grant[] intellectual property rights only to the extent necessary to enable creators to cover their average fixed costs. Anything more does harm and no good.").

10. *See infra* notes 66-71 and accompanying text.

11. *See infra* text accompanying notes 75-80.

12. *See, e.g.,* THOMAS F. COTTER, COMPARATIVE PATENT REMEDIES: A LEGAL AND ECONOMIC ANALYSIS 114-16 (2013); Roger D. Blair & Thomas F. Cotter, *Rethinking Patent Damages*, 10 TEX. INTELL. PROP. L.J. 1, 27-28 (2001); Chao, *supra* note 9, at 1345-46; Cotter, *Make No Little Plans, supra* note 9, at 30; *see also* Brief of Amici Curiae Hewlett-Packard Co. et al. in Support of Defendants-Appellants & in Support of Reversal with Respect to Damages at 8-10, *Mentor Graphics*, 851 F.3d 1275 (Nos. 2015-1470, 2015-1554 & 2015-1556), 2015 WL 4592096 [hereinafter *Mentor Graphics* Corporations' Brief].

13. *See infra* Part I.C.

14. *See infra* Part I.A.

15. *See infra* Part I.B.

In Part II, I offer a comprehensive economic framework for how this "but for" compensatory damages scheme should be implemented in scenarios that differ from the one before the court in *Mentor Graphics* but which will inevitably arise in the future. I describe many scenarios in which, even under the rule set forth in *Mentor Graphics*, parties should not be able to obtain large lost profits awards.

The *Mentor Graphics* court only explained how a "but for," "make-whole" damages structure would be implemented under the "narrow" facts of the case.[16] In particular, the court only resolved how lost profits should be calculated where there are two interested parties (parties with relevant product sales or patent rights), and where one of those interested parties has a patent on an absolutely essential feature of the product at issue (a feature for which there are no noninfringing alternatives).[17] But in reality, the essential (and nonessential) patents required to produce multicomponent products are often widely dispersed among many different entities, both practicing (entities that compete in the relevant market) and nonpracticing (entities that own a relevant patent but do not compete in the relevant market). In other words, the set of "remarkably simple"[18] facts in *Mentor Graphics* is the exception, not the rule.

Part II.A discusses how damages should be calculated in cases involving multiple market actors, each of which owns essential patents. Such a situation presents a potential paradox under *Mentor Graphics*: Each party with an essential patent will argue it would have made all the sales but for the others' infringement. Part II.A offers the most appropriate resolution of this potential paradox. It argues that lost profits damages are inappropriate in such a scenario and provides an alternative, more appropriate measure of damages.

Part II.B addresses how damages should be calculated in cases involving many market actors, some with and some without essential patents, addressing cases more complex than the two-party scenario presented in *Mentor Graphics*. Part II.C addresses how additional nonpracticing entities and market actors with nonessential patents should factor into damages calculations.

Part II.D then coalesces this analysis into two novel rules. First, defendants should be entitled to an *essential patent defense* to lost profits. Under the essential patent defense, a defendant would be exempt from paying lost profits damages if the plaintiff's relevant product sales infringe one or more of the defendant's essential patents. Second, defendants should be entitled to a *lost profits defense*. Under this defense, once a defendant compensates a plaintiff for a sale that the

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16. *See Mentor Graphics*, 851 F.3d at 1284-86.

17. *See id.* at 1286.

18. *See id.*

plaintiff would have made but for the infringement, the defendant is no longer on the hook for additional damages payments related to that sale.

By addressing each of the scenarios about which the *Mentor Graphics* court was silent, this Note provides the first comprehensive economic framework for navigating potential lost profits claims in our multicomponent world. By exploring the implications of this framework, Part III provides needed clarity to the scholarly debate over *Mentor Graphics*. First, Part III shows that a properly constructed compensatory damages rule and the proposed apportionment rule would operate far more similarly than scholars currently believe. Second, it shows that if this Note's proposed framework is adopted, each of the concerns expressed by scholars over the *Mentor Graphics* rule is either alleviated, overstated, or in need of some revision. But that does not mean a compensatory damages rule is free of concerns. Accordingly, Part III concludes by explaining exactly what might remain problematic about compensatory damages in patent law.

I. The Law and Controversy Surrounding Lost Profits in Multicomponent Patent Infringement Cases

This Part provides an introduction to modern patent damages law and then describes the *Mentor Graphics* decision's importance within that doctrine.[19] It then discusses the conditions under which the *Mentor Graphics* decision was correct.[20]

A. Introduction to Modern Patent Damages Law

Patent law permits innovators to obtain patents on sufficiently innovative knowledge goods they create. Patents provide patentees with a statutory "right to exclude others from making, using, offering for sale, or selling" their inventions.[21] The purpose of providing this right to exclude others is to grant patent owners the ability, under some circumstances, to obtain supracompetitive (monopoly) profits, an incentive that motivates the creation of knowledge goods.[22] This incentive is important because of a

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19. *See infra* Parts I.A-.B.

20. *See infra* Part I.C.

21. 35 U.S.C. § 154(a)(1) (2017).

22. *See, e.g.,* Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), *in* 13 THE WRITINGS OF THOMAS JEFFERSON 326, 334-35 (Andrew A. Lipscomb ed., library ed. 1904) (justifying the "embarrassment" of providing monopoly rights through patent law in order to "encourage[] men to pursue ideas which may produce utility"); *see also* U.S. CONST. art. I, § 8, cl. 8 (granting Congress the power "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries").

market defect: Knowledge goods are often public goods; once developed, they can be copied and used by others cheaply and quickly.[23] Absent intervention (such as through granting patents), innovators may not be sufficiently incentivized to create knowledge goods in the first place.[24]

Depending on the circumstances, a patentee's "right to exclude" is protected through injunctions,[25] damages,[26] or both. Because a patentee's ability to obtain an injunction has been somewhat limited in recent years,[27] patent damages law is more important than ever. The remainder of this Subpart provides an introduction to the law of patent damages.

Patent damages are designed to compensate patentees for losses incurred when their right to exclude is infringed, thus preserving the monetary incentive to innovate.[28] The patent damages statute provides for "damages adequate to compensate for the infringement, but in no event less than a reasonable royalty."[29] Courts have divided patent damages into two types: (1) lost profits, for patentees who can show that but for the infringement they would have made more profit; and (2) reasonable royalties, a concept that sets

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23. *See, e.g.,* Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention, in* THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS 609, 615 (1962); Douglas Gary Lichtman, *The Economics of Innovation: Protecting Unpatentable Goods,* 81 MINN. L. REV. 693, 701-02 (1997).

24. *See* Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use,* 56 U. CHI. L. REV. 1017, 1024-25 (1989) ("The incentive to invent theory holds that too few inventions will be made in the absence of patent protection because inventions once made are easily appropriated by competitors of the original inventor who have not shared in the costs of invention."); Edmund W. Kitch, *The Nature and Function of the Patent System,* 20 J.L. & ECON. 265, 276-77 (1977); Lichtman, *supra* note 23, at 701-02 ("Without intellectual property protection, . . . few would want to be innovators, preferring instead to wait and free-ride on someone else's good idea.").

25. *See* 35 U.S.C. § 283.

26. *See id.* § 284.

27. *See, e.g.,* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 391, 393-94 (2006). For critiques of this recent development, see generally John M. Golden, Commentary, *"Patent Trolls" and Patent Remedies,* 85 TEX. L. REV. 2111 (2007) (responding to Lemley & Shapiro, *supra* note 2) (critiquing the argument that injunctions were too often granted before the Supreme Court's decision in *eBay*); and Karen E. Sandrik, *Reframing Patent Remedies,* 67 U. MIAMI L. REV. 95 (2012) (arguing that patent law should look to the law of trespass for reestablishing patents' strength as a property right, and that patent law should therefore permit injunctions more readily).

28. *See* Pall Corp. v. Micron Separations, Inc., 66 F.3d 1211, 1223 (Fed. Cir. 1995); ROGER D. BLAIR & THOMAS F. COTTER, INTELLECTUAL PROPERTY: ECONOMIC AND LEGAL DIMENSIONS OF RIGHTS AND REMEDIES 210 (2005); Mark A. Lemley, *Distinguishing Lost Profits from Reasonable Royalties,* 51 WM. & MARY L. REV. 655, 655, 657 (2009).

29. 35 U.S.C. § 284.

the damages floor for patent owners who either cannot prove lost profits or (for any number of reasons) choose to collect reasonable royalties instead.[30]

Generally speaking, lost profits damages provide an award to patentees that corresponds to the profits they would have made "but for" the infringement, thus providing a compensatory remedy to patent owners whose right to exclude has been violated.[31] By contrast, the idea behind reasonable royalties is that "an infringed patent is valuable and could be licensed for a fee even by patent owners who don't employ the patent in the marketplace."[32] A patent owner's damages need not fully comprise one or the other, and often the patent owner will receive lost profits damages for some of the infringing sales and reasonable royalties for the rest.[33] Both lost profits and reasonable royalties are discussed in turn.

1. Lost profits damages

An award of lost profits damages gives patentees the profits they would have obtained but for the infringement, and thus "effectively puts them in the same position as if they had [been able to exclude others] all along."[34] To obtain lost profits damages, the patent owner must show a reasonable probability that it would have made additional profit but for the infringement.[35] Importantly, lost profits damages are often greater than the profits earned by the infringer, because—among other reasons—one firm's monopoly profits are more than twice as large as two firms' combined duopoly profits.[36]

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30. *See, e.g.,* Panduit Corp. v. Stahlin Bros. Fibre Works, Inc., 575 F.2d 1152, 1157 (6th Cir. 1978) ("When actual damages, e.g., lost profits, cannot be proved, the patent owner is entitled to a reasonable royalty."); Lemley, *supra* note 28, at 655.

31. *See, e.g.,* 7 DONALD S. CHISUM, CHISUM ON PATENTS: A TREATISE ON THE LAW OF PATENTABILITY, VALIDITY AND INFRINGEMENT § 20.05[2][a] (LexisNexis 2019).

32. Lemley, *supra* note 28, at 655-56; *see also* 7 CHISUM, *supra* note 31, §§ 20.06-.07.

33. *See, e.g.,* 7 CHISUM, *supra* note 31, § 20.05.

34. Lemley, *supra* note 28, at 657; *see also* Aro Mfg. Co. v. Convertible Top Replacement Co., 377 U.S. 476, 507 (1964) (noting that the relevant question for lost profits damages is "had the Infringer not infringed, what would Patent Holder[] have made?" (quoting Livesay Window Co. v. Livesay Indus., Inc., 251 F.2d 469, 471 (5th Cir. 1958))); 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, 503 (2000).

35. *See* Kaufman Co. v. Lantech, Inc., 926 F.2d 1136, 1141-42 (Fed. Cir. 1991).

36. *See* Lemley, *supra* note 28, at 661 & n.32. Courts have generally understood and accepted this fact. *See, e.g.,* Minn. Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 1579 (Fed. Cir. 1992); Lam, Inc. v. Johns-Manville Corp., 718 F.2d 1056, 1065 (Fed. Cir. 1983).

Patent owners prove that they would have made additional profit but for the infringement through the four-factor *Panduit* test.[37] This test—which is difficult to satisfy in practice—requires patent owners to prove "(1) demand for the patented product, (2) absence of acceptable noninfringing substitutes, (3) [their] manufacturing and marketing capability to exploit the demand, and (4) the amount of profit [they] would have made."[38] For example, under the first and second factors of this test, lost profits cannot be proven if purchasers do not value the patented technology differently from any noninfringing alternatives, because otherwise, had the infringement not occurred, the infringer would have opted to switch to one of those comparable, noninfringing alternatives.[39] Put differently, the first two factors require that the patented technology is essential to at least a portion of the relevant market. Under the third factor of the test, a patent owner cannot prove lost profits if it did not have the manufacturing or marketing capability to meet the extra demand, because in the "but for" world, the patentee would have been unable to make those extra sales.[40]

2. Reasonable royalties

Patentees that have made purportedly relevant product sales but that cannot clear the high bar for proving lost profits, as well as patentees that did not have any profits to lose, will still obtain a reasonable royalty.[41] Reasonable royalties are designed to make the nonpracticing (or nonmanufacturing) entity "whole" by determining the hypothetical royalty the patentee and infringer would have agreed to in the "but for" world, since a nonpracticing entity loses licensing revenue, not sales profits.[42] In calculating the royalty that would have been agreed to in the "but for" world, it is presumed that the parties had full knowledge of the facts and circumstances surrounding the infringement at

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37. *See* Lemley, *supra* note 28, at 657; *see also* Panduit Corp. v. Stahlin Bros. Fibre Works, Inc., 575 F.2d 1152 (6th Cir. 1978); *Patent Damages Primer*, FISH & RICHARDSON, https://perma.cc/3CA4-AM4F (archived May 1, 2019).

38. *Panduit*, 575 F.2d at 1156. The standard for lost profits is a "reasonable probability." *See* Standard Havens Prods., Inc. v. Gencor Indus., Inc., 953 F.2d 1360, 1372 (Fed. Cir. 1991).

39. *See, e.g.*, Grain Processing Corp. v. Am. Maize-Prods. Co., 185 F.3d 1341, 1351 (Fed. Cir. 1999) ("Without the infringing product, a rational would-be infringer is likely to offer an acceptable noninfringing alternative, if available, to compete with the patent owner rather than leave the market altogether.").

40. *See, e.g.*, Datascope Corp. v. SMEC, Inc., 879 F.2d 820, 827 (Fed. Cir. 1989).

41. *See, e.g.*, 7 CHISUM, *supra* note 31, §§ 20.06-.07.

42. *See* Amy L. Landers, *Liquid Patents*, 84 DENV. U. L. REV. 199, 251-53 (2006) (noting that patents have liquidity due to the fact that all patentees can obtain a reasonable royalty irrespective of their individual circumstances); Lemley & Shapiro, *supra* note 2, at 2017-19.

the time of their hypothetical negotiation. Indeed, the basic question posed is: If, on the eve of the infringement, the parties entered into an agreement as willing licensor and licensee, what would that agreement have been?[43]

The most common approach for determining reasonable royalty damages is the fifteen-factor test set out in *Georgia-Pacific Corp. v. United States Plywood Corp.*[44] These fifteen factors, however, "collapse into only three significant issues: the significance of the patented invention to the product and to market demand, the royalty rates people have been willing to pay for this or other similar inventions in the industry, and expert testimony as to the value of the patent."[45]

In sum, reasonable royalty law is aimed at determining how much money the patented technology is worth in the licensing marketplace, with the understanding that both the licensor and licensee must generally make some profit.[46] This is in stark contrast to lost profits damages, which, as explained above, can often exceed the infringer's total profits.[47]

B. The *Mentor Graphics* Decision

In *Mentor Graphics*, the Federal Circuit determined how lost profits damages should be calculated for multicomponent products in a simple two-

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43. *See* LaserDynamics, Inc. v. Quanta Comput., Inc., 694 F.3d 51, 76 (Fed. Cir. 2012); *see also* Lemley & Shapiro, *supra* note 2, at 2018 (describing the reasonable royalty analysis as "designed to emulate the bargain the parties would have entered into at the time infringement began had they (1) been willing to negotiate and (2) known to a certainty that the patent was valid and infringed").

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

45. Lemley & Shapiro, *supra* note 2, at 2018-19; *see also* Nickson Indus., Inc. v. Rol Mfg. Co., 847 F.2d 795, 798 (Fed. Cir. 1988); BLAIR & COTTER, *supra* note 28, at 228-29. For descriptions of the problems that arise when using existing licenses to measure reasonable royalty awards, see Erik Hovenkamp & Jonathan Masur, *How Patent Damages Skew Licensing Markets*, 36 REV. LITIG. 379 (2017); and Jonathan S. Masur, *The Use and Misuse of Patent Licenses*, 110 NW. U. L. REV. 115 (2015). For other discussions about reasonable royalty analysis and possible reform, see William F. Lee & A. Douglas Melamed, *Breaking the Vicious Cycle of Patent Damages*, 101 CORNELL L. REV. 385 (2016) (explaining how patent damages law creates a cycle of excessive remedies); Oskar Liivak, *When Nominal Is Reasonable: Damages for the Unpracticed Patent*, 56 B.C. L. REV. 1031 (2015) (arguing that history and U.S. Supreme Court precedent support the notion that nominal damages are reasonable compensation for infringement of unpracticed patents); and David O. Taylor, *Using Reasonable Royalties to Value Patented Technology*, 49 GA. L. REV. 79 (2014) (arguing that reasonable royalties are best understood as being based on the value of the patented technology, not the value of the patent right).

46. *See* Lemley, *supra* note 28, at 661 ("[R]easonable royalty case law properly inquires into what the marketplace would actually pay for rights to the technology, bearing in mind that the licensee has to make a profit as well."); Lemley & Shapiro, *supra* note 2, at 2019.

47. *See supra* note 36 and accompanying text.

competitor market with no other relevant market actors or rightsholders.[48] The court determined that the proper inquiry is what the patent owner would have received "but for" the infringement.[49]

The facts of the case were "remarkably simple": The relevant market for emulators (a multicomponent product) included only Synopsys and Mentor; Synopsys did not dispute that but for its infringement, Mentor would have made each of the sales Synopsys made; Synopsys did not dispute how much Mentor would have made; and Synopsys did not dispute the fact that there were no noninfringing alternatives.[50] Put differently, Mentor satisfied the *Panduit* test, in part by showing that it owned an essential patent—that is, a patent on a technology that buyers in the relevant market absolutely demand and for which there are no noninfringing alternative technologies that would satisfy buyers.[51]

The court determined that the proper measure of damages is "the difference between [the patent owner's] pecuniary condition after the infringement, and what his condition would have been if infringement had not occurred."[52] The court explained: "The goal of lost profit damages is to place the patentee in the same position it would have occupied had there been no infringement. In this regard, lost profit patent damages are no different than breach of contract or general tort damages."[53] The court also believed that such a damages scheme was required both by Supreme Court precedent and the patent damages statute, which provides for "damages adequate to compensate for the infringement."[54]

In the case at hand, it was undisputed that Intel, the customer, "would not have purchased the Synopsys emulator system without [Mentor's] two patented features."[55] In addition, the court noted: "There were no other competitors, and the jury found there were no non-infringing alternative emulator systems which would have satisfied Intel. Thus, what did Mentor lose when Synopsys appropriated its two patented features? It lost the profits it would have made on the sale of its emulators to Intel."[56]

Synopsys argued that the alleged infringement encompassed no more than two features of a debugging tool within the emulator—a product with

48. *See* Mentor Graphics Corp. v. EVE-USA, Inc., 851 F.3d 1275, 1289-90 (Fed. Cir. 2017).

49. *See id.*

50. *See id.* at 1286.

51. *See id.* at 1286-87.

52. *Id.* at 1283 (alteration in original) (quoting Aro Mfg. Co. v. Convertible Top Replacement Co., 377 U.S. 476, 507 (1964)).

53. *Id.* at 1285 (footnote omitted).

54. *See id.* at 1283-84 (quoting 35 U.S.C. § 284).

55. *Id.* at 1287.

56. *Id.*

thousands of important features.[57] Accordingly, after determining how much money Mentor had lost due to the infringement, the court should apportion those damages between the patented and unpatented components and only award damages attributable to the patented features.[58] Awarding damages based on the value attributable to both the patented *and* unpatented features would, in Synopsys's view, permit Mentor to recover damages beyond its relatively minor inventive contribution to the debugging tool.[59]

The Federal Circuit disagreed, finding that application of the *Panduit* test properly "ensures that damages are commensurate with the value of the patented features."[60] The court reasoned that "[w]hile there may have been other features of the emulator that were important to Intel, only Mentor could sell Intel an emulator with *all* the features it required."[61]

The Federal Circuit declined to rehear the case en banc, over a dissent by two judges.[62]

C. Was *Mentor Graphics* Correctly Decided?

In addition to the ruling on damages, the *Mentor Graphics* court also reversed the district court's finding that one of Synopsys's two asserted patents—the '109 patent—was invalid.[63] Thus, even after the decision Synopsys still has the opportunity on remand to show that Mentor's products infringe the valid '109 patent. This Subpart assumes that the '109 patent is either not infringed by Mentor or, alternatively, that the '109 patent is nonessential. Part II below will discuss what should happen if Synopsys were to prove on remand that the '109 patent is valid and essential (spoiler: Synopsys should be getting a lot of money back).[64]

Scholars have hotly debated whether patentees should receive all damages incurred due to infringement or if they should receive a smaller, apportioned award.[65] Scholars dispute the merits of apportioning compensatory damages awards. And at first glance, the arguments appear particularly forceful on *both* sides of the debate. The scholars who have voiced agreement with the outcome

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57. *See id.*

58. *See id.*

59. *See id.*

60. *See id.* at 1285.

61. *Id.* at 1289.

62. *See* Mentor Graphics Corp. v. EVE-USA, Inc., 870 F.3d 1298, 1300-04 (Fed. Cir. 2017) (Dyk, J., dissenting from the denial of rehearing en banc).

63. *See Mentor Graphics*, 851 F.3d at 1280.

64. *See infra* Part II.A.

65. *See* sources cited *supra* note 9.

in *Mentor Graphics* generally point out that its rule properly protects a patentee's statutory right to exclude others by placing the patentee in the position it would have obtained but for the infringement.[66] Indeed, for a liability rule to protect a patentee's right to exclude,[67] the rule must compensate the patentee to the extent that the patentee is no worse off due to the infringement.[68] In other words, the proper amount of damages to protect the patentee's right to exclude is the amount of money the patentee would have to receive to be indifferent between (1) the hypothetical world in which no infringement occurred and (2) the actual world in which infringement occurred but the patentee was awarded damages to compensate for the infringement.[69] The court in *Mentor Graphics* adopted such a rule.[70] In addition, scholars have opined that an apportionment rule is more costly and difficult to administer appropriately.[71]

But most commentary has come from critics on the other side of the debate. In particular, Synopsys was supported by eleven corporations as amici;[72] two Federal Circuit judges wanted to reverse the original panel and dissented from the denial of rehearing en banc;[73] and eighteen law professors joined an amicus brief in support of Synopsys's petition for certiorari.[74]

On this side of the debate, scholars argue that any single feature of a product with thousands can only provide a fraction of the product's total value.[75] In *Mentor Graphics* itself, they wonder, how can a patent on a single

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66. *See, e.g.,* Thomas F. Cotter, Mentor v. EVE-USA: *No Apportionment of Lost Profits Award,* COMP. PAT. REMEDIES (Mar. 16, 2017), https://perma.cc/W3BP-BDYV.

67. Liability rules can protect a right to exclude. *See* Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral,* 85 HARV. L. REV. 1089, 1092 (1972). Liability rules are most appropriate when harm is financial in nature—an appropriate assumption in the patent law context. *See, e.g.,* Sichelman, *supra* note 9, at 519 ("Patent law . . . is not designed to remedy private wrongs. Rather, its major aim is to promote innovation.").

68. *See* Louis Kaplow & Steven Shavell, *Property Rules Versus Liability Rules: An Economic Analysis,* 109 HARV. L. REV. 713, 723-24 (1996).

69. *See* Calabresi & Melamed, *supra* note 67, at 1092.

70. *See supra* Part I.B.

71. *See, e.g.,* Cotter, *Make No Little Plans, supra* note 9, at 31-32; Mark A. Lemley, Response, *Taking the Regulatory Nature of IP Seriously,* 92 TEX. L. REV.: SEE ALSO 107, 112-13 (2014) (responding to Sichelman, *supra* note 9).

72. *See Mentor Graphics* Corporations' Brief, *supra* note 12.

73. *See* Mentor Graphics Corp. v. EVE-USA, Inc., 870 F.3d 1298, 1300-04 (Fed. Cir. 2017) (Dyk, J., dissenting from the denial of rehearing en banc).

74. *See* Brief for Amici Curiae Eighteen Intellectual Property Law Professors in Support of Petitioners app. at 1a-3a, EVE-USA, Inc. v. Mentor Graphics Corp., 139 S. Ct. 44 (2018) (No. 17-804), 2018 WL 287757 [hereinafter *Mentor Graphics* Professors' Brief].

75. *See, e.g.,* Chao, *supra* note 9, at 1323-24, 1342-46.

feature of an emulator's debugging tool—a feature that is not even part of the emulator's main functionality—possibly be worth so much?[76]

For instance, the eighteen law professors supporting Synopsys's petition for certiorari as amici raised three policy arguments. First, they argued that because the "value of an infringing feature is necessarily less than the total value" of a multicomponent product, "profits lost as a result of a competitor's use of an infringing feature are necessarily less than the profits lost as a result of a competitor's product as a whole."[77] Second, they argued that defendants should not have to pay "reasonable royalty damages on top of an unapportioned lost profits award" because "[t]here may be insufficient money left over to pay other royalties and still maintain a return on the manufacturer's own investment."[78] Third, they argued that "by awarding Mentor Graphics all its lost profits for one patent, the law treats other patents (including Mentor Graphic[s]'s other patents) as worthless."[79] The professors argued, as do other critics, that an apportionment rule would more appropriately compensate patentees.[80]

Scholars on both sides of the debate currently believe that the compensatory damages rule and apportionment rule would, in most cases, result in drastically different damages awards.[81] In the next Part, I offer the first comprehensive economic framework for implementing the *Mentor Graphics* rule in scenarios that were not before the court but which will inevitably arise in the future. Then, in Part III below, I discuss how this framework relates to the *Mentor Graphics* debate.

II. Compensatory Damages in Patent Law: A Comprehensive Economic Framework

As discussed in Part I.B above, the court's holding in *Mentor Graphics* was important because it affirmed that the "but for" compensatory damages

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76. *See, e.g., id.* at 1345-46.

77. *See Mentor Graphics* Professors' Brief, *supra* note 74, at 9-10; *see also* Bensen, *supra* note 9, at 2 (noting that if a "product contains a number of significant components, each of which [the producer] ha[s] a right to make and sell and each of which contributes to the market value of the product," then the producer "should only be required to compensate the patentee for the lost profits attributable to the patented component, which the patentee has the burden of showing"); Chao, *supra* note 9, at 1342-46; Sichelman, *supra* note 9, at 555-56.

78. *Mentor Graphics* Professors' Brief, *supra* note 74, at 9; *see also* Chao, *supra* note 9, at 1348.

79. *Mentor Graphics* Professors' Brief, *supra* note 74, at 10.

80. *See id.* at 7-10*; see also* Bensen, *supra* note 9, at 45-46; Chao, *supra* note 9, at 1342-46; Sichelman, *supra* note 9, at 555-56.

81. *See* Chao, *supra* note 9, at 1323.

structure for violations of a patentee's right to exclude applies to multicomponent products. But the court only indicated how to implement this "but for" theory of damages under the "narrow" facts of that case.[82] In particular, the court only resolved how lost profits should be calculated where (1) there are only two interested parties and (2) where only one of those parties has an essential patent.[83]

The *Mentor Graphics* court did not address how damages should be calculated in a case between two parties that each own an essential patent. Such a case presents a potential paradox under the rule set forth in *Mentor Graphics*: Each party will argue that but for the other party's infringement, it would have made all the sales. Part II.A addresses this potential paradox and determines how damages should be calculated in such a scenario. Part II.B then discusses how damages should be calculated between a market actor with an essential patent and a market actor without any essential patents (in cases more complex than the two-party scenario presented in *Mentor Graphics*). Finally, Part II.C addresses how nonpracticing entities and market actors with relevant nonessential patents should be compensated. These three Subparts combine to provide a comprehensive framework for calculating lost profits damages in multicomponent patent infringement cases.

Part II.D concludes by synthesizing the analysis in this Part into two novel rules. By addressing every scenario on which the *Mentor Graphics* court was silent, this Note provides the first comprehensive economic framework for navigating potential lost profits claims in our complex, multicomponent world.

Before I go any further, I want to highlight that because an apportioned lost profits reward is generally larger, and never smaller, than a reasonable royalty reward,[84] apportionment advocates would agree that a properly calculated reasonable royalty award would not overcompensate patentees. Thus, for the rest of this Note, I will assume that whenever the proposed economic framework calls for a properly calculated reasonable royalty reward, no scholars would argue that such a reward overcompensates patentees.

A.   Two or More Market Competitors, Each with Essential Patents

This Subpart addresses how lost profits damages should be calculated in cases involving market actors that each own an essential patent or patents.[85]

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82. *See* Mentor Graphics Corp. v. EVE-USA, Inc., 851 F.3d 1275, 1286 (Fed. Cir. 2017).

83. *See id.* at 1286, 1290.

84. *See* 1 ERIC E. BENSEN, PATENT LICENSING TRANSACTIONS § 3.01A[3][b] (LexisNexis 2019).

85. The situation in which multiple market actors each own at least one essential patent is quite common. *See* Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, 1 INNOVATION POL'Y & ECON. 119, 134 (2001); *see also* Michael A.

Before going further, it is important to note that it is quite common for multiple market actors to own essential patents. For instance, Robert Merges has explained that this issue arises when an initial inventor develops and patents some underlying invention, and then a different entity improves the underlying invention—making it more profitable—and patents the improvement.[86] In this scenario, the inventor can block the improver from making, using, or selling the improvement, because the improvement incorporates the inventor's patented discovery.[87] And the improver can use its patent to block the inventor from making, using, or selling the patented improvement.[88]

Michael Heller and Rebecca Eisenberg have noted that the field of biomedical research suffers from a tragedy of the anticommons—the "obstacles that arise when a user needs access to multiple patented inputs to create a single useful product."[89] Heller and Eisenberg provide a number of examples from the biomedical field, in which an anticommons might be developing due to the proliferation of essential patents.[90] In one of their examples, Heller and Eisenberg explain that after companies rapidly obtained patents on gene fragments during the 1980s, "[f]oreseeable commercial products, such as therapeutic proteins or genetic diagnostic tests, [became] more likely to require the use of multiple [patented] fragments."[91] Carl Shapiro has also explained that essential patents are quite common in key

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Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation?: The Anticommons in Biomedical Research*, 280 SCIENCE 698, 699-700 (1998); Josh Lerner & Jean Tirole, *Efficient Patent Pools*, 94 AM. ECON. REV. 691, 691 (2004). Shapiro explains that the blocking patent problem is another common situation and is one of the other primary drivers of the need for patent pools. *See* Shapiro, *supra*, at 120-23. Furthermore, even if a multicomponent product does not have any absolutely essential features generally, certain submarkets may be characterized by the demand for particular features and thus be subject to essential patents. Some recent cases have also involved parties each of which allege that the other is infringing one or more of its essential patents. *See, e.g.*, Defendant Radware, Inc.'s Answer, Affirmative Defenses & Amended Counterclaims to Plaintiff F5 Networks, Inc.'s First Amended Complaint for Patent Infringement ¶¶ 26-27, 43-45, F5 Networks, Inc. v. Radware, Inc., No. 2:16-cv-00480-RAJ (W.D. Wash. Dec. 16, 2016), 2016 WL 8465400. Furthermore, as discussed below, if Synopsys proves on remand that any of its patents are essential, that would move the *Mentor Graphics* case into this portion of the framework. *See infra* text accompanying note 103.

86. *See* Robert Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 TENN. L. REV. 75, 79 (1994). Merges highlights some well-known examples of this inventor-improver scenario. *See id.* at 84-89.

87. *See id.* at 79.

88. *See id.* at 79-80.

89. Heller & Eisenberg, *supra* note 85, at 699.

90. *See id.* at 699-700.

91. *See id.* at 699.

industries such as semiconductors, biotechnology, software, and the internet.[92] In sum, essential patents underlie a variety of important industries.

How damages should be calculated between companies with valid, essential patents is best exemplified by a close derivative of an example used in the *Mentor Graphics* opinion itself.[93] Suppose that a fraction of laptop customers absolutely demand luxury laptops, which are distinguished from standard laptops by having a high-resolution screen and an extended-life battery. Firm *A* and Firm *B* are the only sellers of luxury laptops. Firm *A* owns the patent on a high-resolution screen, and Firm *B* owns the patent on an extended-life battery. Firm *A* and Firm *B* sue each other for patent infringement. (Note that Firm *A* and Firm *B* are clearly infringing each other's patents, since the patented technologies are essential.) In short, this situation is like *Mentor Graphics*, except *both* parties own essential patents.

This case presents a potential paradox under *Mentor Graphics*: Firm *A* will argue that but for Firm *B*'s infringement, Firm *A* would have made all the sales in the luxury laptop market, because only Firm *A* can provide customers with the high-resolution screen they demand. But Firm *B* will similarly argue that but for Firm *A*'s infringement, it would have made all the sales in the luxury laptop market, because only Firm *B* can provide customers with the extended-life battery they demand. Both parties could satisfy the *Panduit* test, since their technologies are in demand and there are no noninfringing alternatives. And from an administrative standpoint, it's not even clear how lost profits would be calculated for either party. How should this potential paradox be resolved?

This Note contends that under these circumstances, each firm should obtain a reasonable royalty from the other as a proxy for the hypothetical cross-license the parties would have agreed to in the "but for" world. Patent damages law is designed to determine what would have happened in the world but for the unlawful infringement and then to place the parties back into the position they would have otherwise occupied.[94] For instance, in *Mentor Graphics*, but for Synopsys's infringement, Synopsys would have been unable to enter the market and Mentor would have reaped all of the profits.[95]

In this hypothetical, each firm has an essential patent, and neither firm could enter the market without obtaining a license from the other. In other words, but for the infringement, neither party could—without first obtaining a license—provide a computer that includes the high-resolution screen and extended-life battery the luxury laptop market demands. Accordingly, the

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92. *See* Shapiro, *supra* note 85, at 144.

93. *See* Mentor Graphics Corp. v. EVE-USA, Inc., 851 F.3d 1275, 1289-90 (Fed. Cir. 2017).

94. *See supra* text accompanying note 28.

95. *See Mentor Graphics*, 851 F.3d at 1286.

firms, as rational negotiators, would have struck some sort of deal, because failing to strike a deal would mean that neither party would obtain any profit.[96]

But what type of licensing deal should courts assume the parties would have struck? This Note contends that it is most appropriate, and most administrable, for courts to assume the parties would have entered into a cross-licensing agreement.[97] Of course, in the "but for" world the parties may have found it most profitable for one party to exclusively license its patent to the other so that one party could operate in the market independently. But it is more appropriate and administrable for courts to assume the parties would have entered into a cross-licensing agreement.

For one, considering both parties did in fact enter the market, this is the only administrable assumption with respect to past infringement. Moreover, the parties could have entered into an alternative profit-maximizing licensing agreement before the lawsuit was filed or at any point before final judgment was entered in the case. But the parties did not enter into such an agreement, and thus the presumed cross-license maintains the status quo, which the parties are free to bargain around ex post if they are so inclined. Additionally, none of the benefits the parties theoretically could have obtained by allowing one party to operate exclusively in the market ever materialized, and it is unclear how the parties would have allocated benefits that never came to fruition.

How would the hypothetical cross-license be structured? It could be argued that both inventions in the hypothetical case are of equal value—because both are absolutely necessary in order to compete in the market—and thus the cross-license would not have involved an exchange of money in addition to the exchange of patents (unless, for instance, one party intended to make significantly more sales and hence make more use of the other party's technology). The better argument, however, is that courts should instead assume that the cross-license would also take various aspects of both technologies into account, and thus result in an additional exchange of money. This approach is analogous to that preferred by courts in determining reasonable royalties for standard-essential patents.[98] It should be noted,

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96. *See supra* Part I.A.2; *see also* LaserDynamics, Inc. v. Quanta Comput., Inc., 694 F.3d 51, 76 (Fed. Cir. 2012). *See generally* R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960) (arguing that absent transaction costs and strategic bargaining, parties will always bargain to the socially optimal outcome).

97. A cross-licensing agreement is a contract between parties that gives each party rights to the other's intellectual property.

98. *See, e.g., In re* Innovatio IP Ventures, LLC Patent Litig., No. 11 C 9308, 2013 WL 5593609, at *39 (N.D. Ill. Oct. 3, 2013); Microsoft Corp. v. Motorola, Inc., No. C10-1823JLR, 2013 WL 2111217, at *80 (W.D. Wash. Apr. 25, 2013), *aff'd*, 795 F.3d 1024 (9th Cir. 2015). Standard-essential patents are patents that companies claim cover an industry standard. For background on standard-essential patents, see Mark A. Lemley & Timothy Simcoe,

however, that determining the relative contributions of different patented technologies to a complex, multicomponent product can be a difficult endeavor.

To provide an example, suppose a steering wheel and an engine are two components necessary to manufacture an automobile, and that developing the engine is more time intensive, resource intensive, and risky. Therefore, patent law ought to treat the two patents differently to ensure that the parties that spend extra resources and bear more risk are rewarded financially for doing so.[99] Advantageously, reasonable royalty law is already designed to award patentees based on resources spent, risk undertaken, and the notion that both parties should make some profit,[100] and therefore each party should simply obtain a reasonable royalty from the other in such a situation.

Putting numbers on our concrete example above helps to illustrate the point.[101] Suppose Firm *A* and Firm *B* each make 150 luxury laptop sales at a profit of $10 per sale. Firm *A*'s patented high-resolution screen technology is worth a royalty of $1 per sale, and Firm *B*'s patented extended-life battery technology is worth a royalty of $2 per sale. After the parties sue each other for infringement, Firm *A* must pay $300 in royalties (150 sales * $2 / sale) to Firm *B*, and Firm *B* must pay $150 in royalties (150 sales * $1 / sale) to Firm *A*. Firm *A* ends up with $1,350 and Firm *B* ends up with $1,650.

To summarize, neither party ought to obtain lost profits if each party infringes at least one of the other's essential patents on the products for which they both seek to recover lost profits. Rather, each party should get a reasonable royalty from the other.

Another way to understand this proposal is that there should be an *essential patent defense* to paying lost profits built into the analysis of the fourth *Panduit* factor.[102] Under this essential patent defense, Firm *A* would be exempt from paying lost profits damages to Firm *B* for infringement of one of Firm *B*'s

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How Essential Are Standard-Essential Patents? (2018) (unpublished manuscript), https://perma.cc/6ZPB-UCAY.

99. This proposal is in line with Ted Sichelman's proposal that patent rewards should be tailored to the incentive necessary to stimulate beneficial innovative activity. *See* Sichelman, *supra* note 9, at 536-60.

100. *See supra* Part I.A.2.

101. For the sake of clarity, this example ignores the effects on product prices and quantities sold when different numbers of parties are competing in the market.

102. *See Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156 (6th Cir. 1978) (describing the fourth factor as "the amount of the profit [the patent owner] would have made"); *supra* notes 37-40 and accompanying text.

patents if Firm *A* can show that Firm *B*'s relevant product (that is, the product Firm *B* would have sold more of but for Firm *A*'s infringement) itself infringes one or more of Firm *A*'s essential patents. Rather, Firm *A* would only owe Firm *B* a reasonable royalty.

Finally, note that this reasoning applies even if there are three or more market competitors, each with at least one essential patent. In such scenarios, each party should still obtain a reasonable royalty from the others.

As noted in Part I.C above, the *Mentor Graphics* court reversed the district court's ruling that one of Synopsys's asserted patents (the '109 patent) was invalid,[103] meaning that Synopsys still had an opportunity on remand to prove that it held a valid, infringed patent. For this reason, based on the analysis above, the *Mentor Graphics* court might have more appropriately stayed the damages ruling pending a ruling on whether the '109 patent was infringed. But a stay was certainly not necessary, because if Synopsys can prove on remand that its patent is infringed and essential, the district court can just readjust the damages payments in accordance with the proposed rule discussed above. This would mean that Synopsys would get back a large percentage of its initial damages payment.

B. Three or More Interested Parties: Handling Additional Market Competitors

In *Mentor Graphics*, Mentor and Synopsys were the only two market competitors.[104] But assume that there are instead three competitors in the market for luxury laptops: Firms *A*, *B*, and *C*. As in the example above, Firm *A* has a patent on the high-resolution screen, a feature absolutely demanded by the luxury laptop market, and Firm *B* has a patent on the extended-life battery, the other feature absolutely demanded by the market. Suppose Firm *C* is competing in the market but has no essential patents.

In such a case, this Note contends that Firm *A* and Firm *B* should split the lost profits damages paid by Firm *C* based on their respective market shares, and then Firm *A* and Firm *B* should obtain a reasonable royalty from each other for the reasons outlined in Part II.A above. Firm *A* and Firm *B* should pay each other a reasonable royalty not only for their actual respective sales but also on their hypothetical sales for which they were compensated by Firm *C*.

Initially assume, for simplicity, that Firm *A* and Firm *B* sue each other and Firm *C*, all in a single lawsuit. (The scenario in which all parties are not privy to the first lawsuit will be addressed later on.)[105]

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103. *See* Mentor Graphics Corp. v. EVE-USA, Inc., 851 F.3d 1275, 1290-94 (Fed. Cir. 2017).

104. *See id.* at 1286.

105. *See infra* notes 109-10 and accompanying text.

As rational, willing negotiators in the "but for" world, Firms *A* and *B* could always enter a cross-licensing agreement with one another and operate in the market to Firm *C*'s exclusion. Thus, even if there is some hypothetical "but for" world in which Firm *C* gets in on the action (perhaps Firm *C* is best able to commercialize the patent and thus it is in the other firms' best interests to exclusively license to Firm *C*), in no situation would Firm *A* or Firm *B* agree to be put in a worse position than they would otherwise occupy by cross-licensing to one another and then excluding all others (including Firm *C*).

Therefore, to protect Firm *A* and Firm *B*'s right to exclude, Firm *C* would have to pay lost profits to both firms based on their respective market shares; doing so puts Firm *A* and Firm *B* in the position they would have occupied had they cross-licensed with one another and excluded Firm *C*. By compensating Firms *A* and *B* collectively for lost profits, Firm *C* has paid for all of the harm that its infringement caused. If Firm *C* paid any more in damages (such as an additional royalty on each of the sales), then Firms *A* and *B* would in effect be better off due to Firm *C*'s infringement.

Firms *A* and *B* would then owe each other a reasonable royalty,[106] not only for each of their actual sales, but also for each of the hypothetical sales for which Firm *C* compensated them. Firms *A* and *B* must also pay a royalty on each of their hypothetical sales because those hypothetical sales incorporated each other's technology, and in the "but for" world in which Firms *A* and *B* actually made those hypothetical sales, they would have owed each other a royalty.

Adding numbers to this simple example helps to illustrate the point.[107] Suppose Firms *A*, *B*, and *C* each make 100 luxury laptop sales at a profit of $10 per sale. Firm *A*'s patented high-resolution screen technology (an essential technology) is worth a royalty of $1 per sale, and Firm *B*'s patented extended-life battery technology (the other essential technology) is worth a royalty of $2 per sale. After the parties sue, Firm *C* must first pay $500 to both Firm *A* and Firm *B* to make up for the 50 sales each firm lost due to Firm *C*'s infringement.[108] This places Firms *A* and *B* back into the "but for" world in which Firm *C* never infringed; in this world Firms *A* and *B* would have each controlled half of the 300-sale market. Then Firms *A* and *B* owe each other a reasonable royalty on the real *and hypothetical* sales, so Firm *A* must pay $300 in royalties ((100 actual sales + 50 hypothetical sales) * $2 / sale) to Firm *B*, and Firm *B* must pay $150 in royalties ((100 actual sales + 50 hypothetical sales) * $1 / sale) to

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106. *See supra* Part II.A.

107. For the sake of clarity, this example ignores the effects on product prices and quantities sold when different numbers of parties are competing in the market.

108. Here, Firms *A* and *B* lost equal shares of Firm *C*'s sales because they each controlled 50% of the market. *See, e.g.*, 7 CHISUM, *supra* note 31, § 20.05[2][f] (discussing the market share rule).

Firm *A*. Thus, Firm *A* ends up with $1,350 and Firm *B* ends up with $1,650. Importantly, this is exactly where Firms *A* and *B* ended up in the analogous hypothetical in Part II.A above, which means (1) that Firm *C* has properly paid damages sufficient to collectively compensate Firms *A* and *B* for its infringement, and (2) that Firms *A* and *B* have paid each other a reasonable royalty on their actual sales and their hypothetical sales. If Firms *A* and *B* only paid each other a royalty on their actual sales, Firm *B*—as the party with the more valuable patent—would end up undercompensated, and Firm *A*—as the party with the less valuable patent—would end up overcompensated.

If only some parties are privy to the first lawsuit, will we still achieve the proper result? Suppose Firm *A* sues Firm *C* but not Firm *B* in a first lawsuit; neither Firm *A* nor Firm *C* is aware ex ante that Firm *B* owns an essential patent; and Firm *B* has not yet sued. In other words, assume that Firm *B* is not privy to the first lawsuit and that Firms *A* and *C* are unaware of Firm *B*'s essential patent. Suppose also, for ease of discussion, that all three firms maintain equal market shares, so that Firms *A* and *B* would split the market evenly but for Firm *C*'s infringement.

In Firm *A*'s lawsuit against Firm *C*, under current patent damages law Firm *A* would receive lost profits damages from Firm *C* for all of Firm *C*'s sales, because Firm *A* will (in all likelihood) be able to prove that Firm *B* is a likely infringer.[109] Drawing on our example above, that would mean Firm *A* would receive lost profits damages of $1,000 (100 sales * $10 / sale) from Firm *C*. What would happen, then, if Firm *B* sued Firm *C* for Firm *B*'s lost profits? Firm *C* should not have to pay again, since it has already paid lost profits damages for all of its sales—that is, Firm *C* has already paid to Firm *A* what both Firm *A* and Firm *B* collectively lost due to Firm *C*'s infringement. In this case, Firm *C* should be able to raise a *lost profits defense* to avoid paying further lost profits or reasonable royalties to Firm *B*, on the ground that Firm *C* already paid lost profits damages on all of its sales. Because Firm *A*'s relevant hypothetical lost

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109. *See, e.g.,* State Indus., Inc. v. Mor-Flo Indus., Inc., 883 F.2d 1573, 1578 (Fed. Cir. 1989) ("If the court is correct in its finding that the other [nonparty] competitors were likely infringers of one or the other of [the patentee's] patents, [the patentee] would have been entitled to [its] shares of the market on top of its own, and a correspondingly greater share of [the defendant infringer's] sales."); Schneider (Eur.) AG v. SciMed Life Sys., Inc., 852 F. Supp. 813, 858 (D. Minn. 1994) ("[W]here there are competitors other than the defendant in a product market, and all of the competitors are likely infringers of the subject patent, the patentee is entitled to lost profits of a percentage of the defendant's sales corresponding to the market shares of all the infringing competitors in addition to the market share of the patentee."), *aff'd per curiam*, Nos. 94-1317, 94-1410 & 94-1456, 1995 WL 375949 (Fed. Cir. Apr. 26, 1995).

sales incorporated Firm *B*'s technology, Firm *A* should now be treated as if it had made those infringing sales itself. Only then do all of the parties properly end up receiving what they would have otherwise made but for Firm *C*'s infringement.

Put differently, the problem is not that Firm *C* did not pay enough but rather one of allocation: The entirety of Firm *C*'s payment went to Firm *A*. Firm *B* should thus recover from Firm *A*. Firm *B* would first obtain from Firm *A* half of the money Firm *A* received from Firm *C*, because in the example Firms *A* and *B* maintained equal market shares and thus had an equal entitlement to Firm *C*'s profits. Firms *A* and *B* would then owe each other a reasonable royalty on their actual and hypothetical sales. As explained above, after the reasonable royalties are paid, Firm *A* and Firm *B* would end up with $1,350 and $1,650, respectively—the proper result.[110]

These findings are also instructive for price erosion damages, which are damages patentees can sometimes obtain by proving that monopoly profits would have been more than twice as much as duopoly profits.[111] This Note contends that where there are many market actors and only some of them have

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110. If, for some reason, Firm *A* cannot prove during its lawsuit with Firm *C* that Firm *B* is a likely infringer, then Firm *A* will receive lost profits damages for half of Firm *C*'s sales (because it controlled half of the noninfringing market) and a reasonable royalty on the rest of the sales. *See, e.g.,* 7 CHISUM, *supra* note 31, § 20.05[2][f] (discussing the market share rule).

 Suppose Firm *B* now sues Firm *C* (but not yet Firm *A*). Firm *B* will seek to obtain what Firm *A* obtained, namely, lost profits on half of the sales and a reasonable royalty on the other half. But if Firm *B* is granted this relief, then Firm *C* pays lost profits on each of its sales and, in addition, pays a royalty to either Firm *A* or Firm *B* on each of its sales as well. This result is incorrect because it would make Firms *A* and *B* collectively better off due to Firm *C*'s infringement. To remedy this potential problem, Firm *C* should be permitted to invoke the lost profits defense so that Firm *C* would never be required to pay more than lost profits damages on any of its sales. Accordingly, Firm *C* would pay to Firm *B* lost profits damages less the reasonable royalty paid to Firm *A* for half of the sales, and nothing on the other half of the sales since Firm *C* has already paid lost profits to Firm *A* on those sales. In effect, Firm *C* has paid lost profits damages on all of its sales and has collectively paid Firms *A* and *B* for all of the harm they incurred due to Firm *C*'s infringement. Firm *B* can still sue Firm *A* to secure a royalty for each of Firm *A*'s actual sales and for each of Firm *A*'s hypothetical sales for which Firm *A* was compensated by Firm *C*. Firm *A* will receive a reasonable royalty from Firm *B* for each of Firm *B*'s actual sales, but not on Firm *B*'s hypothetical sales, because Firm *A* received that royalty in the first lawsuit with Firm *C*. As a result, both parties are placed back into the positions they otherwise would have obtained had Firm *C* never entered the market and had they cross-licensed their patents to one another. Using the simple example from above, Firm *A* and Firm *B* would end up with $1,350 and $1,650, respectively.

111. *See, e.g.,* Minn. Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 1579 (Fed. Cir. 1992); Lam, Inc. v. Johns-Manville Corp., 718 F.2d 1056, 1065 (Fed. Cir. 1983); *see also* 7 CHISUM, *supra* note 31, § 20.05[2][a]; Lemley, *supra* note 28, at 661 & n.32.

been brought to court, and where the plaintiff shows that the third-party market actors are likely infringers, the plaintiff should not be entitled to damages due to the price erosion caused by all of the likely infringing market actors. At most, the plaintiff should be entitled only to the price erosion that occurred due to the defendants' infringement (that is, the price erosion based not on the "but for" world in which the plaintiff maintained a monopoly, but rather the "but for" world in which the plaintiff maintained a duopoly or oligopoly with the other firms not present in the lawsuit). This is because it will be impossible to determine the degree to which price erosion has occurred due to the market actors that have not been sued—and any uncertainty should be resolved against the patentee, considering the patentee could have sued each such actor if it wanted.

Indeed, recovery for price erosion is too speculative when only some alleged infringers are before the court. Suppose there are five market actors, Firms *A, B, C, D,* and *E.* Firm *A* has an essential patent and sues Firm *E,* which has no relevant patents. If Firm *A* cannot prove during the lawsuit that Firms *B, C,* and *D* are likely infringers of its patent, then presumably Firm *E* can point to the noninfringing technologies Firms *B, C,* and *D* are using and escape lost profits liability.[112] But if Firm *A* can prove that the other three firms are likely infringers, it can obtain lost profits from Firm *E* as if Firm *A* were the only market actor.[113]

Firm *A* should not also be able to recover for price erosion based on its being the only market actor in the "but for" world. There are three possibilities here, only one of which leads to price erosion. The first is that Firms *B, C,* and *D* are not actually infringing Firm *A*'s patent, in which case no party is entitled to supracompetitive rents and thus there is no price erosion. The second is that Firms *B, C,* and *D* are infringing, but they are also holders of essential patents. If that is the case, then, as described above, we assume that Firms *A, B, C,* and *D* would have entered into cross-licensing agreements and competed in the market in oligopolistic fashion (or competitively). Thus, Firm *A* should recover, at most, for the price erosion relative to the "but for" world in which Firms *A, B, C,* and *D* all compete in an oligopoly. The final possibility is that Firms *B, C,* and *D* all infringe Firm *A*'s patent and own no essential patents of their own. This is the only scenario in which price erosion has likely occurred. But because price erosion only occurs in this limited scenario, and because the patentee has the option to bring suit against every alleged infringer, the doubt surrounding the degree of price erosion should be resolved against the patentee. If Firm *A* wants to obtain price erosion damages, it should sue Firms *B, C, D,* and *E* together, not just Firm *E.* Firm *A* can either

112. *See* Panduit Corp. v. Stahlin Bros. Fibre Works, Inc., 575 F.2d 1152, 1156 (6th Cir. 1978).
113. *See supra* text accompanying note 109.

sue all four firms together, or sue each separately and stay any damages proceedings until there is a ruling on infringement in each case.

C.   Three or More Interested Parties: Considering Nonpracticing Entities

Now let's add a nonpracticing entity to the mix (or, equivalently, a practicing entity with a nonessential patent, since in both cases the patentee would obtain a reasonable royalty). This situation was not before the court in *Mentor Graphics*, though given that the products at issue had multiple components, it is virtually certain that there were other stakeholders (such as nonpracticing entities) who were not privy to the suit.

Suppose again that Firms *A* and *B* are the only two competitors in the market for luxury laptops. Firm *A* owns the essential patent on the high-resolution screen, and Firm *B* owns no essential patents. Firm *C*, a nonpracticing entity, owns the essential patent on the extended-life battery. Suppose the parties all sue one another in a single lawsuit. In short, this hypothetical is the similar to *Mentor Graphics* except that a nonpracticing entity with an essential patent also joins the lawsuit.[114] In this scenario, as explained below, Firm *C* should obtain a reasonable royalty from both Firm *A* and Firm *B*, and Firm *A* should receive from Firm *B* lost profits damages minus Firm *C*'s reasonable royalty.

In the hypothetical "but for" world, Firms *A* and *C*, as willing and rational negotiators, could clearly reach a cross-licensing agreement, since both parties are better off if such a deal is struck. With a deal in place, Firm *A* could operate independently in the market—to Firm *B*'s exclusion—and obtain monopoly profits, less the royalty to Firm *C*. Therefore, although it is possible that in the "but for" world some different arrangement may have occurred (perhaps Firms *A* and *C* both would license to Firm *B* because Firm *B* is best able to commercialize the patent), in no event would Firm *A* ever agree to licensing out its patent if doing so would place it in a worse position than it would otherwise occupy by obtaining a license from Firm *C* and operating independently in the market.[115]

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114. *See* Mentor Graphics Corp. v. EVE-USA, Inc., 851 F.3d 1275, 1286 (Fed. Cir. 2017).

115. Of course, Firm *A* does not have full autonomy here. Firm *C* could threaten to license or sell its patent to Firm *B* instead of to Firm *A*, thus inhibiting Firm *A* from reaping monopoly profits. *See supra* Part II.A. But such a threat is unlikely to prevent Firm *A* from securing the license from Firm *C*, because Firm *A* will have more to gain in the market alone than Firms *A* and *B* could collectively obtain by competing in the market. Even if Firm *B* is sufficiently better than Firm *A* at commercializing the product, such that Firm *B* would be willing to pay Firm *C* more for the patent rights, in that case all parties would be best off if both Firm *A* and Firm *C* licensed to Firm *B*. But that scenario seems unlikely, because the parties here never made such an agreement. It is instead more appropriate for the court to maintain the status quo ante and let the

To place the parties back into this "but for" world, Firm *C* must receive a reasonable royalty from both Firm *A* and Firm *B*, and Firm *B* must pay to Firm *A* total lost profits less that reasonable royalty, because had Firm *A* made those hypothetical sales, Firm *A* would have owed a royalty to Firm *C*. As described above, Firm *B* should not have to pay lost profits to Firm *A* and then an additional reasonable royalty to Firm *C*, because then Firms *A* and *C* would, in aggregate, be better off due to Firm *B*'s infringement.[116]

But what if the nonpracticing entity chooses to sue in a lawsuit in the future? For example, now that Synopsys has paid lost profits damages to Mentor for all of Synopsys's sales, what if a nonpracticing entity comes out of the woodwork and sues Synopsys for a reasonable royalty on another essential feature of the multicomponent product at issue?

As described above, it is most appropriate to assume that in the "but for" world, Mentor would have received lost profits less any reasonable royalties that must be paid out. Synopsys would have already compensated Mentor for lost profits from all the hypothetical sales Mentor would have otherwise made. That is, Mentor would have been restored to the financial position it would have occupied had it made all of the sales and Synopsys none. Synopsys should not then have to pay a royalty to this nonpracticing entity for the sales on which Synopsys has already given up lost profits damages. Doing so would put Mentor and the nonpracticing entity in a collectively better position than they otherwise would have obtained but for Synopsys's infringement.

The nonpracticing entity should instead be entitled to recover a reasonable royalty from Mentor for Mentor's actual and hypothetical sales, because Synopsys has already compensated Mentor as if Mentor made *all* the sales. And all of Mentor's sales—actual and hypothetical—infringed the nonpracticing entity's essential patent (Mentor's sales were infringing by definition, because in this hypothetical there are no noninfringing alternatives to the nonpracticing entity's technology).

An analogous example to the one we have been using illustrates this point. Assume Firms *A* and *B* each sell 150 luxury laptops at a profit of $10 each. Firm *C*'s patented extended-life battery technology is worth a royalty of $1 per sale. In this example, Firm *B*—the party without any essential patents—should first pay lost profits damages to Firm *A* for all of Firm *B*'s sales because Firm *B* is infringing Firm *A*'s essential patent on the high-resolution screen. This tentatively puts Firm *A* at 300 sales at $10 each, or $3,000 total. Firm *B* has thus compensated Firm *A* for what Firm *A* would have obtained in the market but for Firm *B*'s infringement. In other words, it is as if Firm *B* had never entered

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parties, who have superior knowledge as to the costs and benefits of various arrangements, bargain around this status quo ante should they so choose. *See supra* Part II.A.

116. *See supra* Part II.B.

the market, leaving Firm *A* to operate in the market alone. Framing the "but for" world in this manner, it is clear that Firm *A* must pay Firm *C* a royalty on all of its sales—the 150 real sales and the 150 hypothetical sales—because that is what Firm *A* would have owed to Firm *C* had Firm *B* never entered the market.[117] Firm *A* would end up with $2,700 and Firm *C* with $300—the appropriate result.

The final iteration is a scenario in which a nonpracticing entity, or a practicing entity that cannot prove lost profits, sues over a *nonessential* patent. I will illustrate this by turning back to *Mentor Graphics.* If Mentor and Synopsys were both using the nonpracticing entity's technology, then the analysis would track the analysis above. Because the lost profits award Mentor received from Synopsys was predicated on using the nonpracticing entity's technology, it would still make sense for this nonpracticing entity to sue Mentor, because Mentor was the party that benefited from sales that utilized the infringing technology.[118]

Now suppose only Synopsys were using the nonpracticing entity's technology, and Mentor were instead using some noninfringing technology. In this case, the nonpracticing entity would have to sue Synopsys for the royalty, because only Synopsys actually used and benefited from the technology. None of Mentor's sales—actual or hypothetical—implemented Synopsys's technology, so Mentor is not liable. If the technology is of any value above and beyond the noninfringing technology used by Mentor, then those benefits still lie with Synopsys, and the nonpracticing entity should recover that benefit from Synopsys. Indeed, because the lost profits award paid by Synopsys to Mentor was based on Mentor's lost profits, if only Synopsys—and not Mentor—implemented a valuable cost-saving technology, Synopsys would not disgorge the extra profits it obtained to Mentor. Importantly, this means that the nonpracticing entity can recover from *either* Mentor or Synopsys, but not both.

Suppose now that Synopsys later proves that it owns a nonessential patent that Mentor infringed. In this case, it is important to note that Synopsys would receive a reasonable royalty for all of Mentor's sales—both actual and hypothetical—meaning that Synopsys would get back a portion of the lost profits award it paid to Mentor based on the value of Synopsys's patented technology.

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117. Suppose Firm *A* were the only market actor (Firm *B* never infringed) and Firm *C* still owned the essential patent. Firm *A* would have made all 300 sales at $10 per sale, and then Firm *C* would have sued for a reasonable royalty of $1 per sale. Thus, Firm *A* would have to pay Firm *C* $300 in reasonable royalties, which is exactly the outcome that resulted in the example above.

118. In this case, Mentor's actual and hypothetical sales benefited from the nonpracticing entity's patented technology.

The analysis in this Subpart can be summarized by the following rule: Once Firm *B* has paid lost profits damages to Firm *A* based on a particular sale, Firm *B* can then invoke a lost profits defense to avoid paying any additional royalties on that sale for infringement of patents that were also infringed by Firm *A*'s relevant sales (that is, the sales Firm *A* made less of due to the infringement). In this case, other patentholders who allege infringement should sue Firm *A* for the royalty. These patentholders will only be able to recover from one of the two parties, not both. Firm *B* cannot invoke this defense, however, for any patented technology not incorporated by Firm *A*.

D.   Summary of the Analysis: Two Novel Rules

Broadly speaking, the economic analysis provided in this Part can be summarized by two novel rules. One rule pertains to lost profits calculations and the other to both lost profits and reasonable royalty calculations.

Rule one: Defendants should be entitled to an essential patent defense to lost profits damages, which likely fits as a gloss on the fourth *Panduit* factor (or, alternatively, as a new factor).[119] Under the essential patent defense, Firm *B* would be exempt from paying lost profits damages to Firm *A* if Firm *A*'s relevant sales (the sales it made less of due to the infringement) themselves infringe one or more of Firm *B*'s essential patents.[120] Put differently, when Firm *A* and Firm *B* are on equal footing in that they both own at least one valid and infringed patent essential to operating in the relevant market, both parties should receive a reasonable royalty from the other.[121]

Rule two: Under some circumstances, defendants should be entitled to a lost profits defense against paying additional damages. This defense always applies to additional lost profits claims; once a defendant has paid lost profits damages for a particular sale of a product, that party obviously cannot be subject to further lost profits damages based on that same sale: "Under *Panduit*, . . . there can only be one recovery of lost profits for any particular sale."[122] Indeed, in the "but for" world, each infringing sale could have only been made by one other party. This portion of rule two is the well-known "market share rule."[123]

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119. *See* Panduit Corp. v. Stahlin Bros. Fibre Works, Inc., 575 F.2d 1152, 1156 (6th Cir. 1978) (describing the fourth factor as "the amount of the profit [the patent owner] would have made"); *supra* notes 37-40 and accompanying text.

120. This test also assumes the defendant could have met the additional market demand.

121. Interestingly, a defendant can only raise this defense by proving that the products for which the plaintiff wishes to obtain lost profits damages infringe one or more of the *defendant*'s essential patents; it cannot raise this defense by pointing to essential patents owned by other entities. This result is advantageous because permitting parties to invoke defenses based on any existing patent would be an administrative nightmare.

122. Mentor Graphics Corp. v. EVE-USA, Inc., 851 F.3d 1275, 1289 (Fed. Cir. 2017).

123. *See* 7 CHISUM, *supra* note 31, § 20.05[2][f] (discussing the market share rule).

In addition, once Firm *B* has paid lost profits damages to Firm *A* for a particular sale, Firm *B* can then invoke the lost profits defense to avoid paying any additional royalties on that sale for any patents that were also infringed by Firm *A*'s relevant sales (the sales Firm *A* made less of due to the infringement). In this case, other patentholders should sue Firm *A* for the royalty, and Firm *A* will have to pay a royalty on its actual sales and hypothetical infringing sales. If, however, Firm *A*'s product did not incorporate the patented technology, then other patentholders should still sue Firm *B*. Importantly, these patentholders will only be able to recover against either Firm *A* or Firm *B*, not both.

Furthermore, although not discussed directly in Part II above, parties in privity with one another with regard to the sale of a particular product (that is, parties within a distribution chain) should be able to assert both defenses based on patents owned by other parties within that chain. For example, suppose Firm *A* supplies Firm *B* with widgets. Firms *B* and *C* are the only two companies supplying the market with widgets, and both Firm *A* and Firm *C* own essential patents on widgets. If Firm *C* chooses to sue Firm *B* for patent infringement, Firm *B* should be able to raise the essential patent defense based on Firm *A*'s essential patent, because Firm *A* and Firm *B* are in privity. This is because in the "but for" world, Firm *A* would have paid at most a reasonable royalty to Firm *C*, which means that the most that could be passed on to Firm *B* would be that royalty amount. This result is intuitive: Any particular product sale will only economically harm the plaintiff so much, regardless of which entity in the distribution chain makes the sale.

One question that remains is how to implement the second rule in practice where the original plaintiff's hypothetical sales arguably incorporate a nonpracticing entity's technology. In this scenario, the rule would require the nonpracticing entity to obtain a reasonable royalty from the original plaintiff rather than from the party that actually made the infringing sales.[124] One way to implement this rule is to keep patent law otherwise unchanged but apply the defenses described above—that is, allow parties to litigate their claims as they wish and then allocate damages based on the two rules outlined here. In this case, the nonpracticing entity must choose whether to sue the plaintiff, defendant, or both—with the understanding that it will only be able to recover from one party. If the nonpracticing entity sues the plaintiff from the original suit and can show that the plaintiff's products infringe its patent, the nonpracticing entity will recover a reasonable royalty on all of the plaintiff's sales—actual and hypothetical.

Things are a bit trickier if the nonpracticing entity attempts to sue the defendant instead. The defendant can always show that its products do not

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124. *See supra* Part II.C.

infringe the patents at issue, but the defendant can also raise the lost profits defense, as described above. This defense hinges on whether the original plaintiff's product incorporated the nonpracticing entity's technology. The potential oddity of resolving the lawsuit in this manner is that the parties could be disputing whether the original plaintiff's product infringes the patent at issue even though the original plaintiff is not privy to the lawsuit. The resolution would obviously not be binding on the original plaintiff if it is not part of the suit, but the plaintiff may still wish to be a part of the suit to defend its products. The nonpracticing entity could also bring both parties into the lawsuit and plead in the alternative so that the determination can be made in a single suit.[125]

III. Clarifying the Debate

As discussed previously, critics—such as the eighteen law professors supporting Synopsys's petition for certiorari—have raised three policy arguments against the *Mentor Graphics* holding: (1) that compensatory damages overcompensate patentees because any given patented technology—even essential technologies—can only make up a fraction of the total value of a multicomponent product covered by many patents;[126] (2) that infringers should not have to pay additional lost profits damages or reasonable royalties on top of a full lost profits award;[127] and (3) that the law treats the plaintiff's

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125. The discussion above makes clear that the best and easiest resolution would be if all the parties were part of the original lawsuit. In other words, the ideal situation would be if all parties with a patent infringement claim against the defendant's products bring their claims in the initial lawsuit.

    While I have previously argued that it may be appropriate to require the plaintiff to bring all potential patent infringement claims against the defendant's accused products in a single lawsuit, *see* Jason D. Reinecke, *Does Patent Law Allow Plaintiffs Too Many Bites at the Apple?*, 99 J. PAT. & TRADEMARK OFF. SOC'Y 360, 387 (2017), requiring interpleader might take things too far. For one, it would be difficult to know whether all potential rightsholders were even aware of the initial lawsuit in the first place. Moreover, different rightsholders may prefer different venues. Further, the joining of all parties in a single lawsuit only provides a benefit, from a damages perspective, if a party can actually prove lost profits. Other possible solutions would be to deduct from the lost profits award in the initial lawsuit any royalty payments the defendant may have to pay in the future, but this amount would be very speculative. I believe that the parties should at least be able to add additional parties to the suit if they think those parties are necessary, and third parties should be able to join the initial suit if they think they can best protect their interests by doing so.

126. *See Mentor Graphics* Professors' Brief, *supra* note 74, at 9-10; *see also* Bensen, *supra* note 9, at 45-46; Chao, *supra* note 9, at 1342-46; Sichelman, *supra* note 9, at 555-56.

127. *See Mentor Graphics* Professors' Brief, *supra* note 74, at 9; *see also* Chao, *supra* note 9, at 1348-49.

and defendant's other patents as worthless.[128] In this Part, I aim to show that if this Note's proposed economic framework is adopted, each of these concerns is either alleviated, exaggerated, or in need of revision. I will address each of these arguments in turn.

To be sure, this is not to say that the compensatory damages scheme as outlined here is totally unproblematic. I conclude this Note by explaining what still might be concerning about compensatory damages. Whether these problems are more or less significant than the concerns that come with an apportionment rule (such as the administrative concerns noted previously) is an empirical question I cannot answer. Rather, my goal is to point out that the arguments against compensatory damages are in need of revision.

Before I begin, I want to reiterate that while scholars advocating for an apportionment rule believe that lost profits damages overcompensate patentees, these scholars—by definition—do not believe that properly calculated reasonable royalty awards overcompensate patentees, considering reasonable royalties still provide a damages floor. Properly calculated reasonable royalty awards are related to, and generally smaller than, the apportionment damages for which these scholars advocate.

A. The Value of One Feature of a Multicomponent Product

First, scholars have argued that because multicomponent products have many features, any given feature can only provide a fraction of the total value of the multicomponent product.[129] Therefore, compensatory damages overcompensate patentees when those damages are not apportioned between the patented and unpatented features.[130] But assuming courts adopt the framework proposed in Part II above, this argument is overstated. In this Subpart, I discuss both how this argument is overstated and under what circumstances overcompensation may still occur.

At least under this Note's proposed framework, scholars would be incorrect to think that the *Mentor Graphics* rule drastically overcompensates patentees. First, market actors with at least one essential patent are completely exempt from paying lost profits damages.[131] Moreover, within a particular distribution chain, every party in the chain is exempt from paying lost profits

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128. *See Mentor Graphics* Professors' Brief, *supra* note 74, at 10; *see also* Bensen, *supra* note 9, at 8 & n.39; Chao, *supra* note 9, at 1344.

129. *See* Bensen, *supra* note 9, at 45-46; Chao, *supra* note 9, at 1323-24, 1342-46; Sichelman, *supra* note 9, at 555-56.

130. *See* Bensen, *supra* note 9, at 45-46; Chao, *supra* note 9, at 1323-24; Sichelman, *supra* note 9, at 555-56.

131. *See supra* Part II.A.

damages if *any* market actor within the chain has at least one essential patent.[132] This portion of the framework constitutes a significant limitation on lost profits damages. In many cases involving multicomponent products, all market actors will have at least one essential patent. Instead of paying out lost profits damages, market actors with at least one essential patent will owe at most a reasonable royalty, which is, by definition, based on the value of the patented feature.[133]

Suppose that one or more market actors still manage to win lost profits awards. Even if this is the case, those lost profits awards will be spread across all market actors with essential patents.[134] In addition, and perhaps more importantly, market actors who win lost profits awards will still owe a reasonable royalty to all other relevant rightsholders, including on the hypothetical sales on which the lost profits awards are based.[135] This means that any single lost profits award will be spread among many market actors, and that market actors who pay large lost profits awards can get some of their damages payments back if they can prove their patented technologies contributed to those profits.

Suppose, for instance, that there are two market actors, Firms *A* and *B*, in a market for a multicomponent product. Firm *A* has the only essential patent, and Firm *B* has forty relevant nonessential patents, of which Firm *A* is infringing twenty. Even though Firm *B* will be forced to pay lost profits damages to Firm *A*, Firm *A* will be required to pay Firm *B* a reasonable royalty on all twenty infringed patents, based on Firm *A*'s actual sales *and* Firm *A*'s hypothetical sales (i.e., Firm *B* gets back some of its lost profits damages payment).[136] In other words, Firm *B* does not relinquish lost profits entirely, but rather lost profits less any reasonable royalty based on the value of patented technologies Firm *B* brought to the table.[137] In short, the potential for patentee overcompensation is much less drastic than scholars currently believe because patentees can still earn a fair royalty for their patented technologies.

So far, this Subpart has shown that a properly implemented compensatory damages rule and an apportionment rule are much more similar than scholars currently believe. But they still operate differently under some circumstances. The rest of this Subpart highlights under what circumstances the two rules operate differently.

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132. *See supra* Part II.D.

133. *See supra* text accompanying note 46.

134. *See supra* Part II.A.

135. *See supra* Part II.C.

136. *See supra* Part II.C.

137. *See supra* Part II.C.

1. Difference of presumptions

One key finding of this Note that mitigates the differences between compensatory damages and apportionment is that under a properly conceived compensatory damages rule, market actors are exempt from paying lost profits damages if they can prove that they have at least one valid and infringed essential patent.[138] While this means that market actors will not be able to obtain lost profits damages in multicomponent product cases nearly as frequently as many scholars fear, it does not mean compensatory damages and apportionment are exactly the same.

One way to look at the difference is to note that under a properly conceived compensatory damages scheme, defendants who infringe a valid, essential patent are *presumed* to have to pay lost profits damages, but can break this presumption and enter instead into an apportionment scheme by proving that they have at least one valid and infringed essential patent.[139] Put differently, a compensatory damages system operates just like an apportionment system, but only upon a showing by the defendant that it has a valid, essential patent. An apportionment system, then, operates like the proposed compensatory damages system combined with an irrebuttable presumption that both parties own at least one essential patent.

If all parties involved have lots of essential patents and these patents are easy to identify ex ante, then the choice of rule does not matter. But what about scenarios in which parties have far more patents than they could ever assert, but they have fewer essential patents and do not know which patents in their portfolio the court will ultimately consider essential? In this case, the compensatory damages rule will involve more uncertainty than an apportionment rule. This increased uncertainty arises because the resulting damages payment in the compensatory damages scheme depends in large part on whether the parties can prove that they have at least one valid, essential patent. If only one of the parties ultimately proves that it owns a valid, essential patent, then that party will get a very large damages award at the expense of the other party. When parties do not have a significant number of essential patents, or if these patents are difficult to identify, they will also be incentivized to assert more patents in litigation to make sure that at least one of their asserted patents is essential, thereby (possibly) entitling them to a large lost profits award, and (definitely) exempting them from having to pay out a large lost profits award.

If we believe that most parties are likely to have at least one relevant, valid, and essential patent in their portfolio, but we believe that these essential

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138. *See supra* Part II.D.
139. *See supra* Part II.D.

patents will be difficult to identify, then an apportionment rule might be most appropriate, because such a scheme would presume something that is usually true yet difficult to prove. But if we believe that essential patents are rather easy to identify, and if we believe that patent law truly ought to protect a patentee's right to exclude under the appropriate circumstances, then the compensatory damages rule seems most appropriate.

Finally, I want to note that because the apportionment rule involves an *irrebuttable* presumption, the compensatory damages rule is much more flexible. In fact, the market might be able to advantageously use the flexibility of the compensatory damages rule to address the concerns I just mentioned. For instance, in multicomponent product cases between two large corporations with large patent portfolios that include some essential patents, the parties could agree ex ante to take lost profits damages off the table, thereby reducing the litigation risk and uncertainty on both sides. But in cases where one party clearly has the superior and more essential patent portfolio, that party need not agree to such a deal, and it will be able to obtain lost profits damages under appropriate circumstances.

2. Treatment of patented technology

Another critical finding of this Note is that even if Firm *B* must pay lost profits damages to Firm *A*, it will still get back the portion of those damages attributable to its own patented technologies infringed by Firm *A*. While this finding serves in large part to show that a properly constructed compensatory damages scheme does not overcompensate patentees as much as many scholars currently believe, it again does not mean that compensatory damages and apportionment are the same.

Under an apportionment rule, Firm *A* receives damages only upon a showing that a portion of Firm *B*'s profits are attributable to Firm *A*'s patented technologies. The rest of the profit—not attributable to Firm *A*'s patented technologies—remains with Firm *B*. Thus, when parties are unable to assert all of their relevant patents, the party with the most significant unasserted patents will go undercompensated with respect to the value of its patented technologies.

A compensatory damages rule operates differently in cases where only one of the two parties proves that it owns a patent that is valid, essential, and infringed. In this case, the party with the essential patent, say Firm *A*, gets all the profits. Although the party without an essential patent, say Firm *B*, has the opportunity to show that some of Firm *A*'s profits (including the lost profits payment) were attributable to Firm *B*'s own nonessential patented technologies, Firm *B* nevertheless must still assert the patents and prove that. When parties cannot assert all of their relevant patents, a compensatory

damages rule would overcompensate the party with the essential patent. This situation is quite similar to how patent law tends to undercompensate nonpracticing rightsholders to the extent those rightsholders own valuable patents that are not quite valuable enough to be worth asserting in litigation. This is a problem no matter which rule is adopted.

So which way does this analysis cut? If parties are able to assert all of their relevant patent rights, then this Subpart is inapplicable. But when they cannot, this Subpart might favor apportionment. One benefit of an apportionment rule is that each party bears the burden of showing that it deserves a portion of the other's profits, which means errors due to unasserted patents affect all parties and will at least partially cancel out. With compensatory damages, however, any party receiving lost profits damages will reap all of the profits, and the party paying the lost profits award will bear the entire burden of showing that it should recover some of that award.

3. Treatment of unpatented technology

Scholars have similarly expressed concern that the *Mentor Graphics* rule will prevent infringers from earning a return on all the reasons unrelated to patents why a product is profitable, such as a "company's reputation[,] . . . trade secrets, better employees, and general know-how."[140] Here, the scholars are right under some circumstances. Suppose again that Firms *A* and *B* are the only two market actors selling luxury laptops. Firm *A* owns all the essential patents (on the essential high-resolution screen and the essential extended-life battery). Firm *B* developed a trade secret technology, not known to Firm *A*, that allows it to make computer keyboards at a lower cost such that, setting infringement aside, Firm *B* can make more profit than Firm *A* on each luxury laptop sale. In this case, the benefits of Firm *B*'s trade secret technology will still lie with Firm *B* even after Firm *B* pays lost profits damages to Firm *A*, because Firm *B*'s damages are based on Firm *A's* profit, not Firm *B*'s profit—lost profits damages are not profit disgorgement.[141] Thus, Firm *B* is appropriately compensated for all nonpatent benefits it provides to the market above and beyond what Firm *A* provides.

But the scholars' concern is valid under some circumstances. In the previous example, if we instead assume that Firm *A* and Firm *B* independently developed the trade secret technology and therefore have similar profits on each product sale (or if we assume that Firms *A* and *B* have similar profit margins for any other reason), in this case Firm *B* will be forced to give up all the nonpatent value because Firm *A* now has similar profit margins. Under an

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140. *See* Chao, *supra* note 9, at 1349.

141. That is, as explained throughout, lost profits damages are about making the patent owner whole, not disgorging the infringer's profits.

apportionment rule, because Firm *B* compensates Firm *A* only for the value of the patented feature, the benefits of Firm *B*'s trade secret technology would remain with Firm *B* in both cases. It seems to me that Firm *B* should keep the nonpatent benefits that it brought to the table, but my guess is that commentators' views will ultimately depend on whether they believe patent law truly ought to provide patentees with a right to exclude others.

B. Additional Damages After Paying Lost Profits

Many scholars fear that defendants in multicomponent products cases may be forced to "pay[] multiple lost profits damages awards to different patentees," noting that per *Mentor Graphics*, "each patentee would be entitled to all the lost profits due to the infringing product without apportionment."[142] Under the proposed framework and current case law, however, this argument is wrong. Defendants are entitled to a lost profits defense that keeps them from having to pay more than one lost profits reward on any particular sale.[143]

Many of these scholars fear that defendants will have to "pay[] reasonable royalty damages on top of an unapportioned lost profits award."[144] This is a completely valid fear if courts do not implement the proposed framework. However, as discussed above, under the proposed framework patentees are entitled to a lost profits defense that completely alleviates this concern. Under the lost profits defense, once Firm *B* has paid lost profits damages to Firm *A* for a particular sale, Firm *B* is exempt from paying additional royalties on that sale for any patents that were also infringed by Firm *A*'s relevant sales. In effect, after paying lost profits damages for an infringing sale, Firm *B* will only be subject to paying additional royalties for that sale if Firm *B*'s, and *not* Firm *A*'s, product infringes the patent. But in this case, Firm *B* is the proper party from which to recover because only Firm *B*, and not Firm *A*, benefited from using the patented technology. In sum, this argument is incorrect if courts properly implement the compensatory damages scheme.

C. Additional Patents Are Worthless

Finally, many scholars fear that "by awarding [Firm *A*] all its lost profits for one patent, the law treats other patents (including [Firm *B*'s] other patents) as worthless."[145] At least under the proposed framework, this statement is untrue. For one, in accordance with the essential patent defense, if Firm *B* could prove that it owns at least one essential patent infringed by Firm *A*, then

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142. *Mentor Graphics* Professors' Brief, *supra* note 74, at 8.

143. *See* 7 CHISUM, *supra* note 31, § 20.05[2][f] (discussing the market share rule).

144. *Mentor Graphics* Professors' Brief, *supra* note 74, at 9.

145. *Id.* at 10.

Firm *B* would be exempt from paying lost profits damages. Furthermore, even if Firm *B* has no essential patents, for every *non*essential patent that Firm *B* can prove Firm *A* infringed, Firm *B* would get a reasonable royalty from Firm *A* for all of Firm *A*'s sales—both its actual sales and the hypothetical sales for which Firm *B* compensated Firm *A*. So Firm *B* should be able to use its infringed nonessential patents to get back the portion of the lost profits damages attributable to its own patented technologies. Thus, under the proposed framework, Firm *B*'s patents are anything but worthless; indeed, they are extremely valuable.

And what about Firm *A*'s patents? By obtaining lost profits damages, Firm *A* is compensated as if it were able to exclude competitors from the market all along. Accordingly, Firm *A*'s patents are valuable for the same reasons patents are valuable for any market actor.

Conclusion

This Note offers a comprehensive economic framework for implementing lost profits damages in multicomponent patent infringement cases. If the proposed framework is not adopted, patentees will be systematically overcompensated. But if the proposed framework is adopted, the concerns scholars have expressed about compensatory damages in patent law are either alleviated, overstated, or in need of revision.

Of course, even if the proposed framework is adopted, some concerns still remain. For example, under some circumstances infringers may not obtain a return on their nonpatent investments. And at least some aspects of the proposed economic framework could be costly to administer (for instance, the portions of the framework that require courts to consider patents not at issue in the cases before them). It is ultimately an empirical question whether these concerns are more detrimental than the concerns that arise under an apportionment scheme, such as a lack of administrability. The purpose of this Note is only to provide needed clarity to the debate.