LOST PROFITS DAMAGES FOR MULTICOMPONENT PRODUCTS: CLARIFYING THE DEBATE

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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 over multicomponent products. The court rejected Synopsys's argument that because multicomponent products necessarily have many important features beyond the one or two that are infringing, the court should only award the plaintiff the portion of "but for" damages that are apportionable to the infringing features. Although some scholars have supported the decision, many scholars believe that the* Mentor Graphics *rule will tend to overcompensate patentees and that an apportionment rule would be best.*

I offer 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 will arise in the future in this complex multicomponent world. By exploring the implications of this framework, I provide needed clarity to the* Mentor Graphics *debate. First, I show 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, I show that if my proposed framework is adopted, then each of the concerns expressed by scholars over the Mentor Graphics *rule is either alleviated, overstated, or in need of some revision. I conclude by clarifying exactly what might be concerning about the* Mentor Graphics *rule.*

INTRODUCTION

The application of patent law to multicomponent products has never been so important. Although single-component products were relatively common up until the 1990's,[1] multicomponent products have truly become the norm over the last couple decades.[2] To provide just one example,[3] it has been estimated that there are over 250,000 active patents that impact smartphones.[4]

In *Mentor Graphics Corp. v. EVE-USA, Inc.*,[5] the Federal Circuit was asked to determine how lost profits damages ought to be calculated for multicomponent products in a simple two

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[1] 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] Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1992 (2007); Note, Brian J. Love, *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."); Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 354 (2010) ("[M]any patented products contain components that infringe earlier patents.").

[3] *See* Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anti-Commons in Biomedical Research*, 280 SCIENCE 698 (1998); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, *in* 1 INNOVATION POLICY AND THE ECONOMY 119 (Adam B. Jaffe et al. eds., 2001).

[4] Mike Masnick, *There are 250,000 Active Patents that Impact Smartphones; Representing One in Six Active Patents Today*, TECHDIRT (Oct. 18, 2012), https://www.techdirt.com/articles/20121017/10480520734/there-are-250000-active-patents-that-impact-smartphones-representing-one-six-active-patents-today.shtml.

[5] 851 F.3d 1275 (Fed. Cir. 2017), *reh'g en banc denied*, 870 F.3d 1298 (Fed. Cir. 2017) (mem.).

competitor market with no other relevant market actors or rightsholders.[6] In the case, 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 no noninfringing alternatives would satisfy the buyer. Mentor argued that because the buyer in the market absolutely demanded the patented feature, "but for" Synopsys's infringement, Mentor would have made all the sales. Accordingly, Mentor argued that Synopsys should compensate Mentor for all the sales Mentor lost.

Synopsys countered that because the infringing features were merely two features of thousands,[7] the court should not award the plaintiff with all the profits she lost due to the infringement but rather only the portion of those "but for" losses that are attributable to, or apportionable to, the patented features.[8] Awarding damages based on the lost profits attributable to both the patented features *and* the unpatented features would, in Synopsys's view, permit the patentee to recover damages far beyond the patentee's inventive contribution.[9]

The Federal Circuit sided with Mentor and determined that no apportionment of lost profits was necessary: the "but for" compensatory damages test already "ensures that damages are commensurate with the value of the patented features."[10] The court reasoned that damages should equal the profits the patent owner would have earned "but for" the infringement.[11] Because Mentor's patented technology was absolutely essential to the buyer in the market, Mentor was

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[6] *Id.* at 1290.
[7] *Id.* at 1287.
[8] *Id.*
[9] *Id.*
[10] *Id.* at 1288.
[11] *Id.*

entitled to damages that equaled its lost sales.

Importantly, *Mentor Graphics* involved "remarkably simple" facts: the parties competed in a two-competitor market, and only one of the parties had an essential patent on the product at-issue.[12] The court left for another day more complex fact patterns that will inevitably arise in this multicomponent world.[13] The Federal Circuit declined to rehear the case *en banc* over a dissent by two judges.[14] After Part I.A provides an introduction to patent damages law, Part I.B provides a deeper dive into the *Mentor Graphics* decision.[15]

Scholars have hotly debated whether *Mentor Graphics* was correctly decided.[16] Eighteen scholars on one side of the debate filed a brief in support of Synopsys's petition for certiorari.[17] At a high level, these scholars made the following three policy arguments: (1) any single patented feature, even if essential to the buyers in the market, is of small value relative to the value of the entire multicomponent product, so lost profits on the entire product overcompensates patentees; (2) infringers will sometimes have to pay royalties on top of lost profits, which is excessive and something infringers may not be able to pay; (3) Synopsys's patents (and Mentor's other patents)

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[12] *Id.* at 1286.

[13] *Id.*

[14] Mentor Graphics Corp. v. EVE-USA, Inc., 851 F.3d 1275, *reh'g en banc denied*, 2017 WL 3806141 (Fed. Cir. Sept. 1, 2017) (Fed. Cir. 2017)..

[15] *Infra* Part I.B.

[16] For support of the *Mentor Graphics* decision, *see, e.g.*, Thomas F. Cotter, *Make No Little Plans: Response to Ted Sichelman,* Purging Patent Law of "Private Law" Remedies, 92 TEX. L. REV. SEE ALSO 25 (2014); Roger D. Blair & Thomas F. Cotter, *An Economic Analysis of Damages Rules in Intellectual Property Law*, 39 WM. & MARY L. REV. 1585, 1590 (1998). For articles disagreeing, *see* Eric E. Bensen, *Apportionment of Lost Profits in Contemporary Patent Damages Cases*, 10 VA. J. L. & TECH. 8, 2 (2005); Bernard Chao, *Lost Profits in a Multicomponent World*, 59 BOSTON COLLEGE L. REV. 1321 (2018); Brian J. Love, *Patentee Overcompensation and the Entire Market Value Rule*, 60 STAN. L. REV. 263 (2007); Ted Sichelman, *Purging Patent Law of "Private Law" Remedies*, 92 TEX. L. REV. 517 (2014). For the first general discussion of these issues, see Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 Texas L. Rev. 1031, 1065 (2005) (arguing that we should 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.").

[17] Brief for Amici Curiae Eighteen Intellectual Property Law Professors in Support of Petitioner, EVE-USA, Inc. v. Mentor Graphics Corp., No. 17-804, at 9 (Jan. 3, 2018)

are now worthless. Fewer scholars have voiced agreement with the outcome in *Mentor Graphics*; those that do generally reason that (1) compensatory damages 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,[18] and (2) an apportionment rule is difficult and costly to administer.

Interestingly, the arguments seem particularly forceful on *both* sides of the debate. On one side of the debate, scholars correctly argue that patent law provides patentees with the right to prevent infringement, and only a "but for" compensatory damages structure adequately compensates patentees when their essential patents are infringed. On the other side of the debate, scholars argue that any single feature of a product with thousands, even if essential to the buyer in the market, can only account for a portion of the product's total value. In the case of *Mentor Graphics*, how can a patent on a single feature of an emulator's debugging tool, a feature which is not even part of the emulator's main functionality, possibly be worth so much? Scholars on both sides of the debate currently believe that the compensatory damages rule and apportionment rule would generally produce drastically different damages awards under most circumstances.[19] Part I.C discusses these arguments in greater detail.

In Part II, I offer a comprehensive economic framework for how this "but for" compensatory damages scheme should be implemented in scenarios that were not before the court in *Mentor Graphics* but will inevitably arise in the future in this complex multicomponent world. This Article describes many scenarios in which, even under the rule set forth in *Mentor Graphics*, parties should

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[18] *See, e.g.*, Cotter, *supra* note 16; *see also* Thomas F. Cotter, *Mentor v. EVE-USA: No Apportionment of Lost Profits Award*, COMPARATIVE PATENT REMEDIES (Mar. 16, 2017), http://comparativepatentremedies.blogspot.com/2017/03/mentor-v-eve-usa-no-apportionment-of.html.

[19] *See generally* Chao, *supra* note 16; Cotter, *supra* note 16;

not be able to obtain large lost profits rewards.

As stated, the court in *Mentor Graphics* only explained how a "but for," "make whole" compensatory damages structure would be implemented under the "narrow" facts of the case.[20] In particular, the court in *Mentor Graphics* only resolved how lost profits should be calculated where there are only two interested parties (parties with relevant product sales or patent rights), and where only 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).[21] But, as stated previously, in reality the essential (and nonessential) patents required to produce many multicomponent products are often widely dispersed among many different entities, both practicing (entities competing in the relevant market) and nonpracticing (entities that own a relevant patent but are not competing in the relevant market). In other words, the "remarkably simple" facts in *Mentor Graphics* is the exception, not the rule.

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

Part II.B addresses how damages should be calculated between market actors with and without essential patents but does so beyond the simple two-party case presented in *Mentor Graphics*. Part

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[20] *Mentor Graphics Corp. v. EVE-USA, Inc.*, 851 F.3d 1275, 1286 (Fed. Cir. 2017).
[21] *Id.*

II.C addresses how additional nonpracticing entities and market actors with nonessential patents should factor into the patent damages calculations.

Part II.D then coalesces Parts II.A-C into two novel rules. First, defendants should be entitled to an "***essential patent defense***" to lost profits, which likely fits under the fourth *Panduit* factor (or alternatively as a new factor). Under the essential patent defense, a defendant is 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 defendants pay full lost profits on a particular sale, defendants cannot be subject to either (a) additional lost profits damages based on that sale (this portion of the rule is already well established), or (b) additional royalties on that sale for any patents that were also infringed by the original plaintiff's relevant sales (e.g., the sales the original plaintiff made less of). In the second case, this article explains that the original plaintiff should be on the hook for the royalty instead.

By addressing each of the scenarios on which the *Mentor Graphics* court was silent, this Article provides the first comprehensive economic framework for navigating potential lost profits claims in our multicomponent world. By exploring the implications of this framework in Part III, I provide 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 operate far more similarly than scholars currently believe. Second, Part III shows that if my proposed framework is adopted, then 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 concern-free. Accordingly, I conclude Part III by explaining exactly what might be

concerning about compensatory damages in patent law.

I. THE LAW AND CONTROVERSY SURROUNDING LOST PROFITS IN MULTICOMPONENT PATENT INFRINGEMENT CASES

Part I.A provides an introduction to modern patent damages law. Next, Part I.B describes the *Mentor Graphics* opinion and its importance in lost profits patent damages law. Finally, Part I.C discusses whether and under what conditions *Mentor Graphics* was correctly decided.

A. Introduction to Modern Patent Damages Law

Patent law permits innovators to obtain patents on sufficiently innovative knowledge goods that they have created. Patents provide patentees with a statutory "right to exclude others from making, using, offering for sale, or selling" their inventions.[22] The purpose of providing this right to exclude others is to grant patent owners the ability, under some circumstances, to obtain supracompetitive (e.g., monopoly) profits, which operates to incentivize the creation of knowledge goods.[23] This added incentive may be desirable due to a market defect: knowledge goods are often public goods because once developed, they can be copied and used by others cheaply and quickly.[24] Absent intervention (such as through patent law), innovators may not be sufficiently incentivized to create knowledge goods in the first place.[25]

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[22] 35 U.S.C. § 154(a)(1).

[23] *See, e.g.*, Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), 13 THE WRITINGS OF THOMAS JEFFERSON 326, 334-35 (Andrew A. Lipscomb ed., 1903) (justifying the "embarrassment" of providing monopoly rights through the patent law to "encourage[] men [and women] to pursue ideas which may produce utility").

[24] *See, e.g.*, Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, 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).

[25] *See id; see also* Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental*

Depending on the circumstances, a patentee's "right to exclude" is protected through one or both of injunctions[26] and damages.[27] Because a patentee's ability to obtain an injunction has been somewhat limited in recent years,[28] patent damages law is more important than ever. The rest of this Subpart provides an introduction into patent damages law.

Patent damages are designed to compensate patentees for their losses when a patentee's right to exclude is infringed, which preserves the monetary incentive to innovate provided by a patent.[29] The patent damages statute provides for "damages adequate to compensate for the infringement, but in no event less than a reasonable royalty."[30] 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, which sets the damages "floor" for patent owners who either cannot prove lost profits or (for various reasons) choose to collect a reasonable royalty instead.[31]

Generally speaking, lost profits damages provide an award to patentees of the amount of profit they would have made "but for" the infringement and thus provides a compensatory damages

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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 24, at 701-02 (arguing without some mechanism to keep others from copying an inventor's inventions, "few would want to be innovators, preferring instead to wait and free-ride on someone else's good idea").

[26] 35 U.S.C. § 283.

[27] 35 U.S.C. § 284.

[28] *See* eBay Inc. v. MercExchange, LLC, 547 U.S. 388 (2006). For critiques of this recent development, see John M. Golden, *"Patent Trolls" and Patent Remedies*, 85 TEX. L. REV. 2111 (2007);Karen E. Sandrik, *Reframing Patent Remedies*, 67 U. MIAMI L. REV. 95 (2012).

[29] 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* 208 (2005); Mark A. Lemley, *Distinguishing Lost Profits from Reasonable Royalties*, 51 Wm. & Mary L. Rev. 655, 655 (2009).

[30] 35 U.S.C. § 284.

[31] *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.").

remedy to patent owners whose right to exclude has been violated.[32] By contrast, the "rationale [for 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."[33] A patent owner's damages need not be fully comprised of one or the other, and often the patent owner may receive lost profits damages for some of the infringer's sales and a reasonable royalty for the rest.[34] Both lost profits and reasonable royalties are discussed in turn.

1. Lost Profits

Lost profits damages awards patentees with the profit they would have obtained "but for" the infringement and thus "effectively puts them in the same position as if they had [in fact excluded others] all along."[35] To obtain lost profits damages, the patentee must show a reasonable probability that it would have made additional profit but for the infringement.[36] Importantly, lost profits damages are often greater than the entire profit made by the infringer because, among other reasons, one firm's monopoly profits is more than twice as large as two firms' duopoly profits combined.[37]

Patentees prove that they would have made extra profit but for the infringement through the

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[32] *See, e.g.*, DONALD S. CHISUM, CHISUM ON PATENTS § 20.05 (2017).

[33] Lemley, *supra* note 29, at 655-56; *see also* CHISUM, *supra* note 32, §§ 20.06-20.07.

[34] *See, e.g.*, CHISUM, *supra* note 32, § 20.05.

[35] Lemley, *supra* note 29, at 657; *see also* Aro Mfg. Co. v. Convertible Top Replacement Co., 377 U.S. 476, 507 (1964) (plurality opinion) (finding the relevant question for lost profits is "had the Infringer not infringed, what would Patent Holder-Licensee have made?"); 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).

[36] Kaufman Co., Inc. v. Lantech, Inc., 926 F.2d 1136, 1141-42 (Fed. Cir. 1991).

[37] Lemley, *supra* note 29, at 661, 661 n. 32. Courts have generally understood and accepted this fact. *See, e.g.*, Minnesota Mining & Manuf. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559 (Fed. Cir. 1992); Lam, Inc. v. Johns-Manville Corp., 718 F.2d 1056, 1065 (Fed. Cir. 1983).

difficult-to-meet[38] four-factor *Panduit* test, which requires patentees to prove "(1) demand for the patented product, (2) absence of acceptable noninfringing substitutes, (3) his manufacturing and marketing capability to exploit the demand, and (4) the amount of profit he would have made."[39] For example, under factors one and two of this test, lost profits cannot be proven if purchasers do not value the patented technology materially differently from any noninfringing alternatives because in that case, had the infringement not occurred, the infringer would have opted to switch to one of those comparable noninfringing alternatives.[40] Put differently, the first two factors require that the patented technology is essential to at least a portion of the relevant market. Under factor three of the test, a patentee cannot prove lost profits if the patentee 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.[41]

2. Reasonable Royalty

Patentees who have made purportedly relevant product sales but cannot jump over the high bar for proving lost profits, or patentees who did not have any profits to lose, will still obtain a

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[38] Lemley, *supra* note 29, at 657; *see also Damages Under the Patent Statute*, FISH, https://www.fr.com/services/litigation/patent/patent-damages/patent-damages-primer/ (last visited Oct. 19, 2017).

[39] Panduit Corp. v. Stahlin Bros. Fibre Works, Inc., 575 F.2d 1152, 1156 (6th Cir. 1978).

[40] *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. The competitor in the 'but for' marketplace is hardly likely to surrender its complete market share when faced with a patent, if it can compete in some other lawful manner. Moreover, only by comparing the patented invention to its next-best available alternative(s)— regardless of whether the alternative(s) were actually produced and sold during the infringement—can the court discern the market value of the patent owner's exclusive right, and therefore his expected profit or reward, had the infringer's activities not prevented him from taking full economic advantage of his right.").

[41] *See, e.g.*, Datascope Corp. v. SMEC, Inc., 879 F.2d 826-27 (Fed. Cir. 1989).

reasonable royalty.[42] Reasonable royalties are designed to make the nonpracticing (nonmanufacturing) entity "whole" by determining the hypothetical royalty amount the patentee and infringer would have agreed to in the "but for" world, since the entity lost licensing revenue, not profit due to lost sales.[43] 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 the time. Indeed, the basic question posed in a hypothetical negotiation is: if, on the eve of infringement, a willing licensor and licensee had entered into an agreement instead of allowing the infringement of the patent to take place, what would that agreement be?[44]

The most common approach for determining reasonable royalty damages is the lengthy fifteen factor test set out in *Georgia-Pacific v. United States Plywood*.[45] 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."[46]

In sum, reasonable royalty law is aimed at determining how much money the patented

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[42] See, e.g., CHISUM, *supra* note 32, §§ 20.06-20.07.

[43] *See* Lemley et al., *supra* note 2, at 2017; *see generally* Amy L. Landers, *Liquid Patents*, 84 DENV. U. L. REV. 199, 253 (2006).

[44] Laser Dynamics, Inc. v. Quanta Computer, Inc., 694 F.3d 51, 76 (Fed. Cir. 2012); *see also* Lemley et al., *supra* note 2, at 2018 (finding reasonable royalty analysis is "designed to emulate the bargain the parties would have entered into at the time of infringement had they (1) been willing to negotiate and (2) known to a certainty that the patent was valid and infringed").

[45] 318 F. Supp. 1116, 1121 (S.D.N.Y. 1970), *mod. and aff'd*, 446 F.2d 295 (2d Cir.), *cert. denied*, 404 U.S. 870 (1971).

[46] Lemley et al., *supra* note 2, at 2018-19; *see also* Nickson Indus., Inc. v. Rol. Mfg. Co., 847 F.2d 798 (Fed. Cir. 1988); Roger D. Blair et al., supra note 29, at 228-29. For a discussion on problems that arise when using existing licenses to measure reasonable royalty damages, see Erik Hovenkamp & Jonathan S. Masur, *How Patent Damages Skew Licensing Markets*, 36 REV. LITIG. 379 (2017); Jonathan S. Masur, *The Use and Misuse of Patent Licenses*, 110 NW. U. L. REV. 115 (2015). For more general discussions on reasonable royalty analysis and reform, see John M. Golden, Reasonable Certainty in Contract and Patent Damages, 30 HARV. J. L. & TECH. 257 (2017); John M. Golden & Karen E. Sandrik, *A Restitution Perspective on Reasonable Royalties*, 36 REV. LITIG. 335 (2017); William F. Lee & A. Douglas Melamed, *Breaking the Vicious Cycle of Patent Damages*, 101 CORNELL L. REV. 385 (2016); Oskar Liivak, *When Nominal is Reasonable: Damages for the Unpracticed Patent*, 56 B.C. L. REV. 1031 (2015); David O. Taylor, *Using Reasonable Royalties to Value Patented Technology*, 49 GA. L. REV. 79 (2014).

technology is worth in the licensing marketplace, with the understanding that both the licensor and licensee must generally make some profit.[47] This fact is in stark contrast to lost profits damages, which, as explained above, is often greater than the profit made by the infringer.[48]

B. The Mentor Graphics Opinion

In *Mentor Graphics Corp. v. EVE-USA, Inc.*,[49] the Federal Circuit determined how lost profits damages ought to be calculated for multicomponent products in a simple two competitor market with no other relevant market actors or rightsholders.[50] The court adopted, for multicomponent product cases, the long-standing compensatory damages rule which states, in determining lost profits, the proper inquiry is what the patent owner would have received "but for" the infringement.[51]

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, nor did Synopsys dispute that there were no noninfringing alternatives.[52] Put differently, Mentor satisfied the *Panduit* test by showing how much profit it would have made "but for" Synopsys's infringement.[53]

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[47] Lemley et al., *supra* note 2, at 2019; Lemley, *supra* note 29, 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.").

[48] *Supra* note 37.

[49] 851 F.3d 1275 (Fed. Cir. 2017), *reh'g en banc denied*, 2017 WL 3806141 (Fed. Cir. Sept. 1, 2017).

[50] *Id.* at 1290.

[51] *Id.*

[52] *Id.* at 1286.

[53] *Id.* at 1286-87.

The court determined that the proper measure of damages is the difference between the patent holder's pecuniary condition after the infringement and what her condition would have been if infringement had not occurred.[54] The court explained that "[t]he 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 profits damages are no different than breach of contract or general tort damages." The court also found that such a damages scheme is required by Supreme Court precedent[55] and the patent damages statute,[56] which provides for "damages adequate to compensate for the infringement."[57]

For 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."[58] In addition, "[t]here 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."[59]

Synopsys argued that the allegedly infringing features were merely two of thousands of important features, many of which were essential to Intel.[60] The infringing features were merely two features of the debugging tool, and these features did not make up a large fraction of the total

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[54] *Id.* at 1283-84.
[55] *Id.* at 1283, 1284 (citing and quoting Gen. Motors Corp. v. Devex Corp., 461 U.S. 648, 654-55 (1983); Aro Mfg. Co. v. Convertible Top Replacement Co., 377 U.S. 476, 507 (1964) (plurality opinion)).
[56] *Id.*
[57] 35 U.S.C. § 284.
[58] *Id.* at 1287.
[59] *Id.*
[60] *Id.* at 1287.

value of the emulator.[61] Accordingly, after determining how much money the plaintiff lost due to the infringement, the court should apportion those damages between the patented and unpatented components and only award damages apportioned to, and thus attributable to, the patented features.[62] Awarding damages based on the value attributable to the patented *and* unpatented features would, in Synopsys's view, permit the patentee to recover damages beyond the patentee's relatively minor inventive contribution toward the debugging tool.[63]

The Federal Circuit disagreed, finding that application of the *Panduit* test properly "ensures that damages are commensurate with the value of the patented features."[64] 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."[65]

The Federal Circuit declined to rehear the case *en banc* over a dissent by two judges.[66]

C. *Was* Mentor Graphics *Correctly Decided?*

In addition to the holding just described in Part I.B, the *Mentor Graphics* court also reversed the district court's finding that Synopsys's asserted '109 patent is invalid.[67] For that reason, Synopsys still has the opportunity to show that Mentor's products infringe Synopsys's valid '109 patent. The rest of this Part will assume that Synopsys's patent is either not infringed by Mentor or alternatively that the patent is nonessential. Later, Part II will discuss what should happen if

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[61] *Id.*

[62] *Id.* at 1287.

[63] *Id.*

[64] *Id.* at 1288.

[65] *Id.* at 1289.

[66] Mentor Graphics Corp. v. EVE-USA, Inc., 851 F.3d 1275, *reh'g en banc denied*, 2017 WL 3806141 (Fed. Cir. Sept. 1, 2017) (Fed. Cir. 2017)..

[67] *Id.* at 1280.

Synopsys proves that the patent is valid and essential (spoiler: Synopsys should be getting a lot of money back).[68]

Scholars have hotly debated whether *Mentor Graphics* was correctly decided.[69] Interestingly, the arguments are particularly forceful on *both* sides of the debate. The scholars who have voiced agreement with the outcome in *Mentor Graphics* generally correctly point out that the *Mentor Graphics* 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.[70] Indeed, for a liability rule to protect a patentee's right to exclude,[71] the rule must make the patentee "whole" by forcing the infringer to compensate the patentee for all of the patentee's harm incurred due to the infringement so that the patentee is no worse off due to the infringement.[72] 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 exactly *indifferent* between (1) the hypothetical world where no infringement occurs, and (2) the actual world where infringement occurred but the patentee was awarded damages to compensate for the infringement.[73] The court in *Mentor Graphics* adopted such a rule.[74] In addition, scholars have correctly pointed out that an apportionment rule is more

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[68] *Infra* Part II.B.

[69] *Supra* note 16.

[70] *See, e.g.*, Cotter, *supra* note 16; *see also* Thomas F. Cotter, *Mentor v. EVE-USA: No Apportionment of Lost Profits Award*, COMPARATIVE PATENT REMEDIES (Mar. 16, 2017), http://comparativepatentremedies.blogspot.com/2017/03/mentor-v-eve-usa-no-apportionment-of.html.

[71] 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); *see also* Louis Kaplow & Steven Shavell, *Property Rules Versus Liability Rules: An Economic Analysis*, 109 HARV. L. REV. 713 (1996). Liability rules are most appropriate when harm is financial in nature, which is an appropriate assumption in the patent law context. *See, e.g.*, Sichelman, *supra* note 16, at 519 ("Patent law, on the other hand, is not designed to remedy private wrongs. Rather, its major aim is to promote innovation.").

[72] *See* Kaplow et al., *supra* note 71, at 723-24.

[73] *See generally* Calabresi et al., *supra* note 71; Kaplow et al., *supra* note 71.

[74] *Supra* Part I.B.

costly and difficult to administer appropriately.[75]

But most commentary has come from critics on the other side of the debate. In particular, Synopsys was supported by eleven amici corporations,[76] two Federal Circuit judges wanted to reverse the original panel and dissented from the denial of rehearing *en banc*,[77] and eighteen law professors have joined a brief in support of Synopsys's pending petition for certiorari in *Mentor Graphics*.[78]

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. In the case of *Mentor Graphics*, how can a patent on a single feature of an emulator's debugging tool, a feature which is not even part of the emulator's main functionality, possibly be worth so much?

More specifically, these critics, such as the eighteen law professors supporting Synopsys's petition for certiorari, have raised three policy arguments. First, scholars argue 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."[79] Second, critics argue that defendants should not have to pay "reasonable royalty damages on top of an unapportioned lost

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[75] *See, e.g.*, Cotter, *supra* note 16.

[76] Brief of Amici Curiae Hewlett-Packard Company et al., Mentor Graphics Corp. v. EVE-USA, Inc., Nos. 15-1470, 15-1554, 15-1556, 2015 WL 4592096, at *3-*9 (Fed. Cir. July 24, 2015).

[77] Dissent from Denial Rehearing En Banc, Mentor Graphics Corp. v. EVE-USA, Inc., Nos. 2015-1470, 2015-1554, 2015-1556, 870 F.3d 1298 (Dyk, J., dissenting).

[78] Brief for Amici Curiae Eighteen Intellectual Property Law Professors in Support of Petitioner, EVE-USA, Inc. v. Mentor Graphics Corp., No. 17-804 (Jan. 3, 2018).

[79] *Id.* at 10. *see also* Bensen, *supra* note 16, at 2 (arguing that "because your product contains a number of significant components, each of which you have a right to make and sell and each of which contributes to the market value of the product, you 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 16, at 1342-46; Sichelman, *supra* note 16, at 520-23, 555-56.

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."[80] Third, critics argue that "by awarding Mentor Graphics all its lost profits for one patent, the law treats other patents (including Mentor Graphic's other patents) as worthless."[81] These critics argue that an apportionment rule would more appropriately compensate patentees.[82]

Scholars on both sides of the debate currently believe that the compensatory damages rule and apportionment rule would generally recommend drastically different damages awards under most circumstances.[83] In Part II, I offer the first comprehensive economic framework for implementing the *Mentor Graphics* rule in scenarios that were not before the court but will inevitably arise in the future. I discuss how this framework relates to the *Mentor Graphics* debate in Part III.

II. COMPENSATORY DAMAGES IN PATENT LAW: A COMPREHENSIVE ECONOMIC FRAMEWORK

As discussed in Part I.B, the court's holding in *Mentor Graphics* is important because it affirmed that the "but for" compensatory damages structure for violations of a patentee's right to exclude applies to multicomponent products.[84] But the court only indicated how to implement this "but for" theory of damages under the "narrow" facts of the case.[85] In particular, the court in *Mentor Graphics* only resolved how lost profits should be calculated where there are (1) only two

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[80] Brief for Amici Curiae Eighteen Intellectual Property Law Professors in Support of Petitioner, EVE-USA, Inc. v. Mentor Graphics Corp., No. 17-804, at 9 (Jan. 3, 2018); *see also* Chao, *supra* note 16, at 1348-49.
[81] *Id.* at 10.
[82] *See generally id; see also* Bensen, *supra* note 16, at 2; Chao, *supra* note 16, at 1342-46; Sichelman, *supra* note 16, at 520-23, 555-56.
[83] *See generally* Chao, *supra* note 16; Cotter, *supra* note 16;
[84] *Supra* Part I.B.
[85] *Id.*

interested parties, and where (2) only one of those parties has an essential patent.[86]

The *Mentor Graphics* court did not address how damages should be calculated between parties with essential patents. This case presents a potential paradox under the rule set forth in *Mentor Graphics*: every party will argue that but for the other parties' infringement, they 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 (aside from the simple two-party scenario posed by *Mentor Graphics*). Finally, Part II.C addresses how nonpracticing entities and market actors with relevant nonessential patents should be compensated. Parts II.A through II.C combine to provide a comprehensive framework for calculating lost profits damages in patent infringement cases.

Finally, Part II.D concludes by coalescing the analysis provided in Parts II.A-C into two novel rules. By addressing every scenario on which the *Mentor Graphics* court was silent and coalescing this analysis into two novel rules, this Article provides the first comprehensive economic framework for navigating potential lost profits claims in our complex multicomponent world.

Before I begin, I want to highlight that while scholars advocating for an apportionment rule believe that lost profits damages overcompensates patentees, these scholars do not believe that properly calculated reasonable royalty awards overcompensate patentees. In fact, properly calculated reasonable royalty awards are related to, and generally smaller than, apportionment awards because as discussed above, reasonable royalty awards are similarly based on the value the

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[86] *Id.*

patented technology adds to the product.[87] Thus, for the rest of this Article, I will appropriately presume that whenever the proposed economic framework calls for a properly calculated reasonable royalty reward, scholars would not believe that this reasonable royalty reward overcompensates patentees.

A. *Two or More Market Competitors Each with Essential patents*

This Subpart addresses how lost profits damages should be calculated between market actors with essential patents.[88] 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 very issue arises where an initial inventor develops and patents some underlying invention, and then an improver improves the underlying invention, making it more profitable.[89] 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.[90] And the improver can clearly use its patent to block the inventor from making, using, or selling the improver's patented

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[87] *See* Harold Einhorn & Eric E. Bensen, Patent Licensing Transactions § 3.01A[3][b] (Matthew Bender).

[88] The situation where multiple market actors each own at least one essential patent is quite common. *See* Shapiro, *supra* note 3, at 122-24, 127-28; Heller & Eisenberg, *supra* note 3; Josh Lerner & Jean Tirole, *Efficient Patent Pools*, 94 AM. ECON. REV. 691 (2004). Shapiro explains that the blocking patent problem is another common patenting situation and is one of the other primary drivers for the need for patent pools. *See* Shapiro, *supra* note 3, at 120-23. Furthermore, even if a multicomponent product does not have any absolutely essential features most generally, certain submarkets may be characterized by the demand for particular features, and thus these submarkets are thus subject to essential patents. Some recent cases also involve parties each alleging that the other is infringing one or more of their essential patents. *See, e.g.*, Defendant Radware, Inc.'s Answer, Affirmative Defenses, and Amended Counterclaims to Plaintiff F5 Networks, Inc.'s First Amended Complaint for Patent Infringement, F5 Networks, Inc. v. Radware, Inc., No. 16-cv-480 (N.D. Cal. Dec. 16, 2016) (both Radware and F5 are alleging that the other is infringing its essential patents). Furthermore, as discussed later, if Synopsys proves that any of its patents are essential, that would move the *Mentor Graphics* case into this portion of the framework.

[89] *See* Robert Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 TENN. L. REV. 75, 79 (1994).

[90] *Id.*

improvement.[91]

Merges provides two well-known examples of this inventor-improver scenario.[92] First, Merges highlighted that in the early days of the radio, the Marconi Company owned a patent on an early form of the oscillating radio tube, which was an essential component of early radio transmission. Lee De Forest owned patents on improved designs.[93] Second, in the steel industry, Bessemer and Kelly owned patents on a blast-furnace process for making iron stronger, and Mushet discovered an alloying compound that was necessary to unlock the potential of the blast-furnace process. In both of these examples, both the inventors and improvers owned patents blocking each other from placing the improvement into the market.

Michael Heller and Rebecca Eisenberg have noted that the field of biomedical research suffers from the tragedy of the anticommons, which "refers to the … obstacles that arise when a user needs access to multiple patented inputs to crease a single useful product."[94] Heller and Eisenberg provide a number of examples where an anticommons might be developing in the biomedical field due to the proliferation of essential patents.[95] To provide one of their examples, Heller and Eisenberg explain that companies rapidly obtained patents on gene fragments throughout the 1980's, which meant that "[f]oreseeable commercial products, such as therapeutic proteins or genetic diagnostic tests, are more likely to *require* the use of multiple [patented] fragments."[96] Furthermore, Carl Shapiro has explained that essential patents are quite common in key industries

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[91] *Id.*
[92] *Id.* at 84-89 (1994).
[93] *Id.* at 84-85.
[94] Heller & Eisenberg, *supra* note 3, at 698-99.
[95] *Id.* at 689.
[96] *Id.* (emphasis added).

such as semiconductors, biotechnology, software, and the internet, in effect "requiring that those seeking to commercialize new technology obtain licenses from multiple patentees."[97].In sum, essential patents are quite common, particularly in important fields such as biomedical research and biotechnology, semiconductors, software, and the internet.

How damages should be calculated between companies with valid essential patents is best exemplified by using a close derivative of the example used in the *Mentor Graphics* opinion itself.[98] Suppose that a portion of laptop customers absolutely demand luxury laptops, which are distinguished by their *high-resolution* screen and *extended-life* battery. Put differently, suppose a relevant subset of the laptop market demands that their laptops include a high-resolution screen and extended-life battery. A and B are the only suppliers of these luxury laptops. A owns the patent on a high-resolution screen, and B owns the patent on an extended-life battery. A and B sue each other for patent infringement. In short, this situation is like *Mentor Graphics* except *both* parties own an essential patent.

This case presents a potential paradox under *Mentor Graphics*: A will argue that "but for" B's infringement, A would have made all the sales in the luxury laptop market because only A could provide customers with the high-resolution screen that they demand. But B will similarly argue that "but for" A's infringement, B would have made all the sales in the luxury laptop market because only B could provide customers with the extended-life battery that they demand. 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?

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[97] Shapiro, *supra* note 3, at 119.
[98] *See* Mentor Graphics, 851 F.3d at 1289.

This Article contends that under these circumstances, each party 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 in this "but for" world.[99] 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.[100]

Of course, it's possible that some other arrangement would have been entered into in this "but for" world. For instance, Mentor may have found it most advantageous to grant Synopsys an exclusive license. An example of when such an agreement may be optimal is where Synopsys is the superior commercializer, because then Synopsys could possibly offer Mentor more for an exclusive license than Mentor would have expected to obtain operating alone in the market. But, what is clear is that in no circumstance would Mentor be willing to license out the patented technology for less value than Mentor would otherwise receive operating exclusively in the market.[101] Thus, patent damages law compensates Mentor based on a "but for" world where Mentor operated in the market to the exclusion of all others, because in the "but for" world, Mentor would have obtained at least that much money.[102]

Reasonable royalty cases also attempt to recreate what would have happened in the "but for"

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[99] *Supra* note 29.

[100] *See generally* Mentor Graphics v. EVE-USA, Inc., 851 F.3d 1275 (Fed. Cir. 2017), *reh'g en banc denied*, 2017 WL 3806141 (Fed. Cir. Sept. 1, 2017).

[101] This is true because Mentor would never agree to a licensing agreement that puts it in a worse position than it would otherwise be without entering into a licensing agreement.

[102] In the "but for" world, Mentor would have either (a) operated exclusively in the market as assumed by patent damages law, or (b) licensed the technology to others, but only if Mentor would make *even more money*.

world. Patentees obtain reasonable royalties when they cannot prove that they actually competed in and lost sales in the relevant market. Accordingly, in the "but for" world, the parties, as rational willing negotiators, would have entered into some sort of licensing agreement, since failing to reach an agreement would cause both parties to miss out on obtaining profits in the relevant market.

In this hypothetical, both parties have an essential patent, and neither party could enter the market without obtaining a license from the other. In other words, but for the infringement, neither party could provide the luxury laptop market with a computer that includes the high-resolution screen and extended-life battery the luxury laptop market requires without first obtaining a license. Accordingly, the parties, as rational willing negotiators, would have struck some sort of deal in the "but for" world, because failing to strike a deal would mean that neither party obtains any profit.[103]

But what type of licensing deal should courts assume the parties would have made? This Article contends that it is most appropriate, and most administrable, for courts to assume the parties would have entered into a cross-licensing agreement. 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. Indeed, such a monopolistic arrangement may be more profitable for the parties than competing against each other in a two-party market.

But it is more appropriate and administrable for courts to assume the parties would have entered into a cross-license. For one, both parties did in fact enter the market, so assuming the parties would have cross-licensed will be by far the most administrable. Moreover, the parties could have entered into an alternative profit-maximizing licensing agreement before filing a

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

lawsuit, or at any point before final judgment was entered in the case. But they did not do so, and thus the presumed cross-license appropriately maintains the status quo in case that's what the parties truly want but leaves the parties free to enter into an alternative profit-maximizing arrangement *ex post* if they are so inclined.

Third, 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 these benefits that never came to fruition (e.g., it may be appropriate to assume they would split the benefits).

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 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 more use of the other party's technology). The better argument, however, is likely that courts should instead assume that the cross-license would also take various aspects of both technologies into account and thus would generally result in an additional exchange of money. This approach is analogous to that preferred by courts in determining reasonable royalties for standard-essential patents.[104] It should be noted, however, that determining the relative contributions of different patented technologies to a complex multicomponent product is a complex endeavor.

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[104] *See, e.g.*, GPNE Corp. v. Apple, Inc., No. 12-CV-2885, 2014 WL 1494247, at *7 (N.D. Cal. Apr. 16, 2014); Microsoft Corp. v. Motorola, Inc., 10-CV-1823, 2013 WL 2111217, at *80 (W.D. Wash. Apr. 25, 2013), *aff'd*, 795 F.3d 1024 (9th Cir. 2015); In re Innovatio IP Ventures, LLC, No. 11-CV-9308, 2013 WL 5593609, at *39 (N.D. Ill. Oct. 3, 2013).

To provide an example, a steering wheel and an engine are two components necessary to manufacture a vehicle, but as a matter of public policy, the developer of the engine should receive more money than the developer of the steering wheel. Developing the engine would have been more time intensive, resource intensive, and risky. Therefore, per Professor Sichelman's proposal to align *ex post* rewards with *ex ante* incentives,[105] patent law ought to treat both patents differently to ensure that parties that spend extra resources and bear more risk are financially rewarded for doing so.[106] Advantageously, reasonable royalty law is already designed to award patentees with the market rate for a license to their inventions. [107] Therefore, both parties should simply obtain a reasonable royalty from the other in this hypothetical situation.

Putting numbers on our concrete example above helps to illustrate the point. For sake of clarity, this example ignores the effects on product prices and quantities sold when different numbers of parties are competing in the market. Suppose A and B make 150 luxury laptop sales each at $10 profit per sale. A's patented high-resolution screen technology is worth a $1 royalty per sale, and B's patented extended-life battery technology is worth a $2 royalty per sale. After the parties sue each other, A must pay (150 sales)*($2/sale) = $300 in royalties to B, and B must pay (150 sales)*($1/sale) = $150 in royalties to A. A ends up with $1,350 and B ends up with $1,650.

In summary, neither party ought to obtain lost profits if the plaintiff and defendant are both infringing at least one of the other's essential patents on the products for which they both seek to

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[105] *Supra* Part I.C.

[106] This argument would certainly be true as a matter of policy and is in accordance with Sichelman's argument that patent law ought to reward patentees based on *ex ante* R&D costs and risk. *Supra* Part I.C.

[107] *Supra* Part I.A.

prove lost profits.[108] Rather, both parties should get a reasonable royalty from the other.[109]

Another way to understand this proposal is that there should be an "***essential patent defense***" to paying lost profits as part of the fourth *Panduit* factor. Under the essential patent defense, Party A is exempt from paying lost profits damages to Party B for infringement of one of Party B's patents if Party A shows that Party B's relevant products (i.e., the products of which Party B would have sold more had Party A not infringed) infringe one or more of the Party A's valid essential patents, and Party A can otherwise satisfy the *Panduit* test. Rather, A would only owe B a reasonable royalty.

Last, note that this reasoning applies even if there are three or more market competitors each with at least one essential patent. In these scenarios, each party will still obtain a reasonable royalty from the others on their patents.

As noted in Part I.C,[110] the *Mentor Graphics* court reversed the district court's ruling that one of Synopsys's asserted patents is invalid,[111] meaning that Synopsys still has an opportunity to prove that it owns a valid and infringed patent. For this reason, based on the analysis above, the *Mentor Graphics* court might have more appropriately stayed the damages ruling pending an infringement verdict of Synopsys's '109 patent. But a stay was certainly not necessary, because if Synopsys can prove that its patent is infringed and essential to operate in the market, the district

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[108] This is true so long as both parties otherwise meet the *Panduit* test.

[109] I want to quickly note that, because this hypothetical negotiation is taking place after the courts have found the essential patents valid and infringed, there are no antitrust concerns with such agreements; but, an important caveat to the hypothetical bargaining negotiations discussed throughout this paper is that the patents indeed are valid and infringed blocking patents. *See* Herbert Hovenkamp et al., *Anticompetitive Settlement of Intellectual Property Disputes*, 87 MINN. L. REV. 1719, 1726-27 (2003).

[110] *Supra* Part I.C.

[111] *Mentor Graphics*, 851 F.3d at 1280.

court can just readjust the damages payments in accordance with the proposed rule discussed above. Note that this would mean that Synopsys would get back a large percentage of its initial damages payment.

B. Three-plus Interested Parties: Additional Market Competitors

In *Mentor Graphics*, Mentor and Synopsys were the only two market competitors.[112] But now let's assume that there are three competitors in the market for luxury laptops: A, B, and C. A has a patent once again on the high-resolution screen, a feature absolutely demanded by the luxury laptop market. B also has a patent once again on the extended-life battery, the other feature absolutely demanded by the luxury laptop market. Suppose C is competing in the market but has no essential patents. In short, this hypothetical is like *Mentor Graphics* but with an additional practicing entity with an essential patent.

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

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

As rational willing negotiators in the "but for" world, A and B could always cross-license with

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[112] Mentor Graphics Corp. v. EVE-USA, Inc., 851 F.3d 1275, 1286 (Fed. Cir. 2017)

one another (just like A and B in Part II.A) and operate in the market to C's exclusion.[113] Thus, even if there is some hypothetical "but for" world in which C gets in on the action (e.g., C is the best commercializer and thus it's in A and B's best interest to exclusively license to C), in no situation would A or B agree to be put in a worse position than they otherwise would be by cross-licensing to one another and then excluding all others (including C).

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

A and B would then owe each other a reasonable royalty, in accordance with Part II.A,[114] not only for each of their actual sales, *but also for each of the hypothetical sales for which C compensated them.* A and B must also pay a royalty on each of their hypothetical sales because those hypothetical sales incorporated the other's technology, and in the "but for" world where A and B actually made those hypothetical sales, they would have owed each other a royalty on those sales.

Adding numbers to our simple example helps to illustrate the point. The numbers are analogous to those used in the example in Part II.A. For sake of clarity, this example will ignore the effects on product prices and quantities sold when different numbers of parties are competing in the

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[113] *See supra* Part II.A.
[114] *Id.*

market. Suppose A, B, and C each make 100 luxury laptop sales at $10 profit per sale. A's patented high-resolution screen technology (an essential technology) is worth a $1 royalty per sale, and B's patented extended-life battery technology (the other essential technology) is worth a $2 royalty per sale. After the parties sue, C must first pay $500 to both A and B to make up for the 50 sales A and B each lost due to C's infringement.[115] This places A and B back into the "but for" world where C never infringed, because in this world A and B would have each controlled half of the 300-sale market.[116] A and B each owe each other a reasonable royalty on the real *and hypothetical sales*, so A must pay (100 actual sales + 50 hypothetical sales)*($2/sale) = $300 in royalties to B, and B must pay (100 actual sales + 50 hypothetical sales)*($1/sale) = $150 in royalties to A. Thus, A ends up with $1,350 and B ends up with $1,650. Importantly, this is exactly where A and B ended up in the analogous hypothetical from Part II.A, which means (1) that C properly paid damages sufficient to collectively compensate A and B for C's infringement, and (2) A and B must indeed pay each other a reasonable royalty on their actual sales *and their hypothetical sales*. If A and B only paid each other a royalty on their actual sales, B as the party with the more valuable patent would end up undercompensated, and 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 A sues C but not B in a first lawsuit, neither A nor C is aware *ex ante* that B owns an essential patent, and B has not yet sued. In other words, assume B is not privy to the first lawsuit and that A and C are unaware of B's essential patent. Suppose also, for ease of discussion, that A,

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[115] Here, A and B lost equal shares of C's sales because they both controlled 50% of the market. *See, e.g.*, CHISUM, *supra* note 32, § 20.05 (discussing the market share rule).

[116] *Supra* note 115.

B, and C all maintain equal market shares, which implies that A and B would split the market evenly "but for" C's infringement.

In A's lawsuit against C, under current patent damages law, A will receive lost profits against C for all of C's sales because A will (in all likelihood) be able to prove that B is a likely infringer.[117] Drawing on our example above, that would mean A would receive lost profits of (100 sales)*($10/sale) = $1,000 from C. What would happen, then, if B sued C for B's lost profits? C should not have to pay again, since C has already paid lost profits on all of its sales. C has already paid to A what A and B collectively lost due to C's infringement. In this case, C should be able to raise a "***lost profits defense***" to paying further lost profits or reasonable royalties to B, on the grounds that C already paid lost profits to A on all of C's sales. Because A's relevant hypothetical lost sales incorporated B's technology, A should now be treated as if A itself made those infringing sales. Only then do all of the parties properly end up receiving what they would have otherwise made "but for" C's infringement.

Put differently, the problem is not that C did not pay enough but rather one of allocation: all the money went to A. B should thus have to recover against A. B would first obtain from A half of the money A received from C, because in the example A and B maintained equal market shares and had an equal entitlement to C's profits. A and B would then owe each other a reasonable

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[117] *See, e.g.*, State Indus. V. Mor-Flo Indus., Inc., 883 F.2d 1573 (Fed. Cir. 1989) ("If the court is correct in its finding that the other competitors were likely infringers of one or the other of [the patentee's] patents, [the patentee] would have been entitled to their shares of the market on top of its own, and a correspondingly greater share of [the infringer's] sales."); Schneider (Europe) AG v. SciMed Life Sys., Inc., 852 F. Supp. 813, 858 (D. Minn. 1994), *aff'd*, 60 F.3d 839 (Fed. Cir. 1995) (unpublished), *cert. denied*, 516 U.S. 990 (1995) ("[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.").

royalty on their actual and hypothetical sales, as discussed previously. Drawing again on our example above, doing so would put A and B at $1,350 and $1,650 respectively, which is the proper result.[118]

As stated previously, although courts generally award lost profits based on diverted sales,[119] courts have occasionally recognized that monopoly rents are more than twice as much as duopoly rents and awarded lost profits accordingly.[120] Courts have coined such damages as damages due to "price erosion."[121]

This Article contends that, due to question of proof concerns, where there are many market

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[118] If, for some reason, A cannot prove during its lawsuit with C that B is a likely infringer, then A will receive lost profits on half of C's sales (because it controlled half of the noninfringing market) and a reasonable royalty on the rest of the sales. *See, e.g.*, CHISUM, *supra* note 32, § 20.05 (discussing the market share rule). A was overcompensated, but the parties did not know at the time because B was not a part of the lawsuit. Suppose B now sues C (but not A yet). B will seek to obtain what A obtained, namely, lost profits on half the sales and a reasonable royalty on the other half of the sales. But if B is granted this relief, then C pays lost profits on each of her sales and in addition pays a royalty to either A or B on each of the sales. This result is incorrect because it would in effect make A and B better off due to C's infringement. Put differently, A and B would obtain from C not only the profits they collectively lost as a result of C entering the market, but also an additional royalty to boot. To remedy this potential problem, C should be permitted to invoke the *lost profits defense* so that C is required to pay no more than lost profits on any of C's sales. Accordingly, C would pay to B lost profits less the reasonable royalty paid to A on half the sales and nothing on the other half of the sales since C has already paid lost profits to A on those sales. In effect, C has paid lost profits on all of its sales and has collectively paid A and B for all of the harm that A and B incurred due to C's infringement. Assuming the royalty C paid to A was fair, B was adequately compensated for the half of the sales for which B received lost profits less the royalty to A. This is because, had B made these sales, B would have had to pay such a royalty to A. However, B can still sue A and has a chance to dispute the royalty C paid to A. B will be able to secure a royalty from A for each of A's actual sales and for each of A's hypothetical sales for which A was compensated by C. B also may be able to dispute the royalty C paid to A and show that B was undercompensated for those sales as well. A will receive a reasonable royalty from B for each of B's actual sales, but not on B's hypothetical sales because A received that royalty in the first lawsuit with C. As explained in Part II.A, neither A nor B can receive lost profits from the other due to the essential patent defense. In effect, both parties are placed back into the positions they otherwise would have obtained had C never entered the market and had they both cross-licensed their patents to one another. Using the simple example from above, A and B would properly end up with $1,350 and $1,650, respectively.

[119] *See* CHISUM, *supra* note 32, § 20.05, § 20.05(2)(a).

[120] *See, e.g.*, Minnesota Mining & Manuf. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559 (Fed. Cir. 1992) (affirming the district court's award of damages based on the patentee raising prices by 2% per year and accordingly awarding damages based on the 2% rise in price but somewhat reduced by the corresponding market contraction due to the price increase); Lam, Inc. v. Johns-Manville Corp., 718 F.2d 1056, 1065 (Fed. Cir. 1983); *see also* Lemley, *supra* note 29, at 661, 661 n. 32.

[121] *Supra* note 120; *see also* CHISUM, *supra* note 32, § 20.05, § 20.05(2)(a).

actors and only some of which have 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 "price erosion" damages due to the price erosion caused by all likely infringing market actors. At most, the plaintiff should be entitled only to the price erosion that occurred due to the defendants' infringement (i.e., price erosion not due to the "but for" world where the plaintiff maintained a monopoly, but in the "but for" world where the plaintiff maintained a duopoly or oligopoly with the other firms not present in the lawsuit).

Suppose there are five market actors A-E. A has an essential patent and sues E, who has no relevant patents. If A cannot prove during the lawsuit that B-D are likely infringers of A's patent, then presumably E can point to the noninfringing technologies that B-D are using and escape lost profits liability.[122] If A can prove that the other entities are likely infringers, however, then A can obtain lost profits from E as if A were the only market actor.[123]

But A should not also be able to show "price erosion" based on if A was the only market actor as well. There are three possibilities here, only one of which ought to lead to a showing of price erosion. The first is that B-D are not actually infringing A's patent, in which case no party is entitled to supracompetitive rents and thus there is no price erosion. The second is that B-D are infringing, but they are also essential patent holders. If that is the case, then as described above, we assume that A-D would have cross-licensed and competed in the market in oligopolistic fashion (or in a competitive market). Thus, here A should obtain, at most, price erosion due to a "but for" world where A-D all compete in an oligopoly. The final possibility is that B-D infringe A's patent

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[122] *See* Panduit Corp. v. Stahlin Bros. Fibre Works, Inc., 575 F.2d 1152, 1156 (6th Cir. 1978).
[123] *Supra* note 117.

and also own no essential patents of their own. Here, although price erosion likely occurred, A should not be permitted to recover for it. If A only sues E, price erosion is too speculative. If A wants to obtain price erosion damages in this case, A should sue B-E at similar times, not just E. A can sue B-E together, or A could sue them separately and stay any damages proceedings until infringement is determined in each case.

C. *Three-plus Interested Parties: Nonpracticing Entities*

Now let's add a nonpracticing entity to the mix (or, equivalently, a practicing entity with a nonessential patent). This situation was not before the court in *Mentor Graphics*,[124] though considering the products at-issue were multicomponent, it is virtually certain that there are other stakeholders (e.g., nonpracticing entities) who were not privy to the suit.

Suppose again that A and B are the only two competitors in the market for luxury laptops. A owns the essential patents on the high-resolution screen, and B owns no essential patents. Nonpracticing entity C 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 a nonpracticing entity with an essential patent also joins the lawsuit.[125] In this scenario, C should obtain a reasonable royalty from A and B, and A should receive from B lost profits minus C's reasonable royalty.

In the hypothetical "but for" world, A and C as willing negotiators could clearly reach a licensing agreement, since both parties are better off if a licensing deal is struck. Then, A could

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[124] Mentor Graphics Corp. v. EVE-USA, Inc., 851 F.3d 1275, 1286 (Fed. Cir. 2017).
[125] *See id.*

operate independently in the market to B's exclusion and obtain monopoly profits less the royalty to C. Therefore, although it's possible that in the "but for" world some different arrangement may have occurred (e.g., A and C both license to B because B is the best commercializer), in no event would A ever agree to licensing out her patent if doing so would place A in a worse position than A would otherwise be by obtaining a license from C and operating independently in the market.[126]

To place the parties back into this "but for" world, C must receive a reasonable royalty from A and B, and B must pay to A total lost profits less that reasonable royalty, because had A made those hypothetical sales, A would have owed a royalty to C. As described in Part II.B, B should not have to pay lost profits to A and then an additional reasonable royalty to C because then A and C combined would be better off due to B's infringement.[127]

But what if the nonpracticing entity chooses to sue in a lawsuit later down the road? For example, now that Synopsys has paid lost profits to Mentor on 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 has already compensated Mentor with lost profits for all the hypothetical sales Mentor would have otherwise

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[126] Of course, A does not have full autonomy here. C could threaten to license or sell its patent to B instead of to A, putting A and B in a Part II.A situation and thus inhibiting A from reaping monopoly profits. But such a threat is unlikely to prevent A from securing the license from C, because A will have more to gain in the market alone than A and B could collectively obtain competing in the market. Even if B is sufficiently better than A at commercializing such that B would be willing to pay C more for the patent rights, in that case all parties would be best off if both C and A licensed to B. But the parties here never made such an agreement, so the litigation outcome discussed above is the most administrable and also an appropriate assumption and penalty default. *See supra* Part II.A.

[127] *See supra* Part II.B.

made.[128] Mentor was financially compensated as if Mentor made all the sales and Synopsys made no sales.[129] Synopsys should not have to pay a royalty to this nonpracticing entity on the sales for which Synopsys has already given up lost profits. 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 (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 A and B each sell 150 luxury laptops at $10 profit each. C's patented extended-life battery technology is worth a $1 royalty. In this example, B—the party without any essential patents—should first pay lost profits to A on all of B's sales because B is infringing A's essential patent on the high-resolution screen. This tentatively puts A at 300 sales at $10. By compensating A in this way, B has compensated A for what A would have obtained in the market "but for" B's infringement. In other words, it is as if B never entered the market and A operated in the market alone. Framing the "but for" world in this manner, it is clear that A must pay to C a royalty on all the sales—the 150 real sales and the 150 hypothetical sales—because that is what A would have owed to C had B never entered the market.[130] In effect, A would end up with $2,700 and C ends up with $300, which

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[128] *See supra* Part I.B.

[129] *See id.*

[130] To illustrate, suppose A was the only market actor (B never infringed) and C still owned the essential patent.

is the appropriate result.

The final iteration is where 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 a nonpracticing entity's technology, then the analysis tracks the analysis above. Because the lost profits Mentor received from Synopsys was predicated on using the nonpracticing entity's technology, it still makes sense for C to sue Mentor because Mentor was the one who benefitted from sales that utilized the infringing technology.[131]

Now suppose only Synopsys is using the nonpracticing entity's technology, and Mentor is 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 benefitted 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. Interestingly, and 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 that case, it is important to note that Synopsys would receive a reasonable royalty on 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

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A would have made the 300 sales at $10, and then C would have sued for a reasonable royalty of $1 per sale. Thus, A would have to pay to C $300 in reasonable royalties, which is exactly the outcome that resulted in the example above.

[131] Mentor's actual and hypothetical sales benefitted from the nonpracticing entity's patented technology in this case.

technology.

The analysis in this Subpart can be summarized by the following rule: once Party B has paid lost profits to Party A based on a particular sale, then Party B can invoke a "***lost profits defense***" to paying any additional royalties on that sale for any patents that were also infringed by Party A's relevant sales (i.e., the sales party A made less of). In this case, future patent holders should sue Party A for the royalty. Party B cannot invoke this defense, however, for any patented technology not incorporated by Party A. Importantly, the patent holder will only be able to recover against one of the two parties, not both.

D. Analysis Summarized in 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: First, defendants should be entitled to an "***essential patent defense***" to lost profits, which likely fits under the fourth *Panduit* factor (or alternatively as a new factor). Under the essential patent defense, a defendant is exempt from paying lost profits damages if the plaintiff's relevant sales (the sales the plaintiff made less of) infringe one or more of the defendant's essential patents.[132] Put differently, the plaintiff and defendant are on "equal footing" because both own at least one valid and infringed patent essential to operating in the relevant market. In this scenario, both parties should instead receive a reasonable royalty from the other.[133]

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[132] This test also assumes the defendant could have met the additional market demand.

[133] Interestingly, a defendant can only raise this defense by proving that the products from which the plaintiff wishes to prove lost profits infringe one or more of the *defendant's* essential patents, and cannot be raised by pointing

Rule two: Second, defendants should be entitled to a "***lost profits defense***" to paying additional damages under some circumstances. This defense always applies to additional lost profits claims; once a defendant has paid "lost profits" on a particular sale of a product, that party obviously cannot be subject to further lost profits damages based on that sale: "Under *Panduit*, . . . there can only be one recovery of lost profits for any particular sale."[134] 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.

But this lost profits defense to additional damages should also apply, under some circumstances, to paying any additional reasonable royalties on top of lost profits on any particular infringing sale. For instance, once Party B has paid lost profits to Party A based on a particular sale, then Party B can invoke a "***lost profits defense***" to paying any additional royalties on that sale for any patents that were also infringed by Party A's relevant sales (i.e., the sales Party A made less of). In this case, future patent holders should sue Party A for the royalty, and Party A will have to pay a royalty on its actual sales and hypothetical infringing sales. If, however, Party A's product did not incorporate the patented technology, then future patent holders should still sue Party B. Importantly, the patent holder will only be able to recover against either A or B, not both.

Furthermore, although not discussed directly above in Parts II.A-II.C, parties in privity with one-another on a particular product sale (i.e., parties within a supply/distribution chain) should be able to assert both defenses based on actions or patents by other parties within that supply/distribution chain. For example, suppose A supplies B with widgets. B and C are the only

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to essential patents owned by *other entities*. This result is advantageous because permitting parties to invoke defenses based on any available patent could be an administrative nightmare.

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

two market actors in widgets, and both A and C own essential patents on widgets. If C chooses to sue B for patent infringement, B should be able to raise the essential patent defense based on party A's essential patent because B and A are in privity. This is because, in the world "but for" the infringement, A would have paid at most a reasonable royalty to C, which means the most that could be passed onto B would be that royalty as well. 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 left is how to implement Rule two in practice where the original plaintiff's hypothetical sales arguably incorporate the nonpracticing entity's technology. In this scenario, the rule would require a nonpracticing entity to obtain a reasonable royalty from the original plaintiff rather than the party that actually made the infringing sales.[135] As explained above, the reasoning for such a requirement is that the defendant already compensated the plaintiff as if the plaintiff had made all of the infringing sales, so the plaintiff should now be on the hook for the reasonable royalty on all those sales.[136] Indeed, in the world "but for" the defendant's infringement, the plaintiff would have made the sales but also would have owed the nonpracticing entity a reasonable royalty on those sales.[137] If the defendant was instead forced to pay twice, the defendant overpays for the harm that was caused due to the defendant's infringement and provides the plaintiff with a windfall.[138]

One way to implement this rule is to keep patent law otherwise unchanged but apply the

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[135] *Supra* Part II.C.
[136] *Id.*
[137] *Id.*
[138] *Id.*

defenses described above—that is, allow parties to litigate their claims as they wish (as is currently the case) and then allocate damages based on the two rules outlined above. In this case, the nonpracticing entity must choose whether to sue the plaintiff, defendant, or both, understanding that the nonpracticing entity will only be able to recover from one party. If the nonpracticing entity sues the plaintiff from the original suit, then if the nonpracticing entity shows that the plaintiff's products infringe the nonpracticing entity's patent, the nonpracticing entity recovers a reasonable royalty on all of the plaintiff's sales—actual and hypothetical. If the nonpracticing entity cannot prove that the plaintiff's product infringed the nonpracticing entity's patent, then the nonpracticing entity cannot recover from the plaintiff at all.

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 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 the original plaintiff 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 sue in the alternative, so that the determination can be made in a single suit.[139]

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[139] 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 where all parties with a patent infringement claim against the defendant's products bring their claim in an initial lawsuit (some sort of interpleader system). *See, e.g.*, CHARLES A. WRIGHT ET AL., FEDERAL PRACTICE & PROCEDURE §§ 1701-1721 (2016) (discussing the related interpleader system). While it has been argued that it may be appropriate to require the plaintiff to bring all potential

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) compensatory damages overcompensates 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;[140] (2) infringers should not have to pay additional lost profits payments or reasonable royalties on top of a full lost profits award;[141] and (3) the law treats the plaintiff's and defendant's other patents as worthless.[142] In this Part, I aim to show that if my 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.

But this is not to say that compensatory damages is problem-free. I conclude Part III by explaining what still might be concerning about compensatory damages. Whether these problems are more or less problematic than the concerns that come with an apportionment rule (e.g., the administrative concerns noted previously) is an empirical question that I cannot currently answer.

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patent infringement claims against the defendant's accused products in a single lawsuit, *see* Jason Reinecke, *Does Patent Law Allow Plaintiffs Too Many Bites at the Apple?*, 99 J. PAT. TRADEMARK OFF. SOC'Y 360 (2017), requiring interpleader might take things too far. For one, it would be difficult to know whether all potential rightsholders even knew of the initial lawsuit in the first place, different rightsholders may prefer different venues, and 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 thoughts would be to deduct from the lost profits payment in the initial lawsuit any royalty payments the defendant may have to pay in the future, but this amount would be very speculative. I personally 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 suit if they think they can best protect their interests by joining the initial lawsuit.

[140] *See, e.g.*, Bensen, *supra* note 16, at 2; Chao, *supra* note 16, at 1342-46; Sichelman, *supra* note 16, at 520-23, 555-56.

[141] Brief for Amici Curiae Eighteen Intellectual Property Law Professors in Support of Petitioner, EVE-USA, Inc. v. Mentor Graphics Corp., No. 17-804, at 9 (Jan. 3, 2018); *see also* Chao, *supra* note 16, at 1348-49.

[142] *See generally id; see also* Bensen, *supra* note 16, at 2; Chao, *supra* note 16, at 1342-46; Sichelman, *supra* note 16, at 520-23, 555-56.

Rather, my goal is to point out that the arguments against using compensatory damages need some revision.

Before I begin, I want to reiterate that while scholars advocating for an apportionment rule believe that lost profits damages overcompensates patentees, these scholars do not believe that properly calculated reasonable royalty awards overcompensate patentees. In fact, properly calculated reasonable royalty awards are related to, and generally smaller than, 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 lots of features, any given feature can only provide a fraction of the total value of the multicomponent product; therefore, compensatory damages overcompensates patentees when those damages are not apportioned between the patented and unpatented features.[143] But assuming courts adopt the framework proposed in Part II, this argument is overstated. In this Subpart, I will discuss both how this argument has been overstated and under what circumstances overcompensation may still occur.

At least under my proposed framework, scholars are incorrect to think that the *Mentor Graphics* rule will result in patentees regularly obtaining large lost profits awards against infringers. First, as discussed in Part II.A, market actors with *at least one essential patent are completely exempt from paying lost profits damages*. Moreover, as discussed in Part II.D, within

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[143] Bensen, *supra* note 16, at 2; Sichelman, *supra* note 16, at 555-56; *see generally* Chao, *supra* note 16.

a particular distribution chain, every party in the chain of distribution is exempt from paying lost profits damages if *any* market actor within the chain has at least one essential patent. This portion of the framework constitutes a huge (and appropriate) limitation to lost profits that was identified in this Article. For multicomponent products, in many cases 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.

Suppose that one or more market actors still manage to win a lost profits award. Even if this is the case, any lost profits award will be spread across all market actors with essential patents.[144] In addition, and perhaps more importantly, market actors who win a lost profits award will still owe a reasonable royalty to all other relevant rightsholders, *including on the hypothetical sales that comprise the lost profits reward*.[145] This means that any single lost profits award will be spread among many market actors, and that market actors who pay a large lost profits award can get some of their back if they can prove that some of their patented technologies contributed to that profit. Suppose, for instance, that there are two market actors, A and B, in a market for a multicomponent product. A has the only essential patent, and B has 40 relevant nonessential patents, of which A is infringing 20. Even though B will be forced to pay lost profits to A,[146] A will be required to pay to B a reasonable royalty on all 20 infringed patents based on A's actual sales *and A's hypothetical sales for which B just compensated A*.[147] In other words, B does not relinquish lost profits entirely

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[144] *Supra* Part II.A.

[145] *Supra* Part II.C.

[146] Mentor Graphics v. EVE-USA, Inc., 851 F.3d 1275, 1283-90 (Fed. Cir. 2017), *reh'g en banc denied*, 2017 WL 3806141 (Fed. Cir. Sept. 1, 2017); *see also supra* Part I.B.

[147] *See supra* Part II.C.

but rather lost profits less any reasonable royalty based on the value of patented technologies B brought to the table.[148] In short, the potential for patentee overcompensation is much less drastic than scholars currently believe, because as shown above, 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 will highlight under what circumstances the two rules operate differently.

1. Difference of presumptions

One key finding in this Article 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. While this means that market actors will not be able to obtain lost profits 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 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 these defendants can break this presumption and enter into an apportionment scheme by proving they have at least one valid essential patent. Put differently, a compensatory damages

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[148] *Id.*

system operates just like an apportionment system, but only upon a showing by the parties that they have a valid essential patent. An apportionment system, then, operates like the proposed compensatory damages system combined with a nonrebuttable 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 where 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, a compensatory damages rule will involve more uncertainty than an apportionment rule. This increased uncertainty is because the resulting damage payment in such a 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 one 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, and when these patents are difficult to identify, parties 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 essential patent in their portfolio, but we believe that these essential patents will be difficult to identify, then an apportionment rule might be most appropriate because such a scheme would then presume something that is true but 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 *unrebuttable* presumption, the compensatory damages rule is much more flexible. In fact, under a compensatory damages rule, the market might be able to advantageously use the flexibility of this rule and fix all 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 off the table to reduce the litigation risk and uncertainty on both sides. But, in cases where one party clearly has the more superior and essential patent portfolio, that party need not agree to such a deal and can obtain lost profits damages under appropriate circumstances.

2. Treatment of Patented Technology

Another critical finding in this Article is that even if B must pay lost profits damages to A, B will still get back the portion of those damages attributable to its own patented technology infringed by 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, A receives damages only upon a showing that a portion of B's profits are attributable to A's patented technologies. The rest of the profit that is not attributable to A's patented technologies remains with 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 where only one of the two parties proves that it owns a valid and infringed essential patent. In this case, the party with the essential patent (say, A) gets all the profits. Although the party without an essential patent (say, B) has the opportunity to show that some of A's profit (including the lost profits payment) was attributable to B's own patented technologies, 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 essential patent holder. This situation is quite similar to how patent law tends to undercompensate nonpracticing rightsholders to the extent those rightsholders own valuable patents that are just not quite valuable enough to be worth asserting in litigation, which is a problem regardless of whether a compensatory damages or apportionment rule is adopted.

So which way does this analysis cut? If parties are able to assert all their relevant patent rights, then this Subpart is irrelevant. But when they cannot, this Subpart might favor apportionment. One benefit of an apportionment rule is that both parties bear the burden of showing that they deserve a portion of the other's profits, which means errors due to unasserted patents go in both directions and will at least somewhat cancel out. With compensatory damages, however, any lost profits winners will reap all the profits, and the lost profits payer will bear the entire burden of showing that some profit should come back.

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 non-patent reasons why a product is profitable, such as

a "company's reputation[,] trade secrets, better employees, and general know-how."[149] Here, the scholars are right under some circumstances. Suppose again that A and B are the only two market actors selling luxury laptops. A owns all the essential patents (on the essential high-resolution screen and extended-life battery). B developed a trade secreted technology not known by A that allows B to make computer keyboards at a lower cost such that, setting infringement aside, B can make more profit than A on each luxury laptop sale. In this case, the benefits of the trade secreted technology will still lie with B even after B pays lost profits damages to A, because B's damages are based on *A's profit*, not B's profit (lost profits damages is not profit disgorgement). Thus, B is appropriately compensated for all nonpatent benefits that B provides to the market above and beyond what A provides.

But this concern is valid under some circumstances. In the previous example, if we instead assume that both A and B independently developed the trade secreted technology and therefore have similar profits on each product sale (or if we assume that A and B have similar profit margins for any other reason), in this case B will be forced to give up all the nonpatent value. B will give this value up because A now has similar profit margins. Under an apportionment rule, because B compensates A only for the value of the patented feature, the benefits of the trade secreted technology would remain with B in both cases. It seems to me that B should keep the nonpatent benefits that B brought to the table, but your views may ultimately depend on whether you believe patent law truly ought to provide patentees with a right to exclude others.

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[149] Chao, *supra* note 16, at 1348-49.

B. Additional Damages After Paying Lost Profits

Many scholars (at least the eighteen who signed on to the brief in support of certiorari) fear that in multicomponent products cases, "[i]t is not difficult to imagine situations in which a defendant pays multiple lost profits damages awards to different patentees. Under the Federal Circuit's rule, each patentee would be entitled to all the lost profits due to the infringing product without apportionment."[150] Under the proposed framework and under current case law, however, this argument is flat out 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 (this is the well-known market share rule).

Many of these scholars (again, at least the eighteen who signed on to the brief in support of certiorari) fear that defendants will have to "pay[] reasonable royalty damages on top of an unapportioned lost profits award."[151] 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 Party B has paid lost profits on a particular sale to Party A, Party B is exempt from paying additional royalties on that sale for any patents that were also infringed by Party A's relevant sales. In effect, after paying lost profits on a sale, Party B will only be subject to paying additional royalties on that sale if the benefits from incorporating the patented technology still lie with the defendant and not the plaintiff from the original lawsuit. In sum, this argument is incorrect

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[150] Brief for Amici Curiae Eighteen Intellectual Property Law Professors in Support of Petitioner, EVE-USA, Inc. v. Mentor Graphics Corp., No. 17-804, at 8 (Jan. 3, 2018).
[151] Brief for Amici Curiae Eighteen Intellectual Property Law Professors in Support of Petitioner, EVE-USA, Inc. v. Mentor Graphics Corp., No. 17-804, at 9 (Jan. 3, 2018).

if courts properly implement compensatory damages.

C. Additional Patents Are Worthless

Finally, many of these scholars (again, at least the eighteen who signed on to the brief in support of certiorari) fear that "by awarding Mentor Graphics all its lost profits for one patent, the law treats other patents (including Mentor's other patents) as worthless."[152] At least under the proposed framework, this statement is untrue. For one, in accordance with the "essential patent defense," if Synopsys can prove that it owns at least one essential patent infringed by Mentor, then Synopsys is advantageously exempt from paying lost profits damages. Furthermore, even if Synopsys has no essential patents, for *every* nonessential patent that Synopsys can prove Mentor infringed, Synopsys would get a reasonable royalty from Mentor on all of Mentors sales—both Mentor's actual sales and the hypothetical sales for which Synopsys compensated Mentor. So Synopsys should be able to use its infringed nonessential patents to get back the portion of the lost profits payment it paid out that is attributable to its patented technologies. Thus, under the proposed framework, Synopsys's patents are anything but worthless; indeed, they are extremely valuable.

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

CONCLUSION

This Article offers a comprehensive economic framework for implementing lost profits

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[152] *Id.* at 10.

damages in the future. If the proposed framework is not adopted, then 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, as discussed in Parts III.A.2 and III.A.3, infringers may not obtain a return on their nonpatent investment under some circumstances with a compensatory damages scheme. It is ultimately an empirical question whether these concerns are more detrimental than the concerns that arise under an apportionment scheme (such as lack of administrability). The purpose of this Article was not to compare these two concerns but rather to provide needed clarity to the debate.