

# HORIZONTAL INNOVATION AND INTERFACE PATENTS

BERNARD CHAO\*

Scholars understandably devote a great deal of effort to studying how well patent law works to incentivize the most important inventions. After all, these inventions form the foundation of our new technological age. But very little time is spent focusing on the other end of the spectrum, inventions that are no better than what the public already has. At first blush, studying such “horizontal” innovation seems pointless. But this inquiry actually reveals much about how patents can be used in unintended and arguably anticompetitive ways.

This issue has roots in one unintuitive aspect of patent law. Despite the law’s goal of promoting innovation, patents can be obtained on inventions that are no better than existing technology. Such patents might appear worthless, but companies regularly obtain these patents to cover interfaces. That is because interface patents actually derive value from two distinct characteristics. First, they can have “innovation value” that is based on how much better the patented interface is than existing technology. Second, interface patents can also have “compatibility value.” In other words, the patented technology is often essential to make products operate (i.e., compatible) with a particular interface. In practical terms, this means that an interface patent that covers little or no meaningful advance can give a company the ability to extract rents and foreclose competition.

This undesirable result is a consequence of how patent law has structured its remedies. For years, patent law has implicitly awarded both innovation and compatibility values. Recently, the courts have taken a sensible first step and excluded compatibility value from reasonable royalty recoveries for standard essential patents. This Article argues that the law needs to go further and do the same for all essential interface patents. Additionally, patent law should discard the use of injunctions and lost profits in these contexts because both of these remedies inevitably award compatibility value. The sole remedy should be an innovation-value-based reasonable royalty. This proposal has two benefits. First, it would eliminate the incentives for wasteful patents on horizontal technology. Second, and more importantly, the value of all interface patents would be better aligned with the goals of the patent system.

Introduction .....	288
I. The “Better” Loophole .....	291
II. Horizontal Innovations.....	295

---

\* Bernard Chao is an associate professor at the University of Denver, Sturm College of Law. Thanks to Frederico Cheever, Cynthia Ho, David McGowan, Viva Moffat, Justin Pidot, Michael Siebecker, Phil Weiser, and the participants of the Patent Law Conference at the University of San Diego School of Law (2015) and the Intellectual Property Scholars Conference at Stanford Law School (2012) for advancing my thinking on this paper.

A. Razors and Handles .....	296
B. Fast Handshakes .....	300
C. Apple’s Lightning Interface .....	305
III. Prior Thinking .....	307
A. Interface Theory .....	308
B. Patent Injury .....	313
IV. A Remedies Solution .....	314
A. Injunctions .....	315
B. Damages .....	320
1. Lost Profits .....	321
2. Reasonable Royalties .....	323
V. Epilogue: Five Oddly Different Views of Tying .....	327
A. Antitrust and Contractual Tying .....	328
B. Antitrust and Tech Ties .....	329
C. Copyrights and Software .....	331
D. The DMCA and Anti-Circumvention .....	333
Conclusion .....	336

#### INTRODUCTION

*[T]he framers of the patent system did not require an inventor to demonstrate an invention’s superiority to existing products in order to qualify for a patent.<sup>1</sup>*

Scholars understandably devote a great deal of effort to studying how well patent law works to incentivize the most important inventions. After all, these inventions form the foundation of our new technological age. But very little time is spent focusing on the other end of the spectrum, inventions that are no better than what the public already has. At first blush, studying such “horizontal” innovation seems pointless. But this inquiry actually reveals much about how patents can be used in unintended and arguably anticompetitive ways.

This issue has roots in one unintuitive aspect of patent law. Despite the law’s goal of promoting innovation, patents can be obtained on inventions that are no better than existing technology. Such patents might appear worthless, but companies regularly obtain these patents to cover interfaces. That is because interface patents actually derive value from two distinct characteristics. First, they can have “innovation value” that is based on how much better the patented interface is than existing technology. Second, interface patents can also have “compatibility value.” In other words, the patented technology is often

---

1. *Vornado Air Circulation Sys., Inc. v. Duracraft Corp.*, 58 F.3d 1498, 1508 (10th Cir. 1995).

essential to make products operate (i.e., compatible) with a particular interface. In practical terms, this means that an interface patent that covers little or no meaningful advance can give a company the ability to extract rents and foreclose competition.

This undesirable result is a consequence of how patent law has structured its remedies. For years, patent law has implicitly awarded both innovation and compatibility values. Recently, the courts have taken a sensible first step and excluded compatibility value from reasonable royalty recoveries for standard essential patents. This Article argues that the law needs to go further and do the same for all essential interface patents. Additionally, patent law should discard the use of injunctions and lost profits in these contexts because both of these remedies inevitably award compatibility value. The sole remedy should be an innovation-value-based reasonable royalty. This proposal has two benefits. First, it would eliminate the incentives for wasteful patents on horizontal technology. Second, and more importantly, the value of all interface patents would be better aligned with the goals of the patent system.

Part I examines the odd rule that allows patents to be obtained on inventions that are no better than existing technology. The U.S. Constitution and long-established case law both say that the underlying goal of the patent system is one of maximizing innovation and not rewarding individuals. Indeed, the different statutory patentability requirements confirm this basic notion. Nevertheless, none of the different patent statutes require better, and the courts have specifically rejected this very idea. This has opened the door for patents that do not cover true technical advances.

Using three real-world examples, Part II explains that the “better” loophole is not just a theoretical concern. Companies obtain patents on horizontal innovation and use them to foreclose competition. First, Part II discusses the patented Gillette razor-and-handle interfaces of the Mach 3 and Fusion shaving systems. These interfaces did not cover any improvement in the technology of connecting razors to handles. But they did foreclose competition in the market for razors that connect to Gillette handles.

Next, Part II describes the case of patent holdup associated with the NWay Ethernet auto-negotiation protocol. Because this simple technology was included in the ubiquitous Ethernet 802.3 standard, the company that purchased the underlying patents was able to holdup an entire industry. The NWay example helps make two points. First, it demonstrates that horizontal innovation exists in technology far more complex than razors and handles. Today’s technical standards inevitably require some form of interface and companies obtain standards-essential patents to control these platforms. Second, the

NWay story illustrates the enormous value this form of interface patent can have even when it only covers horizontal innovation.

Part II concludes by describing the interface used by the latest generation of iPhones and iPads, Apple's patented Lightning interface. By focusing on patents that cover purely horizontal technology, the previous examples helped isolate the "compatibility value" that such patents have. But the Lightning patents cover a real advance, albeit a small one. In addition to providing access to products that use their interface, such patents derive value from the technological advances the patents contribute. The Lightning example illustrates how an interface patent that covers a modest advance gives the patentee disproportionate power to close the platform that uses its interface.

Part III addresses two different lines of relevant thinking that are based on "competition values" and "patent values" respectively. The competition value literature focuses on the role that interface patents play in the development of technical standards. But for the most part, such works treat patents monolithically. They assume each patent contributes the same fixed but unmeasurably sized advance. In contrast, the patent-values literature proposes reforms that depend on the particular contribution a patent makes. However, they don't talk specifically about interface and standards. Rather they assume that patents cover true advances. In contrast, this Article examines how interface patents are currently valued above and apart from any advance they cover. It also explains how this situation is not consistent with patent goals.

Part IV returns to the doctrinal world and explains how patent remedies have implicitly awarded both innovation and compatibility value over the years. However, at the end of 2014, the Federal Circuit took a step in the right direction and excluded compatibility value from reasonable royalty recoveries.<sup>2</sup> This Article argues that patent law should extend this rule to all essential interface patents regardless of whether they are part of a formal standard. In addition, patent law should eliminate both injunctions and lost profits for all necessary interface patents because these remedies inherently award compatibility value. Instead the law should provide for reasonable royalty damages that are calibrated to the magnitude of the patent's contribution above and beyond the prior art while specifically informing any fact finder that they must exclude compatibility value.

Having explained how patent law should deal with interface patents, Part V takes a brief look at the larger picture and notes that interface patents are actually just one of five different tactics companies use to tie products together and foreclose competition. Oddly, these

---

2. See *infra* notes 162–172 and accompanying text.

tactics are governed by different substantive laws—namely patent law, antitrust law, traditional copyright law, and the DMCA (Digital Millennium Copyright Act). The result is a hodgepodge of different standards and values. Part V does not attempt to reconcile these different laws. Rather, it suggests that further work needs to be done to make the larger picture cohesive.

### I. THE “BETTER” LOOPHOLE

The United States Constitution authorizes Congress to enact laws that “promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.”<sup>3</sup> The Supreme Court has repeatedly relied on this clause to declare that the fundamental purpose of patent law is to promote innovation. To the extent that inventors receive financial rewards, it is simply a byproduct of encouraging innovation.<sup>4</sup> Patent law implements its innovation goal through a number of different requirements found in §§ 101, 102, 103, and 112 of the patent laws. I review these statutes in brief to show how they seek to promote innovation. Notably, these requirements are merely innovation proxies. None of these statutes actually require that a patented invention fulfill the constitutional mandate of promoting the progress of science.

Section 101 of the Patent Act broadly defines patentable subject matter as “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.”<sup>5</sup> The courts have interpreted § 101 to contain two distinct requirements.<sup>6</sup> Inventions must relate to subject matter that is eligible for patent protection, and inventions must have utility. Both of these requirements are aimed at promoting innovation.

The subject matter patent eligibility requirement prevents would-be inventors from obtaining patents on basic laws of nature, natural phenomena, and abstract ideas.<sup>7</sup> The doctrine has been in considerable flux, with the Supreme Court recently issuing controversial opinions on the eligibility of medical diagnostic, biotechnology, and software

---

3. U.S. CONST. art. I, § 8, cl. 8.

4. See *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 9 (1966) (“The patent monopoly was not designed to secure to the inventor his natural right in his discoveries. Rather, it was a reward, an inducement, to bring forth new knowledge.”).

5. 35 U.S.C. § 101 (2012).

6. CRAIG ALLEN NARD, *THE LAW OF PATENTS* 165 (3d ed. 2014).

7. *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980).

patents.<sup>8</sup> Although these decisions have been roundly criticized as lacking coherence, the purpose of the doctrine remains clear.<sup>9</sup> The goal of the subject matter patent eligibility requirement is to ensure that patents do not place too large a burden on later innovation.<sup>10</sup> The Supreme Court has characterized the underlying concern as one of “pre-emption” and said that monopolizing the basic tools of scientific and technological work “might tend to impede innovation more than it would tend to promote it.”<sup>11</sup>

Section 101 also requires utility. The Supreme Court has said that until an invention has been refined to the point where it has utility, there is insufficient justification for issuing a patent.<sup>12</sup> Such a patent may turn out to cover a “broad field”<sup>13</sup> and, presumably, hamstring later innovators. In practice, utility has three prongs: (1) operability, (2) substantial utility, and (3) specific utility.<sup>14</sup> Each of these prongs must be met to satisfy the utility requirement.

Operability requires that an invention actually achieve its intended result.<sup>15</sup> Substantial utility focuses on whether the invention has “enough” utility. In other words, the patent application “must show that an invention is useful to the public as disclosed in its current form, not that it may prove useful at some future date after further research.”<sup>16</sup> Specific utility requires that an invention “provide a well-defined and particular benefit to the public.”<sup>17</sup> The purpose of this

8. *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289 (2012); *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107 (2013); *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347 (2014).

9. See, e.g., Robert Merges, *Go Ask Alice—What Can You Patent After Alice v. CLS Bank?*, SCOTUSBLOG (June 20, 2014, 12:04 PM), <http://www.scotusblog.com/2014/06/symposium-go-ask-alice-what-can-you-patent-after-alice-v-cls-bank/> (explaining the difficulty of applying the Court’s new two-step subject matter eligibility test); Bernard Chao, *Moderating Mayo*, 107 NW. U. L. REV. 423 (2012) (discussing the reaction to *Mayo*).

10. *Mayo*, 132 S. Ct. at 1293. (“[M]onopolization of those tools through the grant of a patent might tend to impede innovation more than it would tend to promote it.”).

11. *Alice*, 134 S. Ct. at 2354. But see Katherine J. Strandburg, *Much Ado About Preemption*, 50 HOUS. L. REV. 563 (2012) (arguing that the Supreme Court’s reliance on a preemption justification distracts from the real policy issues underlying the subject matter patent eligibility debate).

12. *Brenner v. Manson*, 383 U.S. 519, 534–35 (1966).

13. *Id.*

14. Sean B. Seymore, *Making Patents Useful*, 98 MINN. L. REV. 1046, 1066–67 (2014).

15. U.S. PATENT & TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE § 2107.01 (9th ed. rev. Nov. 7, 2015) [hereinafter MPEP].

16. *Id.*

17. *Id.* (quoting *In re Fisher*, 421 F.3d 1365, 1371 (Fed. Cir. 2005)).

requirement is to deny patents for inventions where the asserted use is “so vague as to be meaningless.”<sup>18</sup> Together the different prongs of the utility requirement are intended to limit patents to those inventions that provide actual and specific benefits to society without placing too large a burden on downstream innovation.<sup>19</sup>

Sections 102 and 103 require novelty and non-obviousness respectively.<sup>20</sup> A person is not entitled to a patent unless her invention was novel. Novelty ensures that the invention is new and prevents anyone from obtaining a patent on knowledge that the public already possesses.<sup>21</sup> Section 103 builds on § 102’s novelty requirement by saying that even if the invention is novel, the person is not entitled to a patent if the invention was somehow obvious. Non-obviousness denies patents to trivial variations of current technology because such inventions presumably would have come about through ordinary technological progress.<sup>22</sup>

Finally, § 112 discusses what information the written description (also called the specification) of a patent must contain. Three distinct doctrines grow out of § 112. They are known as the definiteness, enablement, and written description requirements. “A patent is invalid for indefiniteness if its claims . . . fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.”<sup>23</sup> Unclear claims burden innovation in several ways.<sup>24</sup> Companies may end up foregoing technology that is not actually covered by a patent. Alternatively, they may pay for licenses they don’t need. Even when

18. *In re Fisher*, 421 F.3d at 1371.

19. Seymore, *supra* note 14, at 1065. Seymore argues that utility has not been applied in a manner that serves these goals. *Id.* at 1076–77.

20. 35 U.S.C. §§ 102–103 (2012).

21. *See Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 147 (1989) (noting that Thomas Jefferson believed that “a grant of patent rights in an idea already disclosed to the public [i]s akin to an *ex post facto* law, ‘obstruct[ing] others in the use of what they possessed before’” (alteration in original) (quoting Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), in 13 THE WRITINGS OF THOMAS JEFFERSON 326, 326–27 (Andrew A. Lipscomb & Albert Ellery Bergh eds., Memorial ed. 1904))); GEORGE TICKNOR CURTIS, A TREATISE ON THE LAW OF PATENTS FOR USEFUL INVENTIONS, AS ENACTED AND ADMINISTERED IN THE UNITED STATES OF AMERICA (4th ed. 1873).

22. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 427 (2007); *see also Bonito Boats*, 489 U.S. at 151, 156 (stating that the nonobviousness standard provides “a careful balance between the need to promote innovation and the recognition that imitation and refinement through imitation are both necessary to invention itself and the very lifeblood of a competitive economy”).

23. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014).

24. *See Bernard Chao, The Infringement Continuum*, 35 CARDOZO L. REV. 1359, 1372–75 (2014) (providing a more thorough discussion of the problems of unclear patent boundaries).

these kinds of problems don't occur, there are substantial transaction costs associated with trying to identify the contours of unclear claims. The definiteness requirement attempts to reduce all these costs by incentivizing inventors to draft clearer patent claims.<sup>25</sup>

Section 112 also requires that a patent enable the claimed invention. To satisfy this requirement, the specification must describe “the manner and process of making and using [the invention], in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use . . . the invention.”<sup>26</sup> This requirement is satisfied when a person of ordinary skill in the art, after reading the specification, could practice the claimed invention without undue experimentation.<sup>27</sup> The enablement requirement serves two functions, both of which are tied to innovation. First, by requiring the inventor to inform the public how to practice the invention, § 112 encourages the dissemination of ideas. Second, by constraining the permissible scope of claims, § 112 prevents a patent from placing too large a burden on downstream innovation.<sup>28</sup>

Like the enablement requirement, the written description requirement is rooted in § 112. The relevant passage says, “The specification shall contain a *written description* of the invention.”<sup>29</sup> To satisfy the written description requirement, the specification “must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed.”<sup>30</sup> In other words, the written description requirement guards against claims that depart too far from the invention actually found in the specification. Again, this preserves incentives for later innovation.

Despite the numerous statutory requirements, there is no patent statute that expressly requires that an invention must somehow be “better” than what was done before. Only § 101's utility doctrine contains any hint that patents must cover inventions that improve on

---

25. *Nautilus*, 134 S. Ct. at 2129.

26. 35 U.S.C. § 112(a) (2012).

27. See *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986) (“Enablement . . . is not precluded even if some experimentation is necessary, although the amount of experimentation needed must not be unduly extensive . . .”).

28. Bernard Chao, *Rethinking Enablement in the Predictable Arts: Fully Scoping the New Rule*, 2009 STAN. TECH. L. REV. 3, ¶¶ 57–58, <http://journals.law.stanford.edu/sites/default/files/stanford-technology-law-review/online/chao-rethinking-enablement.pdf>.

29. § 112(a) (emphasis added).

30. *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc) (alteration in original) (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991)) (internal quotation marks omitted).

existing technology. It's not hard to imagine how the substantial and specific utility requirements might evolve to also require that inventions be better than the prior art. After all, an invention that does not improve on technology does not seem to have any real use.

But Justice Story rejected precisely this expansion of the utility requirement in 1817. In *Bedford v. Hunt*,<sup>31</sup> he wrote, "It is not necessary to establish, that the invention is of such general utility, as to supersede all other inventions now in practice to accomplish the same purpose. . . . The law . . . does not look to the degree of utility . . . ." <sup>32</sup> Story's view persists to this day. Recently, the Federal Circuit said, "An invention need not be the best or the only way to accomplish a certain result . . . ." <sup>33</sup> In fact, an invention that is "less effective than existing devices" can still satisfy "the statutory criteria for patentability." <sup>34</sup> These decisions demonstrate that patent law does not require that patents be "better" than the prior art. In Part II, this Article describes how companies take advantage of this innovation loophole to prevent others from making compatible products and close standards.

## II. HORIZONTAL INNOVATIONS

Despite the fact that patent law does not require "better," market forces typically would counsel companies to only patented inventions that advance technology. After all, why would anyone waste their time and money patenting inventions that are slower, less efficient, or otherwise worse than what was done before? Unfortunately, there are areas where other incentives exist. Specifically, companies regularly seek to obtain a patent just to control an interface.<sup>35</sup> Whether the underlying technology is better may not matter.<sup>36</sup> A company using this

---

31. 3 F. Cas. 37 (Story, Circuit Justice, C.C.D. Mass. 1817) (No. 1,217).

32. *Id.* at 37.

33. *Stiftung v. Renishaw PLC*, 945 F.2d 1173, 1180 (Fed. Cir. 1991); *see also Vornado Air Circulation Sys., Inc. v. Duracraft Corp.*, 58 F.3d 1498, 1506 (10th Cir. 1995) ("[T]o meet patent law's usefulness requirement, a product need not be better than other alternatives or essential to competition . . . ."); DONALD S. CHISUM, CHISUM ON PATENTS § 4.01 (2015).

34. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 960 n.12 (Fed. Cir. 1986).

35. Pamela Samuelson, *Are Patents on Interfaces Impeding Interoperability?*, 93 MINN. L. REV. 1943, 1962 (2009) (suggesting that the ability to control a platform is a more "powerful reason" for obtaining an interface patent than recouping investment in the technology).

36. Maureen A. O'Rourke, *Toward a Doctrine of Fair Use in Patent Law*, 100 COLUM. L. REV. 1177, 1218 (2000) (suggesting that some interfaces have low intrinsic value but not that they have *no* intrinsic value).

tactic is simply trying to control competition in the market for complementary products.

For the purposes of this Article, I will refer to inventions that do not improve on prior technology as “horizontal innovation.” Because my focus is on questionable patents, this Article only uses the term to refer to inventions that satisfy the existing statutory requirements discussed above. Of course, horizontal innovation is far less beneficial than innovation that advances technology. Indeed, some may question whether the term “innovation” is even appropriate for an invention that does nothing better than what society already possesses. But horizontal innovation still requires an odd kind of ingenuity. Inventors must make a new and non-obvious interface to obtain a patent (i.e., satisfy §§ 102 and 103). In practice, that often means that inventors add unnecessary and arbitrary complexity to their invention.<sup>37</sup> The sole purpose underlying these technical bells and whistles is to justify a patent by showing the patent office that the invention is sufficiently different from the prior art—or in patent terms, not obvious.

In the following subsections, I establish that the “better” loophole is more than just a theoretical concern. The examples below demonstrate that real world companies do obtain interface patents on horizontal innovation. Moreover, these patents give their owners the ability to control the market for complementary goods and even close platforms.

#### *A. Razors and Handles*

Consider U.S. Patent No. 5,787,586 (the “586 patent”), which covers the Gillette Mach 3 Razor interface. The patent describes a shaving system with replaceable cartridges. The features necessary to connect the cartridge with the handle are intricate. A cropped version of figure 2 is depicted to the left below. It shows how the handle and cartridge connect.<sup>38</sup> These components mate with a trapezoid-shaped recess at the bottom of the razor and are claimed by the patent.<sup>39</sup> Thus,

---

37. Samuelson, *supra* note 35, at 1962–63 (discussing how some patented interfaces are arbitrary variations of existing techniques); *see also, e.g., infra* note 38–47 and accompanying text (describing the patented Gillette interfaces); *infra* note 76 (discussing the patented escape code sequence of the Hayes smart modem).

38. The handle contains a spring-based plunger, u-shaped ejector, and “ejector” button. U.S. Patent No. 5,787,586 col. 5 ll. 58–60 (filed Apr. 10, 1996).

39. Claim 1 is representative and states,

A razor comprising a replaceable shaving cartridge including a pivotal housing and an interconnect member, said housing carrying one or more blades, a guard, and a cap, and having a camming surface, said interconnect member having a pivotal support structure that pivotally supports said

it is not surprising that the patent satisfied the novelty and non-obviousness requirements.<sup>40</sup> There was probably nothing like this particular interconnection mechanism in the prior art. It is also clear that the claimed invention satisfies § 101's utility requirement and § 112's written description and enablement requirements. The combination of components serves some use and the '586 patent specification clearly provides sufficient detail.

Nevertheless, there is no suggestion that prior methods of connecting razors and handles were somehow lacking. Indeed, it would be surprising if the shaving industry was unable to make a solid connection by the mid-1990s when the Mach 3 patents were filed. Moreover, there is also no indication that this invention is somehow better than what was done before. Although not required, the specifications of many patents explain why the claimed invention improves on existing technology. Nothing of the sort is found in the '586 patent.

A patent on a subsequent Gillette shaving system, the Gillette Fusion, provides additional evidence of horizontal innovation. The Fusion also has another new and different patented interface.<sup>41</sup> Although the Fusion patent identifies "advantages," these advantages do not appear to represent improvements over the Mach 3 interface. For example, the first supposed advantage is that the "connection . . . can secure the cartridge to the handle for use during a trimming operation."<sup>42</sup> However, the earlier Mach 3 interface performs the same function for that system.<sup>43</sup> One commentator has suggested that the key improvement over the Mach 3 was "the space between the blades . . .

---

housing for pivoting about a pivot axis and a central base structure having a recess and an opening from said recess facing said camming surface, and a handle having a cartridge support structure shaped to mate with said recess and a spring biased plunger that has a cam follower surface and extends from said cartridge support structure and through said opening to act on said camming surface to bias said housing.

*Id.* at col. 9 ll. 6–19.

40. *See* 35 U.S.C. §§ 102–103 (2012).

41. *See, e.g.*, U.S. Patent No. 7,168,173 (filed Mar. 11, 2004) (entitled "Shaving System").

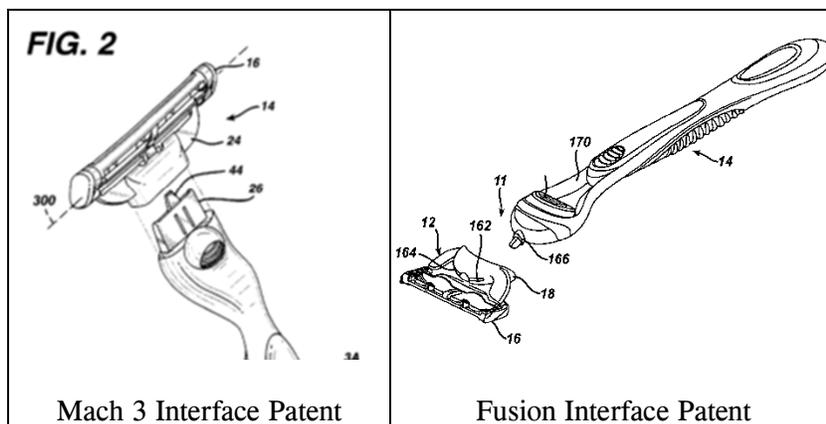
42. *Id.* at col. 2 ll. 64–66.

43. The other listed advantages are

[t]he connecting member can be easily disengaged from the handle by actuating the release button, which causes the pusher to engage the connecting member. Increasing spacing of the contact point between the plunger and the housing from the pivot axis tends to provide leverage for biasing the blade unit toward its rest, spring-biased position.

*Id.* at col. 2 l. 67 to col. 3 ll. 1–5.

and the number of blades [five instead of three],”<sup>44</sup> features that have nothing to do with the manner in which the cartridges connect to the handle. A physical inspection of both systems also fails to identify any improvement in the Fusion interface.<sup>45</sup> Both handles connect to the cartridges in a surprisingly similar way. The cartridges fit on a spring-biased plunger and are released by an ejector button found on the respective handles.<sup>46</sup> At least superficially, the primary difference between the two interfaces is that the plunger in the Mach 3 runs parallel to the main body of the handle interface while the Fusion’s plunger runs perpendicular to the corresponding structure in that handle. Nonetheless, Gillette still obtained three patent families that covered the handle and its connection to the cartridge.<sup>47</sup>



The likely purpose of such patents was to enable Gillette to prevent competitors from making razors that operate with Gillette handles.<sup>48</sup> In other words, Gillette has used patent law to effectively tie the sale of its razors to the sale of its handles. Now, some competition law scholars argue that this tie is harmless. Competitors can make their own razor/handle combinations thereby preventing Gillette from extracting

44. CHRISTIAN STERNITZKE, DRUID, INTERLOCKING PATENT RIGHTS AND MODULARITY: INSIGHTS FROM THE GILLETTE FUSION 12 (2012).

45. I have purchased both systems and compared them.

46. The plungers are labeled as 44 in the ‘586 patent and 134 in the ‘173 patent while the ejector buttons are labeled 50 in the ‘586 patent and 196 in the ‘173 patent. ‘173 Patent fig.28A; ‘586 Patent fig.18.

47. STERNITZKE, *supra* note 44, at 9, 13.

48. MARK BLAXILL & RALPH ECKARDT, THE INVISIBLE EDGE: TAKING YOUR STRATEGY TO THE NEXT LEVEL USING INTELLECTUAL PROPERTY 144 (2009) (discussing how some Fusion patents prevent “third-party cartridge makers from selling knockoff cartridges”).

monopoly rents from its razor sales.<sup>49</sup> Yet, Gillette's high profit margins suggest this view may not paint an entirely accurate picture.<sup>50</sup> Perhaps, Gillette's ability to charge high prices is due to brand recognition. But Gillette is certainly not relying on that advantage. It obtains patents on its interfaces, and there do not appear to be any competitors openly selling Gillette compatible razors in the United States.

But the point of this example is not to engage in the debate about whether Gillette's interface patents allow it to obtain monopoly rents.<sup>51</sup> Rather, the example is intended to show that companies are sufficiently motivated to obtain interface patents on technology that does not advance innovation in any way. That means that society is not receiving anything of technological value when it grants patents on these kinds of interfaces. By contrast, the patents certainly give their owners something of value. They effectively act as "patent ties." Such patents give their owners the right to prevent other companies from using the interface. Consumers must purchase complementary products from the patent owner or its licensees. Thus, Gillette's interface patents are valuable because they have "compatibility value"; they allow it to control who does and does not make razors that operate with Gillette's handles. Importantly, an interface patent can have compatibility value even when it only covers horizontal innovation.

---

49. Randal C. Picker, *The Razors-and-Blades Myth(s)*, 78 U. CHI. L. REV. 225, 228 (2011) ("Standard economics suggests that a firm playing razors-and-blades will face entry into the blades business and that entry will destroy the possibility of subsidizing handles with expensive blades."); *see also Ill. Tool Works Inc. v. Indep. Ink, Inc.*, 547 U.S. 28, 45 (2006) ("Many tying arrangements, even those involving patents and requirements ties, are fully consistent with a free, competitive market.").

50. Forbes lists Gillette as the world's 26th most valuable brand saying, "Razors are one of the most profitable businesses for P&G with operating margins of 32%. Procter & Gamble controls 70% of the global blades and razors market led by Gillette." *The World's Most Valuable Brands*, FORBES, <http://www.forbes.com/companies/gillette/> (last visited Mar. 3, 2015).

51. The debate over the competitive effects of tying continues to this day. *See infra* note 179 and accompanying text. Compare Einer Elhauge, *Tying, Bundled Discounts, and the Death of the Single Monopoly Profit Theory*, 123 HARV. L. REV. 397, 400 (2009) (arguing that those who do not believe that tying is harmful make several restrictive and unwarranted assumptions), with Erik Hovenkamp & Herbert Hovenkamp, *Tying Arrangements and Antitrust Harm*, 52 ARIZ. L. REV. 925, 928 (2010) (disagreeing with Elhauge and suggesting that tying that results in metering only harms competition "in the most flagrant situations," and then it often increases welfare).

### B. Fast Handshakes

The problem of horizontal innovation is not limited to basic mechanical devices like the Gillette razor. For example, one aspect of today's technical standards is their interface. Technology companies can use patents on horizontal technology to close a platform and control the market for hardware and software that operate on that interface.

The story of National Semiconductor's NWay auto-negotiation technology provides a good example of this situation. In the early 90s, the IEEE 802.3 Working Group was developing a new "Fast Ethernet" standard that would allow equipment to transmit at 100 Mbps over copper wire.<sup>52</sup> Fast Ethernet needed to be backwards compatible so that new equipment could continue to communicate with the existing installed base. That meant that the new standard needed to include some form of auto-negotiation technology that would allow different types of equipment to "negotiate" how they would transmit data (i.e., say what mode they were using). The 802.3 Working Group considered several alternative technologies including National's NWay technology.<sup>53</sup>

At its core, the NWay technology is surprisingly simple. Earlier local area networks used the Ethernet communication protocol. One flavor of Ethernet (10Base-T or twisted pair) would issue a "link test pulse" to determine the presence of compatible equipment at the other end of the link. The link test pulse was a very short pulse with a 16-ms interval. Figure 10A from U.S. Patent No. 5,617,418, one of National's NWay patents, depicts the timing of the link test pulse (below).<sup>54</sup>

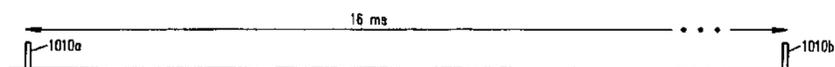


FIG. 10A



FIG. 10B

52. The Institute of Electrical and Electronics Engineers ("IEEE") is a standard-setting organization. IEEE standards include the prominent 802 series (e.g., Wi-Fi and Ethernet standards), which are designed to enhance the interoperability of communications products. *IEEE at a Glance*, IEEE, [https://www.ieee.org/about/today/at\\_a\\_glance.html](https://www.ieee.org/about/today/at_a_glance.html) (last visited Feb. 11, 2016).

53. Complaint ¶ 11, *In the Matter of Negotiated Data Solutions LLC*, No. C-4234 (F.T.C. 2008) [hereinafter *FTC Negotiated Data Complaint*].

54. U.S. Patent No. 5,617,418 (filed Nov. 1, 1993). This was simply one patent in the larger family of NWay patents.

National's NWay technology added "fast link pulses" to help different devices determine which technology they would use to communicate. Fast link pulses differed from the previous link test pulse because they occurred in bursts, not singly. Those pulses are depicted in Figure 10B (immediately below Figure 10A). A new device would recognize the fast link pulse and interpret that to mean that the device at other end of the link could communicate using the new faster technology. The device would respond in kind sending its own fast link pulses. Such a negotiation told both devices to communicate using the newer technology. In contrast, an old device knew nothing of fast link pulses. When such devices received fast link pulses, they would only notice the first pulse in series of fast link pulses and interpret the signal to be the old link test pulse. The older device would respond in the only way it knew how, sending the link test pulse. The newer device would interpret a link test pulse signal to mean that it was communicating with an older device that could only use the slower technology.

National committed to licensing NWay for \$1,000 in the event that the IEEE included NWay in the standard.<sup>55</sup> Subsequently, the IEEE adopted a Fast Ethernet standard with an autodetection feature based upon the NWay technology. After the adoption of the standard, manufacturers incorporated the Fast Ethernet standard with the NWay technology into billions of dollars' worth of computer devices such as personal computers, switches, routers, DSL and cable modems, wireless LAN access points, IP phones, and other equipment.<sup>56</sup> By 2001, the FTC said that there was no commercially viable alternative auto-negotiation technology for Ethernet.<sup>57</sup> At the same time, many of these manufacturers did not bother to formally accept National's offer and pay the nominal fee. This omission provided an opportunity for the subsequent owners of the NWay patents.

For four years, National did nothing to enforce the NWay patents. Eventually, National assigned the NWay patents to Vertical Networks, a corporate spin-off.<sup>58</sup> In 2002, after Fast Ethernet and a successor

---

55. Decision and Order, *In the Matter of Negotiated Data Solutions LLC* (F.T.C. Sept. 22, 2008), F.T.C. File No. 051-0094, app. C, attachment A (Letter from Mark Grant, Dir. of Intellectual Prop., Nat'l Semiconductor Corp., to Geoffery Thompson, Chair, 802.3 Working Group, IEEE (June 7, 1994), available at <https://www.ftc.gov/sites/default/files/documents/cases/2008/09/080923ndsdo.pdf>).

56. M. Sean Royall & Adam J. Di Vincenzo, *The FTC's N-Data Consent Order: A Missed Opportunity to Clarify Antitrust in Standard Setting*, ANTITRUST, Summer 2008, at 83, 84.

57. FTC *Negotiated Data* Complaint, *supra* note 53, ¶ 19.

58. *Id.*, ¶ 23. Vertical Networks later assigned the patents to Negotiated Data Solutions. *Id.*, ¶ 33. Like the FTC's filings, this discussion refers to both entities together as Vertical Networks.

standard known as “Gigabit Ethernet” had taken firm root, Vertical Networks, the new owner of the NWay patents, retracted the prior \$1,000 licensing commitment and began seeking licenses in the neighborhood of ten cents per Ethernet port.<sup>59</sup> Given the billions of dollars’ worth of Fast Ethernet equipment (e.g., hubs, routers, switches, modems) in place at the time and the rate at which new equipment was continuing to be sold, Vertical Network’s royalty demands were enormous.

These tactics triggered an FTC investigation that resulted in a consent decree that required Vertical Networks to honor the original \$1,000 offer made by National.<sup>60</sup> So for most attorneys, Vertical Networks stands as a cautionary tale against renegeing on standards commitments.<sup>61</sup> But this story also helps us understand that the lessons about horizontal technology are not limited to the simple world of mechanical interfaces; they apply equally well to the high-tech industry and standards-essential patents.

The NWay auto-negotiation technology represents another example of horizontal innovation—technology that was no better than existing alternatives. Both the nature of the technology and its original \$1,000 fee suggest that the NWay technology did not represent a meaningful advance. The only important function NWay provided was a unique signal that would serve to identify a device as supporting the new Fast Ethernet technology. There were several alternatives that the IEEE could have selected.<sup>62</sup> The reason NWay was selected was likely because of the nominal fee National originally offered. If NWay was truly superior to the other alternatives, National could have charged far more than \$1,000.<sup>63</sup>

Despite covering little or no technical advance, this story shows the disproportionate value patent law bestowed on the NWay patents. The patents gave Vertical Networks the ability to demand enormous royalties.<sup>64</sup> That value was not based on any technical advance that the patents contributed to the standard. Rather, NWay patents were valuable because companies needed a license to them to make products

---

59. Royall & Di Vincenzo, *supra* note 56, at 84, 88.

60. See Analysis of Proposed Consent Order to Aid Public Comment, *In the Matter of Negotiated Data Solutions LLC*, F.T.C. No. 051 0094, at 4 (Jan. 23, 2008), <https://www.ftc.gov/sites/default/files/documents/cases/2008/01/080122analysis.pdf>.

61. See, e.g., Michele K. Herman, *Negotiating Standards-Related Patent Licenses: How the Deal Is Done, Part 1*, LANDSLIDE, Sept.–Oct. 2010, at 35.

62. FTC *Negotiated Data* Complaint, *supra* note 53, ¶ 11.

63. Some may quibble about whether NWay was better.

64. Royall & Di Vincenzo, *supra* note 56, at 84.

that were IEEE 802.3 compatible.<sup>65</sup> In other words, the NWay patents possessed tremendous compatibility value. Without such a license to the NWay patents, companies risked being enjoined and shut out of the networking market.<sup>66</sup> What's more, they could be subject to outsized damage awards.<sup>67</sup>

The NWay story also illustrates the distinction between *ex post* and *ex ante* compatibility values. *Ex post* compatibility value is the value a patent possesses because it allows patent holders to “holdup” a company that has already adopted the patented technology.<sup>68</sup> The NWay patents possessed *ex post* compatibility value with respect to companies that had already deployed Fast Ethernet products. Such companies are particularly vulnerable to patent assertions because they have already sunk large investments into designing, manufacturing, and marketing a product.<sup>69</sup> If they are found to infringe a patent, they will have large switching costs. Consequently, patent holders can negotiate outsized royalties that are primarily based on these switching costs and not the value of any innovation the patent contributes.<sup>70</sup> For the most part, the competitive harms of patent holdup are well known and both the courts and commentators have sought ways to curb the holdup problem.<sup>71</sup>

---

65. See, e.g., Norman V. Siebrasse & Thomas F. Cotter, *A New Framework for Determining Reasonable Royalties in Patent Litigation*, FLA. L. REV. (forthcoming) (manuscript at 10–11), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2528616](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2528616) (explaining why issuing injunctions for standards-essential patents results in holdup).

66. Since the Supreme Court's decision in *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006), the risk of such an injunction has been reduced but has not disappeared.

67. See *infra* Part IV (discussing how patent remedies implicitly award interface patentees compensation for benefits achieved from operating with a particular interface).

68. See Joseph Farrell, John Hayes, Carl Shapiro & Theresa Sullivan, *Standard Setting, Patents, and Hold-Up*, 74 ANTIRUST L.J. 603, 607–10 (2007); Richard J. Gilbert, *Deal or No Deal? Licensing Negotiations in Standard-Setting Organizations*, 77 ANTIRUST L.J. 855, 862–64 (2011).

69. See Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1993 (2007); see also FED. TRADE COMM'N, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION 191 (2011), <http://www.ftc.gov/sites/default/files/documents/reports/evolving-ip-marketplace-aligning-patent-notice-and-remedies-competition-report-federal-trade/110307patentreport.pdf>.

70. FED. TRADE COMM'N, *supra* note 69, at 5.

71. See, e.g., *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 396–97 (2006) (Kennedy, J., concurring) (pointing out that injunctions against patent infringement “may not serve the public interest” in cases where “the patented invention is but a small component of the product the companies seek to produce and the threat of an injunction is employed simply for undue leverage in negotiations”); see also Mark

However, far less attention has been paid to the *ex ante* component of compatibility value. *Ex ante* compatibility value is the value a patent possesses because companies simply wish to enter a market that requires a license to a particular interface patent. The NWay patents possessed *ex ante* compatibility value with respect to companies that had desired to make Fast Ethernet products but had not yet done so. In these cases, concerns about patent holdup are not present because new market entrants do not have any sunk costs. In other words, interface patents don't possess *ex post* compatibility value in these contexts. Nonetheless, these patents still have *ex ante* value because market entrants still may desire to enter a market covered by an interface patent.<sup>72</sup>

Now, some commentators don't object to patents possessing *ex ante* compatibility value.<sup>73</sup> For example, Norman Siebrasse and Thomas Cotter say that reasonable royalties should take into account the fact that a "patent *did* wind up being included in the standard."<sup>74</sup> They arrive at this conclusion because they believe that "a patent incorporated into a standard is, all other things being equal, of greater social value than one that is not."<sup>75</sup> But Siebrasse and Cotter are simply pointing out that patents have compatibility value. Although current law certainly gives such patents compatibility value, my point is that patent remedies should be based solely on the contribution the patented invention makes over the prior art (i.e., innovation value). As the NWay example demonstrates, patents with little or no innovation value still can have both significant *ex post* and *ex ante* compatibility value. In other words, an NWay license was valuable because it helped companies avoid switching costs. Moreover, regardless of any sunk costs, having the right to sell products into the Ethernet market was still valuable for those companies that had yet to enter the market. However, neither of these values make the standard any better.

---

A. Lemley, *Ten Things to Do About Patent Holdup of Standards (And One Not To)*, 48 B.C. L. REV. 149 (2007).

72. See Jorge L. Contreras & Richard J. Gilbert, *A United Framework for RAND and Other Reasonable Royalties*, 30 BERKLEY TECH L.J. 1451, 1468 (2015) (pointing out that patentees can exploit a company's lack of alternatives after a standard has been adopted).

73. Siebrasse & Cotter, *supra* note 65 (manuscript at 5) (arguing that patentees should be entitled to recover that "value that is conferred upon an individual SEP [standards-essential patent] by virtue of its incorporation into the SSO's [standards-setting organization's] chosen standard").

74. *Id.* (manuscript at 5-6).

75. *Id.* (manuscript at 6).

Of course, these lessons apply to standards generally.<sup>76</sup> Companies can develop arbitrarily different interfaces and patent them. They can then use those patents to close access to those standards or obtain royalties. It is apparent that these remedies are undeserved when the patented interface is no better than existing ones. That is because the patent remedies implicitly allow interface patentees to recover for compatibility value (both *ex ante* and *ex post*).<sup>77</sup> The result is that the public is issuing a valuable patent while receiving nothing in return. Unfortunately, as the next example illustrates, the same kind of problem also exists with interface patents that cover real advances.

### *C. Apple's Lightning Interface*

In this Section, I describe an example of interface patents that cover a real, albeit, modest advance. Like the NWay patents, such patents are valuable because of the compatibility benefits they provide. But they are also valuable for a second distinct reason. They improve on prior interfaces. This is precisely the type of public benefit that the patent system desires. Unfortunately, these patents also can be used to control platforms and obtain rewards that have no connection to the size and nature of the advance the patent covers.

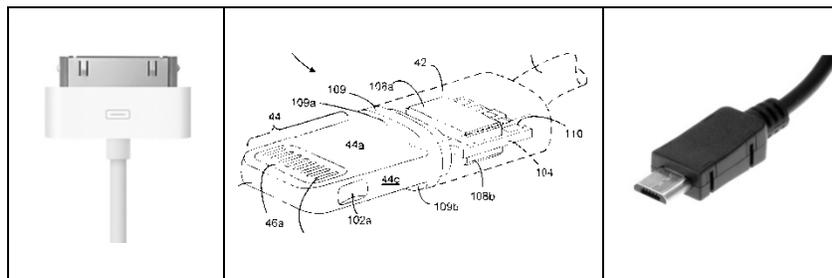
Apple Computer has developed and patented just such an interface. It is the Lightning interface used in the latest generation of iPhones and iPads. Previous generations of the iPhone and iPad used the 30-pin connector illustrated to the left, below. Apple developed a smaller Lightning connector that it introduced with the iPhone 5 and iPad 3, illustrated in the center, below. This connector is covered by U.S. Patent Nos. 8,573,995 and 8,461,465.<sup>78</sup>

---

76. Another good example of horizontal innovation in the standards context is the patented escape code sequence used in Hayes compatible modem, the *de facto* standard. *In re Hayes Microcomputer Prods., Inc.*, 982 F.2d 1527, 1531 (Fed. Cir. 1992). Trial testimony suggested that the particular characters chosen to represent the escape code were “arbitrary” and had no advantages. *Id.* at 1538–39.

77. In this example, compatibility value includes the switching costs that are often the focus of the holdup problem. *See, e.g.*, Lemley & Shapiro, *supra* note 69, at 2008–10. But the Gillette example illustrates how compatibility value does not need to be associated with holdup. New entrants to the razor market do not have costs associated with switching designs. They are simply deciding whether to make Gillette-compatible razors or not.

78. U.S. Patent Nos. 8,573,995 & 8,461,465 (filed Nov. 16, 2012).



There was a general consensus that the old 30-pin connector used in the previous iPhone 4 was outdated. Many of its pins were no longer used and it made sense for Apple to move to a smaller more compact iPhone 5 connector.<sup>79</sup> However, Apple did not have to design a new connector itself. It could have used the open micro-USB standard depicted to the right, above. Indeed, the European Union was urging all smart phone manufacturers to adopt that standard.<sup>80</sup> Even though the micro-USB connector was smaller and more compact, Apple chose to develop the Lightning connector and patent it. One possibility is that the Lightning connector was no better than the micro-USB connector and Apple just wanted to exert control over the complementary market for iPhone 5 products. However, there is reason to believe that the Lightning connector was better suited for Apple's needs than the micro-USB connector. The micro-USB connector could only carry nine watts of power, but the Lightning connector could carry ten watts. Nine watts was sufficient for smart phones like the iPhone 5, but Apple was also using the same connector for its new generation of iPads.<sup>81</sup> Using the Lightning connector allowed iPads to recharge at substantially faster speeds. Thus, the Lightning was apparently better than the prior art in at least one respect.

Because these patents cover an advance, they don't offend patent law in the way patents on horizontal innovation do. Nonetheless, current law gives the owner of these patents disproportionate power. By patenting the Lightning interface, Apple could demand a royalty for the

79. Anand Lal Shimpi, Brian Klug & Vivek Gowri, *The iPhone 5 Review: Lightning 9-pin: Replacing the 30-pin Dock Connector*, ANANDTECH (Oct. 16, 2012, 11:33 AM), <http://www.anandtech.com/show/6330/the-iphone-5-review/14> (discussing why the 30-pin dock connector was "destined for a more modern, compact replacement").

80. Bryan Chaffin, *EU Approves Universal Smartphone Charger Standard*, MAC OBSERVER (Dec. 30, 2010, 4:35 PM), [http://www.macobserver.com/tmo/article/eu\\_approves\\_universal\\_smartphone\\_charger\\_standard](http://www.macobserver.com/tmo/article/eu_approves_universal_smartphone_charger_standard).

81. Steve Wildstrom, *Why Apple Couldn't Go to Micro USB Charging*, MASHABLE (Sept. 6, 2012), <http://mashable.com/2012/10/29/apple-lightning-micro-usb/>.

right to make products that are compatible with iPhones and iPads.<sup>82</sup> Thus, companies that wish to make compatible speakers, credit card swipers, or other accessories need a license from Apple.<sup>83</sup> This is true even if Apple owns no applicable intellectual property in the way the accessory otherwise operates. For example, Bose, a noted speaker company, may have developed significant innovations for its sound system but still have to pay Apple for the privilege of making a speaker system that docks with the iPhone 5. Importantly, these companies probably do not care about how fast the Lightning interface allows iPhones and iPads to charge. These companies simply want to be able to sell their products to the millions of Apple customers. In other words, even though the Lightning patents possess both compatibility value and technical value, it's the compatibility value that dominates.

Now let's take a step back. Relying on the NWay story, I explained why interface patents on horizontal technology should not give their owners the right to control access to products that use the patented interface. But patents like the Lightning patents are different because they cover some meaningful advance. These inventors should be rewarded because the patents have made a meaningful contribution to the public. The key is to disentangle innovation value from compatibility value and only allow the patentee to recover for the former category.

### III. PRIOR THINKING

Part III addresses two lines of relevant thinking. In Section A, I discuss proposals concerned specifically with interface patents and standards. To a large extent, these commentators focus on "competition values," the role that interface patents play in promoting (or stunting) technical standards. But for the most part, such works treat patents monolithically. They assume each patent contributes the same fixed but immeasurably sized innovation. My proposal seeks to inject another dimension into these standards-focused discussions so that they think about patents in a more nuanced fashion.

In Section B, I discuss a different line of thinking that seeks to change patent law to align it more closely with its underlying innovation advancing goals. This line of thinking focuses on "patent values," as distinguished from the "competition values" discussed in

---

82. This is purely from a physical perspective. Other intellectual property undoubtedly helps Apple control what software may run on the iOS operating system.

83. More and more physical connections are becoming obsolete and are being replaced by wireless ones. The same analysis could be done for wireless standards, but their complex technical details make them poor examples.

Section A. Commentators who think about patent values often propose reforms that depend on the particular contribution a patent makes. This Article follows in this patent centric tradition, but it extends on that thinking and applies it to issues unique to the interface and standards world.

### *A. Interface Theory*

Many commentators have debated whether interfaces should be patented and, if so, to what extent. In 2009, Pamela Samuelson discussed more than twenty-five different suggestions for regulating interface patents.<sup>84</sup> The various proposals Samuelson reviewed sought to achieve more compatibility among information and communications technologies.<sup>85</sup>

For the most part, these commentators focused on how patents are used. Others suggest that recommendations need to turn on patents' competitive environments. All these characteristics certainly help us understand the role patents play in competition. But the qualities are all extrinsic characteristics that have no connection to what the patent contributes. Often the resulting policy recommendation does not care whether the patent covers an important new advance or an invention that is no better than existing technology (i.e., the patent's intrinsic value). But from a patent perspective, it makes little sense to discuss interface patents without thinking about the most important patent values, the nature and degree of innovation the patented invention adds to what the public already has. The main thrust of this Article is to suggest that good patent policy (including any policy addressing interface patents) needs to incorporate that dimension into its decision making.

Several commentators have suggested banning patents on interfaces or immunizing their use.<sup>86</sup> For example, some have argued that, under European law, software patents cannot cover interfaces because they are simply unpatentable "ideas and principles."<sup>87</sup> Indeed, the United States Supreme Court may have already implicitly adopted this proposal in *Alice Corp. Pty. Ltd. v. CLS Bank International*,<sup>88</sup> a broad, sweeping decision that has invalidated many different categories of software

---

84. See Samuelson, *supra* note 35, at 2004.

85. *Id.*

86. *Id.* at 1970–79 (providing a survey of these different proposals).

87. W.R. Cornish, *Inter-operable Systems and Copyright*, 11 EUR. INTELL. PROP. REV. 391 (1989); Council Directive 91/250, 1991 O.J. (L 122) 42, 43 (EC).

88. 134 S. Ct. 2347 (2014).

patents.<sup>89</sup> On a similar vein, the European Parliament considered, but ultimately rejected, a proposal that would have declared the use of software interface patents as non-infringing.<sup>90</sup> Julie Cohen has also suggested effectively doing away with interface patents that lockout competition by relying on the patent misuse doctrine.<sup>91</sup> Finally, Philip Weiser has also relied on patent misuse to limit interface patents, but his “Competitive Platforms Model” focuses on market factors as opposed to any patent specific factors.<sup>92</sup>

Notably, none of these proposals isolate the issue of horizontal innovation. Rather, they focus on the harms of patenting interfaces regardless of the significance of the advance covered by the patent. To illustrate this distinction, we can delve into Cohen’s misuse proposal. It is fairly representative of those proposals that would effectively eliminate or render ineffective interface patents. Cohen used the facts from Nintendo’s dispute with Atari to justify the application of misuse.

In that case, Nintendo had developed a security system for one its game consoles, the Nintendo Entertainment System (“NES”), to prevent unauthorized games from running on the console.<sup>93</sup> The security system was covered by a patent and the underlying software by copyright law.<sup>94</sup> Through a combination of reverse engineering and subterfuge, Atari developed its “Rabbit” program to unlock the NES so that it could freely develop games and sell them to customers who owned Nintendo’s system.<sup>95</sup> Nintendo sued for both patent and copyright infringement.<sup>96</sup> Nintendo lost on its copyright claims, but the

---

89. *Id.* at 2349–51; *see also Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1350–51 (Fed. Cir. 2014) (finding that a patent that described the format for tagging digital images was invalid in view of *Alice*).

90. Samuelson, *supra* note 35, at 1978.

91. Julie E. Cohen, *Reverse Engineering and the Rise of Electronic Vigilantism: Intellectual Property Implications of “Lock-Out” Programs*, 68 S. CAL. L. REV. 1091, 1181–82 (1995) (Cohen calls this a paradox because enforcing one’s right leads to losing that very right).

92. Philip J. Weiser, *The Internet, Innovation, and Intellectual Property Policy*, 103 COLUM. L. REV. 534 (2003).

93. *Atari Games Corp. v. Nintendo of Am. Inc.*, 975 F.2d 832, 835–37 (Fed. Cir. 1992).

94. Nintendo’s patent was entitled “System for Determining Authenticity of an External Memory Used in an Information Processing Apparatus.” U.S. Patent No. 4,799,635 (filed Dec. 23, 1985).

95. *Atari Games*, 975 F.2d at 836–37. Atari had applied to the Copyright Office for a reproduction of the 10NES program, falsely saying that it was a defendant in an infringement action and needed a copy of the program for that litigation. *Id.* at 836.

96. *Id.* at 837.

court found that Atari infringed Nintendo's patent.<sup>97</sup> Although Atari had raised patent misuse as a defense, the parties settled before the court reached that issue.<sup>98</sup>

Cohen has characterized Nintendo's patent assertion as a "straightforward" case of patent misuse. She explains,

Nintendo's patent monopoly extended *only to the lock-out programs* embedded in its console and cartridges, *not to the console itself*, nor to the console operating system. . . . Nintendo's subsequent use of the lock-out patent to ensure that only its licensees could gain access to the console was an unlawful extension of the patent grant.<sup>99</sup>

Cohen's analysis oversimplifies the patent analysis in the Nintendo case by distinguishing the lock-out program from the console itself. However, the lock-out program did not exist apart from the physical components that resided on both the console and the cartridge. Moreover, even if we could somehow separately identify some "ethereal" interface that existed in between the components it connected, Cohen's distinction does not accurately reflect what Nintendo's patent covered. For example, claim 1 from that patent contains limitations that correspond to the console's data processor, an authenticating processor that resides on the console (the second recited authenticating processor), and a "control means" for resetting the system.<sup>100</sup> Thus, Cohen is not being totally forthright when she says

---

97. *Atari Games Corp. v. Nintendo of Am. Inc.*, 30 U.S.P.Q.2d 1401, 1419-20 (N.D. Cal. 1993).

98. Cohen, *supra* note 91, at 1104.

99. *Id.* at 1182-83 (emphasis added).

100. Claim 1 recites:

A system for determining whether a videographics software program is authorized for use in an information processing apparatus, comprising: a main data processor unit for executing a videographics software program; an external memory for storing the videographics software program and for removable connection to said main processor unit, said external memory and main processor unit together constituting the information processing apparatus for executing the videographics software program; a first authenticating processor device associated with said external memory for executing a first predetermined authenticating program to determine the authenticity of said external memory; a second authenticating processor device which is installed in said main data processor unit for executing a second predetermined authenticating program to determine the authenticity of said external memory; and control means for resetting said main data processor unit unless the execution of said first authenticating program by said first processor device exhibits a predetermined relationship to the

that Nintendo's patent does not extend to the console. It did. And interface patents almost always claim parts of the devices that connect to the interface.<sup>101</sup>

Cohen's characterization is really a conceptual one, and it makes imminent sense from an innovation perspective. The technology claimed in Nintendo's patent did not allow either the console or the cartridge to operate better. The games did not play any faster or use less storage. Nor were the graphics any more precise. Nevertheless, Nintendo sought to use the interface security patent in a manner that went beyond the security system itself. It was seeking to control consoles and cartridges too. That certainly sounds like the "straightforward" case of patent misuse that Cohen identified.

But the problem with Cohen's proposal and others like it is that they don't consider the varying levels of innovation that the patents may cover. Cohen does not discuss whether Nintendo's patent represents an advance over the prior art. For example, a new interface could allow products to communicate faster or include additional information.<sup>102</sup> Now, that does not appear to be the case with Nintendo's patent, which merely provided a method for authenticating cartridges. When that kind of patent is being used to foreclose competition for devices that connect to it, the patent is not serving any *patent* purpose. In other words, because there is no innovation, the patent system does not need to reward its inventor. It may make sense to declare these kinds of patents unenforceable. But the harder case occurs when an interface patent covers a real innovation. There are patent reasons (i.e., incentivizing innovation) for issuing and enforcing such patents. Cohen's proposal does not recognize this distinction. Taken at face value, it appears that Cohen would declare all interface patents—even if significantly innovative—unenforceable because of misuse. The approach described in this Article differs from Cohen's proposal by only neutralizing those patents that did not represent an advance over the prior art.

---

execution of said second authenticating program by said second processor device.

U.S. Patent No. 4,799,635 (filed Dec. 23, 1985).

101. For example, both Gillette's interface patent and the Apple Lightning patent include physical elements from the components that use their respective interfaces. For examples of Gillette's patents, see U.S. Patent No. 5,787,586 (filed Apr. 10, 1996); U.S. Patent No. 7,168,173 (filed Mar. 11, 2004). For an example of Apple's patent, see U.S. Patent No. 8,561,879 (filed Jan. 9, 2012).

102. For example, around 2001, Intel developed and patented a quad pumped front side bus to allow its processors to communicate faster with chipsets. *See, e.g.*, U.S. Patent No. 6,807,592 (filed Aug. 10, 2001) (entitled "Quad Pumped Bus Architecture and Protocol").

Philip Weiser also suggests using patent misuse to limit interface patents, but he focuses on a different factor—specifically, the competitive market where the patented interface resides.<sup>103</sup> Relying on what he calls the “Competitive Platforms Model,” Weiser would allow companies to use intellectual property to close their standards so long as there was competition between rivals.<sup>104</sup> For example, because videogame manufacturers like Sony, Nintendo, and Microsoft compete vigorously, under Weiser’s theory, these companies should be allowed to use their intellectual property to close their respective platforms. However, when a single platform becomes dominant (e.g., Microsoft Windows), the standard should become open.<sup>105</sup> Doctrines of fair use and patent misuse would come into play to prevent enforcement of copyright rights and patents respectively.<sup>106</sup> Weiser’s proposal is intended to place incentives at a time when they are needed the most, before market dominance is achieved.<sup>107</sup>

While the competitive platforms model certainly advances our thinking about optimizing competition, it also does not consider the innovation dimension. Put more concretely, taking Weiser at face value, he would permit enforcement of an interface patent that reflected no technical advance (i.e., horizontal innovation) so long as the underlying platform had significant competition. At the other end of the spectrum, Weiser’s model suggests that the law should not enforce an interface patent covering a significant advance if the patentee already had a dominant position in the underlying platform. Both these scenarios are problematic. Patents that don’t cover a technical advance should not give their owner any rights. Since Weiser only examines a patent’s context and not the quality of the patent itself, his model is really not considering patent values (i.e., rewarding inventors for innovations that benefit the public). While the law might wish to temper that reward when the patent covers an interface, eliminating interface patents in some market contexts is a drastic step that is at odds with core patent law principles. To be fair, Weiser admits that his model “is only one component of a more comprehensive vision for the regulation.”<sup>108</sup> The current proposal takes a different tack than Weiser.

---

103. Weiser, *supra* note 92, at 557, 566–67.

104. *Id.* at 536 (“This model embraces proprietary development where there is competition between rival platform standards, but calls for open standards where a single platform standard wins out . . .”).

105. *Id.*

106. *Id.* at 556.

107. *Id.* at 583 (“[T]he competitive platforms model . . . reconciles the need to confer the investment incentives necessary to spur innovation with the risk of protecting proprietary dominance.”).

108. *Id.* at 540.

It would open every standard, but allow the interface patent owner to extract rents based on the level of innovation the patent contributed.

In sum, recent thinking on interface patents often focuses on competition values and treats interface patents monolithically. But patents do not just come in one flavor. They can cover horizontal innovation, modest advances, pioneering inventions, or anything in between. My proposal seeks to distinguish between all these patents and adjust the remedy accordingly.

### *B. Patent Injury*

Others have previously complained that intellectual property laws often give their owner strong rights that are incompatible with the underlying goals of those laws.<sup>109</sup> In particular, Christina Bohannan and Herbert Hovenkamp argue that IP law should only recognize harm “that is tied to the purpose for which the IP laws were passed in the first place.”<sup>110</sup> Bohannan and Hovenkamp label such harm as an “IP Injury.”<sup>111</sup> For patent law, claims of infringement that have “no impact on the incentive to innovate” are not IP Injuries.<sup>112</sup> Thus, Bohannan and Hovenkamp would limit the ability to assert patents against infringements that could not be foreseen at the time of the invention.<sup>113</sup> More concretely, they suggest prohibiting inventors from amending their claims to capture after-arising technology.<sup>114</sup>

But Bohannan and Hovenkamp’s focus is on whether a particular policy encourages innovation at all. They do not examine the nature of the innovation itself. A natural extension of Bohannan and Hovenkamp’s proposal is to question incentives to innovate that do not improve on current technology. Because these innovations do not promote progress, this Article argues that patent law should not encourage these horizontal innovations. To borrow Bohannan and Hovenkamp’s terminology, infringement of patents that merely cover horizontal innovation should not count as a “compensable IP injury.”<sup>115</sup>

That is not to say that commentators have not thought about working on different patent law levers to account for the size of the contribution the patented invention makes over the prior art. They

---

109. *See, e.g.*, CHRISTINA BOHANNAN & HERBERT HOVENKAMP, CREATION WITHOUT RESTRAINT: PROMOTING LIBERTY AND RIVALRY IN INNOVATION 33, 39 (2012).

110. *Id.* at 51.

111. *Id.*

112. *Id.* at 51, 53.

113. *Id.* at 57–58 (explaining that unforeseen or “speculative” infringements would not affect an innovator’s decision to create a work).

114. *Id.* at 72–73, 75–76.

115. *Id.* at 53.

have. For example, Dan Burk and Mark Lemley have argued that patent law should give greater claim scope to so-called pioneering patents.<sup>116</sup> Similarly, many others have argued that damages should be apportioned based on the incremental value the patented invention adds to the prior art.<sup>117</sup> However, those commentators have not studied the far end of the innovation spectrum, where patents cover arbitrarily intricate inventions that are no better than what society already has. Indeed, there appears to be an assumption underlying all of these proposals that a patented invention must be at least a little better than the prior art.<sup>118</sup> But in the context of interfaces and standards, patents on horizontal innovation are still valuable. This Article exposes the competitive harm these patents inflict and offers a remedies-based proposal to address it.

#### IV. A REMEDIES SOLUTION

In the past, I have suggested that refining remedies offers the best way to calibrate patent law to handle varying degrees of infringement.<sup>119</sup> I believe that a similar solution also makes sense for the problem of horizontal innovation. After all, measuring infringement and measuring innovation are very similar endeavors. The former determines the gap between the accused device and the patent, while the latter assesses the gap between the patent and the prior art. Both of these kinds of differences can be thought to reside on a continuum. Because money damages also reside on a spectrum, it can be used to calibrate incentives to correspond to the value of the patented invention.

But, for the most part, that does not happen in today's regime. One problem with the way patent remedies have historically operated is that they allowed patent holders to obtain injunctions and receive large damages awards even when the patent covered technology that is no better than the prior art. That allowed the patentee to capture value that

---

116. See Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PA. L. REV. 1743, 1796–97 (2009). But see Brian J. Love, *Interring the Pioneer Invention Doctrine*, 90 N.C. L. REV. 379 (2012) (criticizing the pioneer invention doctrine and arguing that other doctrines give pioneer inventors generous rights).

117. See *infra* notes 141–145 and accompanying text.

118. The pioneering invention doctrine that Burk and Lemley mention gives such inventions more expansive scope under the doctrine of equivalents. But no one has suggested constraining that scope for patents that cover only minor advances. Similarly, Amy Landers discusses how to apportion damages based on the patent's contribution over the prior art, but she never suggests awarding no damages when that contribution is valueless. Amy L. Landers, *Patent Claim Apportionment, Patentee Injury, and Sequential Invention*, 19 GEO. MASON L. REV. 471, 473–74 (2012).

119. Chao, *supra* note 24, at 1404–12.

stems from access to products that use the interface (“compatibility value”) as opposed to value that stems from the patented improvement (“innovation value”).

To illustrate this problem, we can revisit the patented Apple Lightning interface.<sup>120</sup> The interface is apparently better than the prior art because it allows iPads and iPhones to charge more quickly. The patents also allow Apple to control who sells products on those platforms. Both characteristics are valuable, but only one is related to the patented technical advance. My proposal would limit Apple to recovering reasonable royalties for the value of charging devices more quickly, not for the value of being able to sell Apple-compatible products.

In practice, that means changing the way patent law awards damages and issues permanent injunctions. Patent law should only award a remedy if the underlying technology is better than the prior art. To achieve this goal, patent law will have to stop awarding lost profits and issuing injunctions for all necessary interface patents because innovation and compatibility values are inextricably bound together in those remedies. Moreover, reasonable royalty damages will have to be limited to the value of the technical advance, and no value should be attributed simply because the interface helps a product achieve compatibility. The Federal Circuit has already taken a step in this direction when calculating reasonable royalties for standards-essential patents.<sup>121</sup> But the court needs to extend this concept to encompass all necessary interface patents.

To illustrate the different aspects of this proposal, this Part proceeds in two sections. First, Section A explains why injunctions will no longer be available for any necessary interface patents. Second, Section B describes how patent law’s damages framework needs to change to encourage the innovation values that lie at the heart of the current proposal.

### *A. Injunctions*

Denying a reward to those that have developed technology that is not better than the prior art should be fairly uncontroversial. Those inventors have not contributed anything meaningful to the public.

---

120. I use the Apple example to illustrate the power an interface patent has, but Apple has not used its Lightning patents to prevent companies from making Lightning-to-USB cords that essentially open up the iPad and iPhone platform from a physical connection. In short, Apple is NOT enforcing its Lightning patents in the way I hypothesize here.

121. See *infra* notes 162–172 and accompanying text.

Therefore, they deserve nothing. This rather basic insight has practical significance. At a minimum, it means that owners of patents that cover purely horizontal technology should not be entitled to injunctive relief. That proposition begs another harder question: should injunctive relief be available for interface patents that cover real advances? Surprisingly, the answer is again no. Injunctions should not be awarded for any necessary interface patent.

To understand why the prohibition against injunctions should also apply to better interfaces, it is important to keep in mind that the basic goal of my proposal is to isolate innovation value and provide a share of that value (and only that value) to the patentee. Interface patents have a unique characteristic. The reason why companies want to use a particular interface often stems from the popularity of the platform and not the technical benefits of the particular interface. For example, the reason why a company wants to make credit card swipers that work with iPhones and iPads has nothing to do with the fast charging Lightning interface and everything to do with those products' commercial success. In other words, companies would seek to use the Lightning interface even if it was not better than other interfaces. They just want the opportunity to sell their products to the millions of customers that use Apple's products.<sup>122</sup> In short, those companies value Apple's Lightning interface patents because of the considerable compatibility value they possess and not because of the patents' innovation value.<sup>123</sup>

Unfortunately, when permanent injunctions are issued, the patentee inevitably recovers for the value of gaining access to any complementary products. The compatibility value manifests itself in two ways. The patentee can foreclose competition in complementary markets (i.e., enforce the injunction) or extract rents from those markets (i.e., require the infringer to pay money to lift the injunction).<sup>124</sup> That's why Gillette can prevent others from making razors that work with Gillette's handles.

The issue becomes more complicated when patents actually cover better technology. In these situations, the patentees undoubtedly are entitled to some remedy when others use their invention. But that recovery should be based on benefits that stem from the advance the

---

122. See *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1233 (Fed. Cir. 2014) (noting that “[w]hen a technology is incorporated into a standard, . . . that technology is not always used because it is the best or the only option; it is used because its use is necessary to comply with the standard”).

123. *Id.* (noting that “widespread adoption of standard essential technology is not entirely indicative of the added usefulness of an innovation over the prior art”).

124. Christina Bohannon, *IP Misuse as Foreclosure*, 96 IOWA L. REV. 475, 503–05 (2011) (discussing the problems of using intellectual property to foreclose).

invention contributes (i.e., how much better the patented interface is than the prior art). Unfortunately, injunctions on interface patents allow their owners to do much more. Again, consider Apple's patented Lightning interface. The fact that the interface allows devices to charge more quickly certainly has some value. But it should not give Apple the ability to determine who can and cannot make devices that operate with its iPads and iPhones. That would vastly overcompensate Apple for figuring out how to increase charging speeds. Put more generally, patent law should give inventors incentives to innovate. But those incentives should not be so large that they allow inventors to capture benefits associated with complementary goods, as distinguished from the advance in the interface itself.

The first step in changing this result is to eliminate the availability of injunctions for all necessary interface patents. I use the term "necessary" to describe interface patents that other companies need to infringe in order to make products that operate with some complementary products. This definition includes any standards-essential patent, but it goes further and includes interfaces that are not part of any formal standard, like the way Gillette's handles connect with its razors.

This proposal would be a fundamental shift from the current law. For many years, courts had automatically awarded prevailing patentees a permanent injunction against further infringement.<sup>125</sup> However, in *eBay Inc. v. MercExchange, L.L.C.*,<sup>126</sup> the Supreme Court held that courts should apply the traditional four-factor test they use in other areas of the law.<sup>127</sup> Those factors are (1) whether the plaintiff will suffer irreparable harm without the injunction, (2) whether there is an adequate remedy at law, (3) the balance of hardships on the respective parties, and (4) whether granting an injunction would disservice the public interest.<sup>128</sup>

In practice, that has meant that when an infringer competes with the patentee, the patentee can typically obtain a permanent injunction. That is because courts generally view money damages as adequate for non-practicing entities.<sup>129</sup> Such entities are simply seeking to obtain the

---

125. *MercExchange, L.L.C. v. eBay, Inc. (eBay II)*, 401 F.3d 1323, 1338 (Fed. Cir. 2005) (citing *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1246-47 (Fed. Cir. 1989), *vacated*, 547 U.S. 388 (2006)).

126. 547 U.S. 388 (2006).

127. *Id.* at 390.

128. *Id.* at 391.

129. See, e.g., *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1339-40 (Fed. Cir. 2012) (denying injunctive relief after finding money damages were adequate in view of patentee's extensive licensing efforts and no direct competition).

highest royalty they can. In contrast, when the patentee is competing with the infringer, money damages are often inadequate because the parties are fighting over future market share.<sup>130</sup> Since *eBay* was decided, patent holders who compete with an infringer have been granted permanent injunctions in 84% of cases while patentees who did not compete only receive injunctions 21% of the time.<sup>131</sup> Returning to our examples, under current law, Apple and Gillette are likely to obtain permanent injunctions against companies that infringe their patented interfaces because they would compete with any infringer. In contrast, Vertical Networks (a non-practicing entity) would not be able to obtain an injunction against future infringement of the NWay patents.

The proposal would change how courts apply the *eBay* factors, in a manner that is fully consistent with *eBay*'s general framework. The basic premise is that inventors are only entitled to capture a share of the benefits the patented invention contributes but no more. Under this view, a properly sized royalty should be considered adequate compensation. Importantly, the owner of an interface patent would not be entitled to control the market for complementary products. Thus, the first two *eBay* factors are satisfied.<sup>132</sup>

Denying injunctive relief for necessary interface patents is also consistent with the third *eBay* factor, which requires examining the balance of hardship. Again, if we accept the basic premise—that interface inventors should receive a royalty but not obtain value for helping achieve compatibility—the balance of hardship clearly weighs against issuing an injunction. Although the infringer must pay some

---

130. Bernard Chao, *Causation and Harm in a Multicomponent World*, 164 U. PA. L. REV. ONLINE, 61, 63 (2016), <https://www.pennlawreview.com/online/164-U-Pa-L-Rev-Online-61.pdf>; see, e.g., *Robert Bosch LLC v. Pylon Mfg. Corp.*, 659 F.3d 1142, 1152–53 (Fed. Cir. 2011) (patentee demonstrated that it would suffer irreparable harm from competitor's infringement of patents given undisputed evidence of direct competition).

131. See Christopher B. Seaman, *Permanent Injunctions in Patent Litigation After eBay: An Empirical Study*, 101 IOWA L. REV. (forthcoming 2016) (manuscript at 48), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2632834](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2632834) (counting district court decisions through the end of 2013); see also Colleen V. Chien & Mark A. Lemley, *Patent Holdup, the ITC, and the Public Interest*, 98 CORNELL L. REV. 1, 10 fig.1 (2012) (finding that district courts granted NPEs injunctions in 26% of total requests and only 7% when the injunction was opposed by the infringer from July 2006 through August 2011); Stacy Streur, *The eBay Effect: Tougher Standards but Courts Return to the Prior Practice of Granting Injunctions for Patent Infringement*, 8 NW. J. TECH. & INTELL. PROP. 67, 79–86 (2009) (because such entities are seeking money, courts generally find no irreparable harm and that money damages are adequate).

132. The first and second *eBay* factors are often considered to be corollaries. If one is true, the second follows. See FED. TRADE COMM'N, *supra* note 69, at 260 (noting that courts often analyze the first two factors together).

royalty for the benefit it receives from the patented advance, the infringer would suffer from serious hardship if it could not compete in a market at all. In contrast, so long as the patentee receives the appropriate royalty, it has not suffered a recognizable hardship.

The fourth factor, public interest, also weighs against issuing injunctions in these types of cases. *eBay* signified a shift in focus from one based purely on the property rights of patentees to a more public-minded analysis.<sup>133</sup> The current proposal follows a similar vein. Given that the purpose of patent law is to incentivize inventors to make meaningful advances, it only makes sense to compensate patentees for “innovation value” not “compatibility value.”

Now, the courts have recently taken a small step in a similar direction. In *Apple Inc. v. Samsung Electronics Co. (Apple III)*,<sup>134</sup> the Federal Circuit placed a significant limitation on the ability of a patentee to obtain a permanent injunction.<sup>135</sup> It is not sufficient to show that the infringer’s sales are causing irreparable harm to the patentee, there must also be a “causal nexus” between the infringing feature and the harm.<sup>136</sup> A literal application of this requirement would probably eliminate injunctions for most minor features. As the court said, “[s]ales lost to an infringing product cannot irreparably harm a patentee if consumers buy that product for reasons other than the patented feature.”<sup>137</sup> Thus, the Federal Circuit is now assessing whether to issue a permanent injunction based on how much the patented feature contributes to the infringing product.

However, the causal nexus requirement does not solve the basic problem with interface patents. It limits the availability of injunctions to those patents that contribute features that are sufficiently significant that they drive consumer demand. These are patents that possess significant innovation value.<sup>138</sup> Unfortunately, this solution masks the underlying problem by burying the importance of compatibility value. Because these patents contribute significant advances, it is easy to assume that

---

133. See *eBay*, 547 U.S. at 397 (Kennedy, J., concurring) (suggesting that the courts can use their “equitable discretion over injunctions” to “adapt to the rapid technological and legal developments in the patent system”).

134. 735 F.3d 1352 (Fed. Cir. 2013).

135. *Id.* at 1360. The Federal Circuit initially discussed the “causal nexus” requirement in the context of the standard for determining preliminary injunctions. *Apple Inc. v. Samsung Elecs. Co. (Apple I)*, 678 F.3d 1314, 1324 (2012). *But see Apple Inc. v. Samsung Elecs. Co. (Apple IV)*, 809 F.3d 633, 641–42 (Fed. Cir. 2015), *modifying and superseding* 801 F.3d 1352 (Fed. Cir. 2015) (weakening the causal nexus standard established in *Apple I*). See generally Chao, *supra* note 130 (criticizing *Apple IV*).

136. *Apple III*, 735 F.3d at 1360.

137. *Id.* (quoting *Apple I*, 678 F.3d at 1324).

138. As a practical matter, this may be a very small subset of interface patents.

they should be entitled to an injunction.<sup>139</sup> But that is not the case. Awarding injunctive relief inevitably gives patentees undeserved compatibility value. To the extent that interface patents cover significant advances, damages recoveries should increase and that should suffice.

Importantly, the idea of eliminating injunctions for necessary interface patents is only part of the larger proposal.<sup>140</sup> Inventors of innovative patents still need to be fairly compensated. But, because injunctions give their owners value unrelated to the contribution the interface patents make, injunctions should not be issued in these cases. Instead, it makes far more sense to provide money damages for those patents that cover real advances. That discussion follows in the next section.

### *B. Damages*

Identifying horizontal innovation is not easy. Sophisticated companies will undoubtedly be able to disguise their interface patents on horizontal innovation and argue that they cover some meaningful advance over the prior art. The current proposal takes this possibility into account and offers a solution that can adjust to the varying levels of innovation that exist in the real world. Because money damages are easily adjusted and fall on a spectrum, my proposal relies on awarding reasonable royalties that correspond to the size of the patented advance. I am not the first to offer this kind of proposal. At different times, Congress considered adopting legislation that would explicitly require apportionment.<sup>141</sup> Additionally, the Supreme Court discussed the need

---

139. In fact, Contreras and Gilbert argue that there does not need to be any “special analysis” in determining whether to grant an injunction for a standards-essential patent subject to a commitment to license it under reasonable and non-discriminatory terms. Contreras & Gilbert, *supra* note 72, at 1458.

140. This conclusion adds to a growing chorus of scholars that advocate for the elimination or reduction of injunctions in similar contexts, albeit for many different reasons. *See, e.g.*, Peter Lee, *The Evolution of Intellectual Infrastructure*, 83 WASH. L. REV. 39, 45–46 (2008) (arguing that courts should use injunctions less when considering infringement of patents that cover infrastructure); O’Rourke, *supra* note 36, at 1130–35 (arguing that infringers of application programming interface patents should be able to continue to infringe under the doctrine of fair use but pay compensation at “less than fair market value”); Samuelson, *supra* note 35, at 2009 (suggesting that injunctions should not be issued for necessary interface patents so long as damages can cover R&D costs). *But see* Contreras & Gilbert, *supra* note 72, at 1462 (arguing against a rule denying injunctive relief for standards-essential patents saying that “[a]n injunction may be necessary . . . to bring the [infringer] to the bargaining table”).

141. *See, e.g.*, Patent Reform Act of 2009, H.R. 1260, 111th Cong. § 5; Patent Reform Act of 2008, S. 1145, 110th Cong. § 5.

to apportion damages as far back as *Garretson v. Clark*.<sup>142</sup> However, the concept has been obscured by the fifteen-factor test articulated in *Georgia-Pacific Corp. v. U.S. Plywood Corp.*<sup>143</sup> that is currently used to calculate reasonable royalties.<sup>144</sup> Several commentators have urged the courts to restore the doctrine to prominence by insisting that they identify a patent's inventive contribution before assessing damages.<sup>145</sup>

I will not repeat the many worthy arguments in favor of apportionment, but I have two additional points to make regarding damages. First, awarding lost profits doesn't make sense for necessary interface patents. As is the case for injunctions, lost profits allow the patentee to capture value associated with the infringer achieving compatibility with other products that use the interface. Therefore, lost profits should be discarded and all damages should be awarded using a reasonable royalty calculation. Second, the existing "hypothetical negotiation" framework for calculating reasonable royalties also does not work for interface patents. The law must explicitly exclude compatibility value from the hypothetical negotiation. Otherwise, reasonable royalty calculations will suffer from the same problems inherent in injunctions and lost profits. Thankfully, the Federal Circuit has already begun to adopt the second recommendation for standards-essential patents.<sup>146</sup>

## 1. LOST PROFITS

Under the statute governing patent damages, a prevailing patentee can receive lost profits.<sup>147</sup> But, if the patentee does not have any lost

---

142. 111 U.S. 120, 121 (1884) ("The patentee . . . must in every case give evidence tending to separate or apportion the defendant's profits and the patentee's damages between the patented feature and the unpatented features . . .").

143. 318 F. Supp. 1116 (S.D.N.Y. 1970), *modified by* 446 F.2d 295 (2d Cir. 1971).

144. *Id.* at 1120. A number of commentators have complained about the difficulty of applying this test consistently. See Daralyn J. Durie & Mark A. Lemley, *A Structured Approach to Calculating Reasonable Royalties*, 14 LEWIS & CLARK L. REV. 627, 628 (2010); Landers, *supra* note 118, at 491.

145. See, e.g., Eric E. Bensen & Danielle M. White, *Using Apportionment to Rein in the Georgia-Pacific Factors*, 9 COLUM. SCI. & TECH. L. REV. 1, 7, 32–33, 40 (2008) (for arguments in favor of apportionment); Contreras & Gilbert, *supra* note 72, at 1460; Landers, *supra* note 118, at 473; David O. Taylor, *Using Reasonable Royalties to Value Patented Technology*, 49 GA. L. REV. 79, 144 (2014) (suggesting that the *Georgia-Pacific* test should "focus" the analysis on "the value of patented technology").

146. See *infra* notes 162–172 and accompanying text.

147. See 35 U.S.C. § 284 (2012) ("Upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in

profits or is unable to prove them, a reasonable royalty is always available.<sup>148</sup> The problem with lost profits theory is that it tries to return the patentee to the place she would have occupied had there been no infringement.<sup>149</sup> Unfortunately, in the case of interface patents, that recovery inherently includes value unrelated to the contribution the patented invention makes. A lost profits theory allows the patentee to implicitly recover compatibility value.

Consider Gillette's Mach 3 and Fusion shaving systems again. To gain access to the millions of Gillette customers, a competing razor manufacturer would need to include Gillette's patented interface in its razors and thereby commit patent infringement. Under current law, Gillette would clearly be able to recover lost profits associated with any sales that the competitor took from Gillette.<sup>150</sup> In this case, all the lost profits are really attributable to compatibility values. The only reason for a competitor to infringe would be to gain access to customers that previously purchased Gillette's handles. The lost profits have nothing to do with any technical contributions made by the patents because there were none.

The lost profits problem extends to interface patents that cover real advances, too. To illustrate this point, I make a slight variation to the Lightning example. Assume that, besides charging devices more quickly, the Lightning interface made products that used the interface less expensive to manufacture.<sup>151</sup> Additionally, assume that Apple is competing with EasySwipe, a company that makes infringing credit card swipers that connect to iPads and iPhones. Again, under current law, Apple will be able to recover lost profits for all the sales that Apple lost to EasySwipe. However, only some of the lost sales can be attributed to the lower price EasySwipe was able to charge for using the

---

no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court.”).

148. *Id.*

149. *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 377 U.S. 476, 507 (1964) (“[The] question (is) primarily: had the Infringer not infringed, what would Patent Holder-Licensee have made?” (quoting *Livesay Window Co. v. Livesay Indus.*, 251 F.2d 469, 471 (5th Cir. 1958))); *Yale Lock Mfg. Co. v. Sargent*, 117 U.S. 536, 552 (1886) (stating that a patentee's damages are “the difference between his pecuniary condition after the infringement, and what his condition would have been if the infringement had not occurred”).

150. To obtain lost profits a patentee must show “(1) demand for the patented product, (2) [the] absence of acceptable noninfringing substitutes, (3) [her] manufacturing and marketing capability to exploit the demand, and (4) the amount of profit [s]he would have made.” *Panduit Corp. v. Stahl Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156 (6th Cir. 1978).

151. I suggest a different beneficial feature because charging iPads and iPhones quickly does not appear to benefit the card swiper.

patented interface. The remainder of the lost sales occurred because EasySwipe's infringing credit card swipers were compatible with iPads and iPhones. But, that is not value attributable to the contribution the patented invention makes over the prior art, and the law should not compensate for that loss.<sup>152</sup>

These two examples illustrate the problem with awarding lost profits in these contexts. When awarding lost profits, the technical contribution the patented invention makes is not separated from the value associated with helping a product achieve compatibility. Accordingly, a lost profit award inherently includes both values. That is why the sole remedy that the law should award to necessary interface patents is a modified reasonable royalty. The next section explains how that royalty should be calculated.

## 2. REASONABLE ROYALTIES

The preceding section rejected lost profits theory in favor of calculating damages based on the value the patentee contributed to the infringing product. That is essentially a royalty calculation, albeit not the one the courts now use. In its current form, a "reasonable royalty" is calculated using the *Georgia-Pacific* test.<sup>153</sup> Jurors are instructed to ascertain the royalty that the parties would have agreed upon had they successfully negotiated a license just before infringement began. The hypothetical negotiation assumes that the patent at issue is valid and infringed. There are a mind-boggling fifteen factors that are used to calculate the royalty under this analysis.<sup>154</sup> The ninth factor is the factor

---

152. Bohannon and Hovenkamp apply this kind of argument to the sale of related products (e.g., Apple's lost swiper sales might also cause it to lose software sales). They say the loss of such sales should not be considered a compensable IP Injury. BOHANNAN & HOVENKAMP, *supra* note 109, at 53–54.

153. See *Ga.-Pac. Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified by* 446 F.2d 295 (2d Cir. 1971). Reasonable royalty awards can also be calculated using "the so-called 'analytical approach.'" See *TWM Mfg. Co. v. Dura Corp.*, 789 F.2d 895, 899 (Fed. Cir. 1986); accord JOHN SKENYON ET AL., PATENT DAMAGES LAW & PRACTICE § 3:8 (2013). But this test is almost never used. Therefore, I will not address it. See Christopher B. Seaman, *Reconsidering the Georgia-Pacific Standard for Reasonable Royalty Patent Damages*, 2010 BYU L. REV. 1661, 1673 ("Today, nearly all reasonable royalty awards are based on the fifteen-factor [*Georgia-Pacific*] test . . .").

154. See *Ga.-Pac. Corp.*, 318 F. Supp. at 1120. The factors are

1. The royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty.
2. The rates paid by the licensee for the use of other patents comparable to the patent in suit.

that accounts for the contribution the patent makes over the prior art. Apportionment would bring this factor to the forefront by asking the court to (1) isolate the particular patented advance, (2) distinguish it from the prior art, and (3) ask the fact finder to assess a royalty on that invention.<sup>155</sup>

- 
3. The nature and scope of the license, as exclusive or non-exclusive; or as restricted or non-restricted in terms of territory or with respect to whom the manufactured product may be sold.
  4. The licensor's established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly.
  5. The commercial relationship between the licensor and licensee, such as, whether they are competitors in the same territory in the same line of business; or whether they are inventor and promotor.
  6. The effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales.
  7. The duration of the patent and the term of the license.
  8. The established profitability of the product made under the patent; its commercial success; and its current popularity.
  9. The utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results.
  10. The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention.
  11. The extent to which the infringer has made use of the invention; and any evidence probative of the value of that use.
  12. The portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions.
  13. The portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer.
  14. The opinion testimony of qualified experts.
  15. The amount that a licensor (such as the patentee) and a licensee (such as the infringer) would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement; that is, the amount which a prudent licensee—who desired, as a business proposition, to obtain a license to manufacture and sell a particular article embodying the patented invention—would have been willing to pay as a royalty and yet be able to make a reasonable profit and which amount would have been acceptable by a prudent patentee who was willing to grant a license.

*Id.*

155. Landers, *supra* note 118, at 473–74.

Until just recently, reasonable royalty awards implicitly included compatibility value.<sup>156</sup> For example, factor four is “[t]he licensor’s established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly.”<sup>157</sup> This factor assumes that a patentee can use necessary interface patents to foreclose competition in products that use the interface.<sup>158</sup> Royalty awards are increased if the licensor has such a policy. In other words, if Gillette has a policy of forbidding others from making compatible razors, an infringer would have to pay higher damages for infringing an interface patent than it otherwise would, even if the patent did not cover any real advance.

Factor eight considers the commercial success and popularity of products made under the patent.<sup>159</sup> Returning to the Lightning interface example, Apple could rely on this factor to discuss the value of connecting to Apple products. At the time of first infringement (i.e., when the swiper enters the market), the parties will have already understood that a license to the Lightning interface will allow EasySwipe to sell its product to the Apple community. For many products, iPhone and iPad compatibility can be the difference between success and failure.<sup>160</sup> Because Apple has the leverage, we would expect Apple to negotiate for a large portion of EasySwipe’s expected profits.

Of course, these results have no relationship to the size of any improvement associated with the interface. That is true even though the ninth *Georgia-Pacific* factor discusses advantages of the patent over old modes and devices. It is very unlikely that this factor is given much weight in most damages calculations. The *Georgia-Pacific* test “overloads the jury with factors to consider that may be irrelevant, overlapping, or even contradictory.”<sup>161</sup> The result is that, for years, patentees could try to obscure apportionment principles by using compatibility value arguments to push for a high royalty.

---

156. *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1229–31 (Fed. Cir. 2014) (explaining how various *Georgia-Pacific* factors were inconsistent with how parties approach standards-essential patents).

157. *Ga.-Pac. Corp.*, 318 F. Supp. at 1120.

158. See *supra* notes 129–131 and accompanying text (explaining that permanent injunctions are typically issued in the presence of direct competition).

159. *Ga.-Pac. Corp.*, 318 F. Supp. at 1120.

160. CARL SHAPIRO & HAL R. VARIAN, INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY 179–82 (1999) (explaining how consumer demand is higher for products that operate on successful platforms).

161. Durie & Lemley, *supra* note 144, at 628; see also Seaman, *supra* note 153, at 1697–98 (discussing difficulties with the fifteen-factor test).

Thankfully, the Federal Circuit has just recently issued two decisions excluding innovation value from reasonable royalty recoveries for standards-essential patents. In the first case, Ericsson sued D-Link on three patents that were necessary to the 802.11(n) Wi-Fi wireless standard.<sup>162</sup> Before the lawsuit, Ericsson had agreed to license these patents on reasonable and non-discriminatory terms (RAND) as part of the standards process.<sup>163</sup> The jury found that D-Link infringed the three patents and awarded Ericsson \$10 million (approximately fifteen cents per infringing device). On appeal, D-Link argued that the district court erred by giving the jury “the customary *Georgia-Pacific* factors.”<sup>164</sup> According to D-Link, some of these factors were either inapplicable or misleading because Ericsson was obligated to license its patents under reasonable and non-discriminatory terms.<sup>165</sup> Noting that this was an issue of first impression, the Federal Circuit agreed with D-Link and found that factors four, five, eight, nine, and ten were not applicable in the RAND context or needed some modification.<sup>166</sup>

But, the Federal Circuit did not just discuss the problems with the *Georgia-Pacific* factors, the decision took a step further and instructed the lower court to apportion value in the RAND context based on innovation and compatibility values, albeit using different language. The decision first noted that a standards-essential patent is not always used because “it is the best or only option; it is used because its use is necessary to comply with the standard.”<sup>167</sup> Using the terminology of this Article, the court recognized that standards-essential patents have both innovation value and compatibility value and distinguished between the two. The court went on to hold that “the royalty for SEPs should reflect the approximate value of that technological contribution, not the value of its widespread adoption due to standardization.”<sup>168</sup> In other words, the court excluded compatibility value from the recovery. To implement this form of apportionment, the court concluded that the jury “must be told to consider the difference between the added value of the technological invention and the added value of that invention’s standardization.”<sup>169</sup> Subsequently, in *Commonwealth Scientific and Industrial Research Organization v. Cisco Systems, Inc.*,<sup>170</sup> the Federal

---

162. *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1207 (Fed. Cir. 2014).

163. *Id.* at 1209.

164. *Id.* at 1229.

165. *Id.*

166. *Id.* at 1229–31.

167. *Id.* at 1233.

168. *Id.*

169. *Id.*

170. 809 F.3d 1295 (Fed. Cir. 2015).

Circuit vacated another damages award because the district court had failed to ensure that the jury distinguished between the value of the patents and the value of the standard that they covered.<sup>171</sup> Importantly, the decision found that *Ericsson v. D-Link*'s holding was not limited to patents encumbered by an obligation to license on RAND terms but also applied to "SEPs generally."<sup>172</sup>

These developments represent significant progress and demonstrate that the courts are beginning to appreciate the distinction between innovation and compatibility values. However, these reforms need to go further. First, in the context of reasonable royalties, the Federal Circuit should extend *Ericsson v. D-Link*'s many holdings so they don't just apply to standards-essential patents. Neither Gillette's razor-and-handle interfaces nor Apple's Lightning connectors are part of any formal industry standard. Yet, the patents are certainly necessary for companies that want to make and sell products that operate in those environments. Therefore, the principles relied upon in *Ericsson v. D-Link* and *CSIRO v. Cisco* apply with equal force to necessary interface patents. Juries should be instructed to exclude compatibility value from reasonable royalty calculations. Moreover, if the Federal Circuit is serious about preventing patentees from recovering compatibility value, it needs to stop issuing injunctions and awarding lost profits for necessary interface patents. As discussed earlier, these remedies also implicitly award compatibility value.

#### V. EPILOGUE: FIVE ODDLY DIFFERENT VIEWS OF TYING

Up to this point, this Article has discussed the problem of horizontal innovation in the context of interface patents. From a patent perspective these patents don't make sense because the public is giving something (i.e., a patent) for nothing (i.e., technology that is no better than what we have). That insight helps us understand that there is a component of all interface patents that suffers from the same problem. Because of the remedies patent law provides, even interface patents that cover true innovations possess compatibility value. The proposals made in this Article proceed within that general framework. That means that my proposals rely on patent values and take a very patent-centric view of the law.

But I would be remiss if I did not mention that companies use other tactics aside from patenting interfaces to tie products and close platforms. There are at least four other commonly used tactics that accomplish the same goals. First, companies force ties on customers

---

171. *Id.* at 1304–06.

172. *Id.* at 1305.

through contracts. In other words, they require purchasers of one product (e.g., printers) to buy the company's other product (e.g., ink). Second, they redesign their products to render their competitors' complementary products useless. Third, based on the recent *Oracle America, Inc. v. Google Inc.*<sup>173</sup> decision, companies can now try to obtain copyright protection for software interfaces that help products achieve compatibility.<sup>174</sup> Fourth, companies are now seeking to use the DMCA's (Digital Millennium Copyright Act) anti-circumvention provisions to prevent competitors from making compatible products. Oddly, different substantive laws govern these tactics: patent, antitrust, traditional copyright, and the DMCA. Not surprisingly, the motivating principles underlying these laws, the standards they apply, and the results they yield are all different. The following discussion gives a very brief discussion of each of these tactics and the law that governs them.

#### *A. Antitrust and Contractual Tying*

Perhaps, the most well-known form of tying occurs when a company contractually obligates a customer of one product to also buy other products from it. Examples include tying salt tablets to salt machines<sup>175</sup> and tying ink to printers.<sup>176</sup> To the extent these arrangements are challenged as illegal, the issue is governed by antitrust law.

Historically, the Supreme Court has condemned tying arrangements. By as early as 1947, the Court lumped tying together with price fixing and declared that such conduct was a *per se* violation of the antitrust laws.<sup>177</sup> The Court would subsequently say, "Tying agreements serve hardly any purpose beyond the suppression of competition."<sup>178</sup> However, over the years, the Supreme Court gradually became more accepting of tying.<sup>179</sup> By 1984, the Court acknowledged that not all ties were harmful, saying,

---

173. 750 F.3d 1339 (Fed. Cir. 2014), *cert. denied*, 135 S. Ct. 2887 (2015).

174. *Id.* at 1348.

175. *Int'l Salt Co. v. United States*, 332 U.S. 392, 394–95 (1947).

176. *Ill. Tool Works Inc. v. Indep. Ink, Inc.*, 547 U.S. 28 (2006).

177. *Int'l Salt Co.*, 332 U.S. at 396 (violations of both Section 1 of the Sherman Act and Section 3 of the Clayton Act were found).

178. *Standard Oil Co. of Cal. v. United States*, 337 U.S. 293, 305 (1949).

179. *See Fortner Enters., Inc. v. United States Steel Corp.*, 394 U.S. 495, 518 (1969) (White, J., dissenting) (describing many potential scenarios where the seller is merely competing in the tied product market and buyers are not burdened). This reversal stems from Chicago School theorists that argue that a firm with a monopoly in one product cannot increase its monopoly profits by using tying to leverage itself into a

It is clear . . . that not every refusal to sell two products separately can be said to restrain competition. . . . Buyers often find package sales attractive; a seller's decision to offer such packages can merely be an attempt to compete effectively—conduct that is entirely consistent with the Sherman Act.<sup>180</sup>

Later, in *Jefferson Parish Hospital District No. 2 v. Hyde*,<sup>181</sup> the Court took a step back from true *per se* liability and limited liability to those situations in which (1) the seller has market power over the tying product, (2) there is a substantial threat that the seller will acquire market power in the market for the tied product, and (3) the tying and tied products are distinct (i.e., not a single product).<sup>182</sup> This approach to tying has been labeled *quasi per se* liability.<sup>183</sup> The practice is not strictly *per se* unlawful because, unlike decisions on price fixing, the courts inquire into market power and whether the practice actually prevents consumers from taking a competing product.<sup>184</sup> The law is also not applying the rule of reason because plaintiffs have no serious obligation to establish anticompetitive effects and defendants have little opportunity to establish efficiencies.<sup>185</sup> In sum, antitrust law assesses the enforceability of contractual ties by relying on classic antitrust considerations like market power, market definition, and threats to competition.

### B. Antitrust and Tech Ties

Another form of tying also falls under antitrust law's domain. Companies often redesign their products to make it difficult, if not impossible, for other companies' complementary products to work with them. The goal is to make it practically difficult for customers to choose anything but the company's own complementary products.

---

second monopoly in another product. *See, e.g.*, ROBERT H. BORK, *THE ANTITRUST PARADOX: A POLICY AT WAR WITH ITSELF* 372–75, 380–81 (1978); Ward S. Bowman, Jr., *Tying Arrangements and the Leverage Problem*, 67 *YALE L.J.* 19, 20–23 (1957).

180. *Jefferson Parish Hosp. Dist. No. 2 v. Hyde*, 466 U.S. 2, 11–12 (1984) (citations omitted) (citing *Fortner Enters.*, 394 U.S. at 517–18 (White, J., dissenting); *id.* at 524–25 (Fortas, J., dissenting)), *abrogated by Ill. Tool Works Inc.*, 547 U.S. at 45–46.

181. 466 U.S. 2 (1984).

182. *Id.* at 37–39 (O'Connor, J., concurring in the judgment).

183. Thomas A. Lambert, *The Roberts Court and the Limits of Antitrust*, 52 *B.C. L. REV.* 871, 903 (2011); *see* Elhauge, *supra* note 51, at 400.

184. Elhauge, *supra* note 51, 420.

185. *Id.* at 400.

Bohannon and Hovenkamp have called this form of implicit tying a “tech tie.”<sup>186</sup>

A simple example involves Green Mountain Coffee, manufacturer of the Keurig line of single-serving coffee makers.<sup>187</sup> After its patent on K-Cups expired, Green Mountain redesigned its coffee makers to detect whether someone had inserted a Keurig K-Cups coffee cartridge or a competitor’s.<sup>188</sup> If it was a competitor’s cartridge, the machine would not brew coffee. There was a public outcry against the new design and several competitors sued Green Mountain for violating antitrust law.<sup>189</sup> Eventually, Green Mountain withdrew its new design.<sup>190</sup>

Tech ties occur frequently in the technology industry. In the 90s, Microsoft redesigned Windows so that it was difficult, if not impossible, to remove its browser, Microsoft Explorer.<sup>191</sup> This tactic discouraged personal computer makers from including competing browsers in their computers. Because Microsoft was unable to justify the design changes, the courts eventually found that Microsoft had violated Section 2 of the Sherman Antitrust Act.<sup>192</sup>

By focusing on whether Microsoft’s new design was justified (i.e., somehow better than what previously existed), antitrust law has adopted a seemingly patent-like perspective to assessing tech ties. It first asks whether the new design improves on the previous design.<sup>193</sup> If it does, that ends the inquiry, and there is no antitrust violation even in the presence of monopoly power and competitive harm.<sup>194</sup> Interestingly,

186. BOHANNAN & HOVENKAMP, *supra* note 109, at 320.

187. See Glenn Manishan, *Antitrust, DRM & Coffee: Is It Illegal for Keurig to Lock Down Its Brewers?*, TECHDIRT (Oct. 17, 2014, 3:50 AM), <https://www.techdirt.com/articles/20141016/16321228850/antitrust-drm-coffee-is-it-illegal-keurig-to-lock-down-its-brewers.shtml>.

188. See Dan D’Ambrosio, *Lawsuits Claim K-Cup Maker Violates Antitrust Laws*, USA TODAY (Apr. 22, 2014, 7:58 PM), <http://www.usatoday.com/story/news/nation/2014/04/22/lawsuits-claim-k-cup-maker-violates-antitrust-laws/8028197/>.

189. *Id.* (mentioning twelve consumer class actions and two lawsuits brought by competitors).

190. Fred Barbash, *Keurig’s K-Cup Screw-up and How It K-pitulated to Angry Consumers*, WASH. POST (May 7, 2015), <https://www.washingtonpost.com/news/morning-mix/wp/2015/05/07/keurigs-k-cup-screw-up-and-how-it-k-pitulated-wednesday-to-angry-consumers/>.

191. *United States v. Microsoft Corp.*, 253 F.3d 34, 64 (D.C. Cir. 2001). Microsoft redesigned its Windows operating systems so that its browser, Explorer, could not be removed through the add/remove program utility. It also commingled Explorer code with Windows code. *Id.* at 64–65.

192. *Id.* at 66–67.

193. See *Allied Orthopedic Appliances Inc. v. Tyco Health Care Grp.*, 592 F.3d 991, 998–99 (9th Cir. 2010).

194. See *id.* at 999–1000 (product improvement by itself does not violate Section 2, even if it is performed by a monopolist and harms competitors as a result);

antitrust law appears to associate the existence of the patent with product improvement even though patents can cover horizontal technology.<sup>195</sup>

If the new design is not an improvement, the analysis follows the more traditional antitrust analysis. Companies with market power can be found liable for redesigning their products to injure competition.<sup>196</sup> But the larger point is that antitrust law treats contractual ties and tech ties somewhat differently. These discrepancies become more pronounced when we move to types of tying that lie in the patent and copyright regimes.

### C. Copyrights and Software

With its decision in *Oracle v. Google*, the Federal Circuit has just opened the door for software developers to try to tie products together using traditional copyright law. The primary issue in the case was whether Oracle could protect critical parts of Java's application programming interfaces ("API") using traditional copyright law.<sup>197</sup> An API is, generally speaking, a software specification that allows programs to communicate with each other.<sup>198</sup>

By the time Google began to create its own Android operating system for mobile devices, Java was already ubiquitous. Google sought to make Android OS Java compatible so that it would be able to run smoothly on the many websites that used Java. While Google wrote its own code to implement Java,<sup>199</sup> Google did copy the declaring code of

---

*In re Apple iPod iTunes Antitrust Litig.*, 796 F. Supp. 2d 1137, 1144 (N.D. Cal. 2011) (stating that when there is a genuine improvement, "the Court may not balance the benefits or worth of [the new design] against its anticompetitive effects"); PHILLIP E. AREEDA & HERBERT HOVENKAMP, *ANTITRUST LAW* ¶ 776a, at 285–86 (3d ed. 2008) ("At the very least, as all courts recognize, product improvement without more is protected and beyond antitrust challenge.").

195. *Allied Orthopedic Appliances*, 592 F.3d at 1000–01 (the existence of a patent covering the "new product design is some evidence that the change is an improvement over previous designs").

196. *Microsoft Corp.*, 253 F.3d at 66–67 (Because Microsoft was unable to justify the design changes, the courts eventually found that Microsoft had violated Section 2 of the Sherman Antitrust Act.); *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1382 (Fed. Cir. 1998) (antitrust liability imposed for redesigning Bioply gun to prevent the use of competing replacement needles).

197. *Id.* at 1361 (specifically, the court focused on the declaring code and structure of the API packages).

198. Seth Rosenblatt, *Court Sides with Oracle over Android in Java Patent Appeal*, CNET (May 9, 2014, 9:39 AM), <http://www.cnet.com/news/court-sides-with-oracle-over-android-in-java-patent-appeal/>.

199. *Oracle*, 750 F.3d at 1360 ("Google spent two and a half years . . . to write from scratch all of the implementing code.").

thirty-seven different Java packages as well as the structure, sequence, and organization of that code.<sup>200</sup> Google justified its actions by saying that it needed to copy those portions of Java to achieve compatibility. For many, Google's arguments seemed well-founded.<sup>201</sup>

To begin with, § 102(b) explicitly limits copyright protection: “[i]n no case does copyright protection . . . extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied” in a protected work.<sup>202</sup> Additionally, numerous earlier decisions had held that copyright protection cannot extend to functional elements.<sup>203</sup>

However, the Federal Circuit rejected these arguments by identifying different ways to achieve the functions at issue. First, the court said that Google could have made its own different declaring code to achieve the same result it had achieved with Android.<sup>204</sup> Second, the court pointed out that Sun Microsystems, the original developer of Java, which was later acquired by Oracle, had different choices when creating Java.<sup>205</sup> Given these different choices, the Federal Circuit reasoned that Oracle was not seeking to protect the underlying idea, just the expressions Java used.<sup>206</sup> While the decision is undoubtedly correct about the different ways to perform the vast majority of Java's functions, there is one function the court ignores, achieving compatibility. Apparently, the Federal Circuit does not believe that achieving compatibility is a recognizable function.

This omission suggests that companies can design their products to require certain software handshaking protocols and then use copyright

---

200. *Id.* at 1350–51.

201. *See, e.g.*, Brief of Amici Curiae Intellectual Property Professors in Support of Grant of Petition, at 2–4, 6, *Google Inc. v. Oracle Am., Inc.* (U.S. Nov. 7, 2014) (No. 14-410).

202. 17 U.S.C. § 102(b) (2012).

203. *Lotus Dev. Corp. v. Borland Int'l, Inc.*, 49 F.3d 807 (1st Cir. 1995), *aff'd by an equally divided Court*, 516 U.S. 233 (1996) (holding that methods of operation embodied in programs are excluded from protection); *Computer Assocs. Int'l, Inc. v. Altai, Inc.*, 982 F.2d 693, 709–10, 715 (2d Cir. 1992) (holding that the functional requirements for achieving interoperability were not protectable by copyright law); *Sega Enters., Ltd. v. Accolade, Inc.*, 977 F.2d 1510, 1522 (9th Cir. 1992) (holding that “the functional requirements for [achieving] compatibility” are aspects of computer programs that “are not protected by copyright” because these interface procedures are excluded from protection under § 102(b)).

204. *Oracle*, 750 F.3d at 1361. Of course, such code would not be Java compatible.

205. *Id.* at 1356, 1361.

206. *Id.* at 1361.

law to protect those protocols.<sup>207</sup> After all, competitors can clearly write different software that performs the same handshaking function, albeit without achieving compatibility. In effect, this allows for a kind of software tie.<sup>208</sup> However, unlike the way antitrust law deals with tying, copyright law will assess the legality of such software ties by either verifying that various ways of handshaking are possible (following *Oracle v. Google*) or declaring that such software covers unprotectable functions (following conflicting precedent from other circuits).<sup>209</sup>

#### D. The DMCA and Anti-Circumvention

Companies like John Deere and General Motors recently attempted to use the Digital Millennium Copyright Act's (DMCA) anti-circumvention provisions to tie products to their tractors and cars. Passed in 1998, the DMCA includes provisions that focus on those who provide technology for overcoming technological protection measures.<sup>210</sup> Specifically, § 1201(a)(1)(A) states, "No person shall circumvent a technological measure that effectively controls access to a work protected under [the Copyright] title."<sup>211</sup> In effect, the statute "bars 'breaking into' any copyrighted work that the copyright owner has purposefully locked up using technology."<sup>212</sup>

To prevent these restrictions from threatening traditionally protected uses,<sup>213</sup> the DMCA contained a number of exemptions.<sup>214</sup> It also required the Librarian of Congress to periodically conduct a rulemaking proceeding to identify further classes of exemptions.<sup>215</sup>

---

207. Pamela Samuelson, *Are APIs Patent or Copyright Subject Matter?*, PATENTLY-O (May 12, 2014), <http://patentlyo.com/patent/2014/05/copyright-subject-matter.html> (suggesting that if "the *Oracle v. Google* case is to be believed, APIs have migrated back into copyright's realm big time").

208. There is precedent for such attempts. In *Sega Enterprises Ltd. v. Accolade, Inc.*, 977 F.2d 1510, 1515 (9th Cir. 1992), *as amended* (Jan. 6, 1993), Sega designed its videogame console so that it would not operate unless the video cartridge contained specific software.

209. *See supra* note 203.

210. Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies, 80 Fed. Reg. 65,944, 95,944 (proposed Oct. 28, 2015) (to be codified at 37 C.F.R. pt. 201).

211. 17 U.S.C. § 1201(a)(1)(A) (2012).

212. Steve P. Calandrillo & Ewa M. Davison, *The Dangers of the Digital Millennium Copyright Act: Much Ado About Nothing?*, 50 WM. & MARY L. REV. 349, 361-62 (2008).

213. For example, the fair use doctrine has long afforded access to copyrighted works for purposes such as "criticism, comment, news reporting, teaching . . . , scholarship, or research." 17 U.S.C. § 107 (2012).

214. § 1201(d)-(j).

215. § 1201(a)(1)(B)-(D).

During the most recent such proceeding, the Electronic Frontier Foundation (“EFF”) proposed an exemption for “Vehicle Software—Diagnosis, Repair, or Modification.”<sup>216</sup> The purpose of such an exemption is to allow owners to freely personalize, modify, or otherwise improve their cars.<sup>217</sup>

John Deere and General Motors, among others, objected to this exemption.<sup>218</sup> John Deere’s comments are fairly representative of the larger industry response. It argued that such an exemption “will make it possible for pirates, third-party software developers, and less innovative competitors to free-ride off the creativity, unique expression and ingenuity of vehicle software designed by leading vehicle manufacturers and their suppliers.”<sup>219</sup> Of course, companies that make complementary products need to circumvent the vehicle’s technological protection measures to make their products compatible with the vehicle’s software. In its reply, EFF identified a number of such complementary products. They include new products for “repair, diagnosis, and modification, such as scan tools that compete with those of the manufacturer, custom dash computers and apps, and tools to reprogram an ECU [engine control unit] to accept an aftermarket part.”<sup>220</sup> In late 2015, the Librarian of Congress issued his decision and adopted an exemption substantially along the lines that the EFF requested.<sup>221</sup> The result is that, for the most part, others may circumvent the technological protection measures that automobile manufacturers use to prevent modifications to their automobile software.

But, while the Librarian of Congress was focused on the narrow question of whether a particular technology protection measure could be

---

216. Exemption to Prohibition on Circumvention of Copyright Protection System for Access Control Technologies, 79 Fed. Reg. 73,856, 73,869 (proposed Dec. 12, 2014) (to be codified at 37 C.F.R. pt. 201).

217. *Id.* at 73,869.

218. Kyle Wiens, *We Can’t Let John Deere Destroy the Very Idea of Ownership*, WIRED (Apr. 21, 2015, 9:00 AM), <http://www.wired.com/2015/04/dmca-ownership-john-deere/> (criticizing the industry response to the proposed Vehicle Software exemption).

219. John Deere, Long Comment Regarding a Proposed Exemption under 17 U.S.C. 1201, at 2, *available at* [http://copyright.gov/1201/2015/comments-032715/class\\_21/John\\_Deere\\_Class21\\_1201\\_2014.pdf](http://copyright.gov/1201/2015/comments-032715/class_21/John_Deere_Class21_1201_2014.pdf).

220. Electronic Frontier Foundation, Comments in the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies Under 17 U.S.C. 1201, at 4, [https://www.eff.org/files/2015/05/21/1201\\_eff\\_reply\\_comment\\_class\\_21.pdf](https://www.eff.org/files/2015/05/21/1201_eff_reply_comment_class_21.pdf); *see also id.* at 12–13 (listing examples).

221. *See* Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies, 80 Fed. Reg. 65,944 (proposed Oct. 28, 2015) (to be codified at 37 C.F.R. pt. 201).

circumvented, the larger question is one of tying. The automobile industry sought to use the DMCA's anti-circumvention provisions to prevent potential competitors from making products that work with their vehicles. If they had succeeded, customers would only be able to buy such products from the original manufacturer (e.g., John Deere itself) or its licensees. Put more concretely, companies like GM were trying to tie complementary goods, like a new exhaust, to the sale of the original car by virtue of the technological protection measures they placed in the original car.<sup>222</sup> The success or failure of these tying attempts depended on whether the exemption was approved.

Approval of an anti-circumvention exemption is based on five factors. They are (1) the availability for use of copyrighted works; (2) the availability for use of works for nonprofit archival, preservation, and educational purposes; (3) the impact that the prohibition on the circumvention of technological measures applied to copyrighted works has on criticism, comment, news reporting, teaching, scholarship, or research; (4) the effect of circumvention of technological measures on the market for or value of copyrighted works; and (5) such other factors as the Librarian considers appropriate.<sup>223</sup>

Of course, these factors are quite different than the ones patent law, antitrust law, and traditional copyright law use to assess the different forms of tying that fall within their respective jurisdictions. But these tactics all seek to accomplish the same result. They seek to force consumers that buy one product to purchase a second complementary product. Now, in general, the legality of a particular tactic should not turn on which legal or technical approach a company uses.

We would expect that antitrust theory is best suited to provide principles to apply across all these forms of tying. But antitrust law suffers from two problems. First, antitrust scholars cannot agree when tying facilitates or harms competition.<sup>224</sup> Second, even if a consensus

---

222. See Electronic Frontier Foundation, Comments in the Matter of Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies Under 17 U.S.C. 1201 app. A, [https://www.eff.org/files/2015/05/21/1201\\_eff\\_reply\\_comment\\_class\\_21.pdf](https://www.eff.org/files/2015/05/21/1201_eff_reply_comment_class_21.pdf) (statement of David Thawley, CEO, Derive Sys. (May 1, 2015)).

223. 17 U.S.C. § 1201(a)(1)(C)(i)-(v) (2012).

224. Decades ago, Bowman introduced the so-called single monopoly theory arguing that tying does not increase monopoly profits. See Bowman, *supra* note 179; see also BORK, *supra* note 179. But more recently, Elhauge has criticized this theory arguing that it depends on restrictive and unwarranted assumptions. See Elhauge, *supra* note 51, at 400. Additionally, others argue that tying also harms innovation in various ways. See, e.g., Christopher R. Leslie, *Patent Tying, Price Discrimination, and Innovation*, 77 ANTITRUST L.J. 811, 825 (2011). Still others have criticized Elhauge's

develops, it's not clear that the law could implement those principles cost-efficiently or effectively. Regardless, this Article does not attempt to step into antitrust law's tying morass. Rather, I merely explain how patent law should address the interface patent problem using patent values.

#### CONCLUSION

By studying the motivations for patenting horizontal innovation, this Article is able to identify two distinct types of values that interface patents possess, compatibility value and innovation value. Using three real-world examples, the Article explains why awarding compatibility value is inconsistent with the goals of the patent system. Accordingly, patent remedies need to change significantly. Specifically, I recommend that courts no longer issue injunctions or award lost profits for necessary interface patents. Instead, they should only award reasonable royalties that are calibrated to the magnitude of the patented invention's contribution while specifically excluding compatibility value.

---

assumptions arguing that in most cases tying does not harm competition. *See* Hovenkamp & Hovenkamp, *supra* note 51, at 928.