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TIME-VARYING COMPULSORY LICENSE: FACILITATING LICENSE NEGOTIATION FOR EFFICIENT POST-VERDICT PATENT INFRINGEMENT

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I. Introduction

In 2006, the Supreme Court initiated a reassessment of the appropriateness of permanent injunctions as a remedy for patent infringement. The Court reiterated that the patent statute leaves the decision of whether to grant permanent injunctions in the equitable discretion of the court.[1] While the statute does give the patentee a right to exclude,[2] the Court explained, "the creation of a right is distinct from the provision of remedies for violations of that right."[3] This point highlights the striking fact that the statute does not provide an alternative remedy for future infringement of adjudicated patents. Of course, the patentee can continue to file future actions to collect damages for future infringement, but this is an inefficient use of party and judicial resources.

***428** To fill this void, trial courts have used their equitable power to craft compulsory licenses that compensate patentees for future infringement in the historically rare cases where the issuance of a permanent injunction was determined to be inappropriate. The royalty rates of compulsory licenses are set to a rate that a court determines to be the fair value of the infringement of the patent. This valuation is a difficult task because patents are inherently unique. Unless the Court sets the rate high enough to make continued infringement unprofitable, this remedy denies the patentee the right to exclude the infringer. Compulsory licensing thus reduces the value of patents and arguably the incentives for innovation.

A permanent injunction is a blunt instrument that has its own drawbacks. The most significant drawback of injunctions is known as the "holdup"[4] problem. In cases where a patent covers a small aspect of an infringing product, an injunction allows

the patentee to appropriate the value of the infringer's product beyond what is attributable to the invention itself unless and until the product can be modified to avoid infringement. This creates a windfall for the patentee and, at least in cases where the infringer was acting in good faith, seems inequitable. The holdup problem has become more significant in recent years as products have tended to become more complex.[5] The holdup problem creates an incentive for unscrupulous patent owners to engage in ethically questionable tactics, such as submarine patenting. The holdup problem also creates liabilities for producers of complex products and arguably slows the dissemination of the fruits of innovation to the public.

In some cases both an injunction and a compulsory license can be unappealing remedies for the reasons described above. Courts should not be constrained to choosing one of these two options. Ideally, a remedy would be crafted to facilitate the negotiation by the parties of a license limited by the true value of the patented invention in all cases where continued infringement is efficient.

One solution is a time-varying compulsory license. Courts could set royalty rates that increase with time according to a schedule set by the court. When the royalty rate gets high enough it acts as an effective injunction by making continued infringement unprofitable. In this way the remedy preserves the patentee's right to exclude after some imprecisely known delay. This delay can be used to allow an infringing product to be redesigned to avoid infringement without costly interruptions in availability. In this way it mitigates the holdup problem. This solution is similar to the granting of a stay on an injunction, but it has some nicer ***429** properties.[6] For example, the stayed injunction discontinuously raises the cost of infringement from a fixed finite value to effectively infinite cost. By contrast, the time-varying compulsory license provides a smooth transition to the exclusion range. This property allows the court a margin of error in setting the delay that makes it more practical than a stayed injunction.

Part II of this Article reviews the eBay case and how federal district courts have ruled on motions for permanent injunctions against patent infringement since the Supreme Court's decision in the case. Part III describes the properties of traditional remedies for prospective patent infringement in more detail. Part IV describes a proposed time-varying compulsory license remedy. The strengths and weaknesses of the remedy are discussed, as applied to particular industries. Part V is a brief conclusion.

II. The Impact of eBay

For the last two centuries U.S. courts have granted permanent injunctions upon a finding of infringement "in the vast majority of patent cases."[7] In the last two decades, the Federal Circuit had formalized this practice with a "general rule" that "a permanent injunction will issue once infringement and validity have been adjudged."[8] But, the Federal Circuit continued to recognize that trial courts had the discretion to deny injunctive relief to protect the public interest. The Federal Circuit explained that "a court may decline to enter an injunction when 'a patentee's failure to practice the patented invention frustrates an important public need for the invention,' such as the need to use an invention to protect public health."[9] This rule limited trial courts' discretion to deny injunctive relief. Limiting discretion created greater consistency and uniformity of patent remedies across the country but caused some harsh results in specific cases.

In eBay v. MercExchange,[10] the Supreme Court struck down the Federal Circuit's general rule favoring injunctive relief for patent infringement. The Court started by examining the statute which says a court "may grant injunctions in accordance with the principles of equity to prevent the violation of any right secured by patent, on such terms as the court deems reasonable."[11] The Court ***430** interpreted this provision to require trial courts to exercise their discretion in granting injunctions by applying the common law's traditional four-factor test for injunctive relief. Under this test,

> [a] plaintiff must demonstrate: (1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction.[12]

The statute also states that a patent grants "the right to exclude others from making, using, offering for sale, or selling the invention."[13] The Court reconciled this provision and the difficulty of protecting a right to exclude through money damages by noting, "the creation of a right is distinct from the provision of remedies for violations of that right."[14] The Court conspicuously declined to comment on what remedies would be appropriate to vindicate the patent right to exclude when injunctions are deemed inequitable.

In the opinion of the Court, Justice Thomas went on to criticize the general rules espoused by both the district court, in denying injunctive relief, and the Federal Circuit, in reversing this denial. In denying injunctive relief, the trial judge stated that "the evidence of the plaintiff's willingness to license its patents [and] its lack of commercial activity in practicing the patents . . . are sufficient to rebut the presumption that it will suffer irreparable harm if an injunction does not issue."[15] Justice Thomas explained that

traditional equitable principles do not permit such broad classifications. For example, some patent holders, such as university researchers or self-made inventors, might reasonably prefer to license their patents, rather than undertake efforts to secure the financing necessary to bring their works to market themselves. Such patent holders may be able to satisfy the traditional four-factor test, and we see no basis for categorically denying them the opportunity to do so. To the extent that the District Court adopted such a categorical rule, then, its analysis cannot be squared with the principles of equity adopted by Congress.[16]

The Court also reaffirmed the holding of Continental Paper Bag Co. v. Eastern Paper Bag Co.,[17] which held that there is no requirement that a patentee use its invention to be entitled to injunctive relief.[18]

***431** In his concurring opinion, Chief Justice Roberts warned trial courts not to stray too far from past practices of granting injunctive relief. Roberts noted that the "long tradition of equity practice"--granting injunctions in most cases of infringement--"is not surprising, given the difficulty of protecting a right to exclude through monetary remedies that allow an infringer to use an invention against the patentee's wishes--a difficulty that often implicates the first two factors of the traditional four-factor test."[19] He said that to "promote the basic principle of justice that like cases should be decided alike," trial courts should not disregard this long tradition of equity practice when applying the four-factor test.[20]

Justice Kennedy's concurrence stated that a departure from past practice may be justified by changing circumstances. He cited three recent developments that may justify denial of injunctive relief in certain cases. The first is an increasing prevalence of non-practicing patentees who seek to profit from their inventions solely through licensing.[21] The second circumstance is where a patent covers only a small component of an infringing product and an injunction gives the patentee "undue leverage in negotiations."[22] The third circumstance is the advent of business method patents, which Justice Kennedy considers particularly prone to "vagueness and suspect validity."[23] Justice Kennedy emphasized that equitable discretion granted by the Patent Act will "allow courts to adapt to rapid technological and legal developments in the patent system."[24]

After eBay, the Federal Circuit is severely constrained in its ability to harmonize the granting of injunctive relief across jurisdictions.[25] The decision by a trial court to grant or deny permanent injunctive relief is subject to review on appeal under the abuse of discretion standard.[26] Since eBay, the Federal Circuit has reviewed four trial court decisions regarding the permanent injunctions in a patent infringement case. All four were remanded because the trial court had granted the injunction without applying the four-factor test required by eBay.[27] A lack of ***432** meaningful review is likely to create an additional incentive for forum shopping in patent cases.

Since eBay, twenty-seven published district court orders have ruled on motions for a permanent injunction following a finding of patent infringement. These cases were studied to assess the effects of eBay on the likelihood of injunctive relief and to test the significance of a few key characteristics of the cases. The results are summarized in Table 1 below.[28] Each of the cases was analyzed and ***433** classified in three dimensions: (1) whether the patentee was practicing his invention, (2) whether the defendant was found to have willfully infringed the patent, and (3) by the type of patent--product, business method, or other method/process. A patentee was determined to be practicing if it was clear from the court's order, the facts of the case, or the patentee's website that he or his licensee(s) practice the invention. Another potential definition that may be more relevant is whether he practices in the same market as the defendant. In some cases the courts make specific findings about competition between the parties during their application of the eBay test. However, in many cases this is not specifically addressed and there is no practical way to determine the extent to which their products actually compete in the same marketplace. For this reason the simpler definition of practice in any market was used. Product patents were any patents that the jury or court had found particular products to infringe. Business method patents are in general more difficult to distinguish from other method patents, simply because the term itself is difficult to define. Decisions between these two categories were made based on facts recited in the case and the author's conception ***434** of the term "business method." In the five method patent cases studied, there happened to be no close calls. Willfulness was simply the jury or the court's finding on the willfulness issue.

Table 1: Injunctions After *eBay*

	Granted	Denied
All Cases - 27	19 - (70%)	8 - (30%)
Practicing Patentee - 23	19 - (83%)	4 - (17%)[29]
Non-Practicing Patentee - 4	0	4 - (100%)
Product Patent - 20	15 - (75%)	5 - (25%)
Business Method Patent - 1	0	1 - (100%)
Other Method/Process Patent - 6	4 - (67%)	2 - (33%)
Willful Infringement - 15	9 - (60%)	6 - (40%)
No Willful Infringement - 12	10 - (83%)	2 - (17%)

Overall it seems that permanent injunctions are still more likely to be granted than denied. But a 30% denial rate is almost certainly higher than before eBay.

An important factor in determining whether an injunction will issue seems to be whether or not the patentee is practicing its invention. Although the number of cases might be too small to confirm a trend, non-practicing patentees seem doomed to denial of injunctive relief. On the other hand, patentees practicing their inventions appear significantly more likely to be granted injunctive relief. However practicing is not a guarantee of injunctive relief. For example, in Praxair, Inc. v. ATMI, Inc., the court found that the patentee manufactured products embodying the invention which were in "direct and head-to-head competition with" the infringing product.[30] Despite this the Court found that Praxair had not met its burden under eBay, explaining that "Praxair has not provided or described any specific sales or market data to assist the court, nor has it identified precisely what market share, revenues, and customers Praxair has lost to ATMI."[31] The Court denied Praxair's motion for a permanent injunction without prejudice to renew. With respect to the other cases in which a practicing patentee was denied a permanent injunction, context is important. In two of these cases, the patents were ***435** practiced by licensees rather than the patentees themselves.[32] In the final case, the practicing patentee that was denied an injunction had a business method patent, which may have been an independent factor contributing to the denial.[33] In light of contextual considerations, it can be concluded that Table 1 understates the trend toward granting injunctive relief to practicing patentees. Note, however, that an injunction was granted in one case where the invention was practiced by a non-exclusive licensee--the licensee was the patentee's subsidiary.[34]

The preliminary trend raises an important question: where did all the patent trolls go? It may be that eBay is encouraging patent trolls to settle, but much more information is needed for a complete assessment. The data seems to show that many district courts are following Justice Kennedy's suggestion that non-practicing patentees may make injunctive relief inequitable.

The sample size on business method patents is too small to draw conclusions at this time, but the single case decided seemed to follow Justice Kennedy's concurrence on this point as well.[35]

Willful infringement slightly decreased the likelihood of injunctive relief. This is a counterintuitive result since a court should typically be less receptive of arguments on the balance of the hardships factor from a willful infringer. Again, the small sample size must temper our inferences from the data. But, the lack of a positive strong correlation between willfulness and the grant of injunctions at least indicates that many courts do not consider willfulness to be significant factor in balancing the equities. This may reflect a low correlation between willfulness, as currently defined, and the perceived culpability of the defendant.

III. Problems with Existing Remedies for Future Infringement

Historically, U.S. patent law has strongly favored permanent injunctions over compulsory licenses as a remedy for prospective infringement of patents.[36] The U.S. Constitution itself authorizes Congress "[t]o promote the Progress of Science ***436** and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries[.]"[37] It is difficult to see how the granting of a compulsory license secures the exclusive right. Compulsory licensing of patents has been used in three narrow cases: for government use pursuant to 28 U.S.C. § 1498(a), to protect compelling public needs such as public health,[38] and as an antitrust remedy.[39] Many other compulsory licensing schemes have been proposed and consistently rejected by Congress.[40] A reason commonly cited for this preference is that the right to exclude from practice of the invention is not effectively protected by money damages alone.[41]

An underlying reason for the aversion to compulsory licenses is that patented inventions are by definition unique.[42] Money damages are generally inadequate to compensate for patent infringement, not in the sense that there is no amount of money that the patentee would exchange the patent right for, but in the sense that there is really no reliable way for a court to determine what amount of money the patentee would freely take. In contrast, the right to fungible goods can be adequately compensated through money damages because the court can readily determine an amount of money that will allow plaintiff to replace her property and be made whole. A patentee with an encumbered patent cannot restore its patent right with the licensing revenues.

Avoiding compulsory licenses preserves our innovation incentive system of distributed decision making with market valuation of inventions. An important feature of the patent system is that it is designed to reward patentees based on the market value of their inventions. Incentives to innovate are naturally aligned with the needs of society. Alternatively, we could assign the task of valuing inventions to centralized authorities. Granting compulsory licenses is a step in this direction. In granting compulsory licenses, trial courts take on the task of assessing fair royalty rates for inventions in the context of infringing products. Courts already do ***437** this for past infringement, but that is unavoidable. In cases of future infringement, the law should spare courts the task of assessing fair value and should instead use markets to determine the value of an invention.

Unfortunately, permanent injunctions are also a suboptimal remedy in many cases. They have come under particularly strong criticism recently. Justice Kennedy's concurrence in eBay outlines some of the chief complaints against the use of permanent injunctions as a remedy for patent infringement. The three problems he identifies are: (1) the abuse of injunctions by non-practicing patentees; (2) the vagueness and suspect validity of business method patents; and (3) the holdup problem with patents on small components of infringing products.

Patentees should not be denied the right to exclude others from practicing their inventions simply because they do not actively practice their inventions. The Supreme Court's majority opinion in eBay specifically ruled that categorical denial of injunctive relief to non-practicing patentees is inappropriate.[43] As Justice Thomas explained, such a categorical rule would unjustly disadvantage some patentees, such as "university researchers or self-made inventors" who are not in a position to commercialize their inventions themselves and prefer to license.[44] But, Justice Kennedy's concurrence argued that the "economic function of the patent holder" should be considered by courts when exercising their discretion to grant injunctive relief.[45] Since eBay, district courts seem to be following Justice Kennedy's suggestion on this point.[46] As a matter of policy, however, the courts should not consider whether a patentee practices her invention as a factor in deciding whether to grant injunctive relief. Such a policy fosters a liquid market for innovation that benefits small inventors and ultimately society at large.

Liability rules in patent law that favor patentees who practice their inventions tend to put small entities at a disadvantage and thus discourage distributed research and development. Existing theories for compensating non-practicing patentees fail to adequately consider the small entity problem. For example, Julie Turner has advocated a theory of "efficient infringement" that compensates non-practicing patentees with compulsory licenses.[47] She analyzes the justification for granting monopolies under four incentive theories: incentive to invent, incentive to disclose, incentive to innovate, and the prospect theory.[48] According to Turner, the first two ***438** justifications don't make sense in the modern era because "the majority of modern inventive activity occurs within large, research-driven corporations."[49] Turner discounts incentive-for-invention theory by focusing on large corporations, where capital-based barriers to entry may adequately protect inventions and thus render patents superfluous, and by ignoring the patent incentives on small inventors.[50] She similarly discounts incentive-to-disclose theory by focusing on large corporations capable of commercializing in-house--an advantage that may allow them to opt for trade secrecy over patent protection.[51] Turner then argues that the incentive-to-invent and prospect theories categorically do

not apply to non-practicing patentees by characterizing non-practicing patentees as irrational holdouts.[52] Turner's analysis ignores the patentee's incentive to strike a bargain to derive licensing revenues. While transaction costs are a real problem, changing to a liability rule will not reduce transaction costs. It simply shifts the parties' negotiation positions in favor of the infringer[53] and might lead to more litigation.[54] Turner admittedly disregards the incentives to invent and to disclose--the result is a system of "efficient infringement" that shifts rewards of innovation from inventors to parties that commercialize inventions. This change will make it harder for small entities such as researchers, independent inventors, and start-ups to profit from their inventions and will reinforce the trend Turner cites toward concentration of R&D in large corporations.

Creating incentives for small entities to invent is a worthy goal of the patent system. All four of the incentive theories for the patent system that Turner identifies have value and the incentives to invent and disclose should not be so lightly thrown aside. A system that incentivizes small entities to invent by tying rewards directly to the acts of invention and disclosure allows for specialization. A system that denies the option for entities to specialize in the early stages of the innovation process will create inefficiencies. McDonough has advanced a theory of "patent dealers," under which even so-called trolls contribute to society by creating a liquid market for ideas that facilitates distributed innovation.[55] One way to foster distributed innovation is to avoid policies that discriminate against patentees based ***439** on whether or not they practice their invention. For this reason, Justice Kennedy's suggested focus on the economic role the patent owner is ill-advised.

Problems that may well exist with business method patents are not properly addressed by weakening enforcement for all patents. Vagueness and suspect validity are problems directly related to other patent law doctrines including the § 112 written description requirement, the § 101 patentable subject matter requirement, and the § 103 nonobviousness requirement.[56] It seems logical that these problems should be addressed at the source. Richard Klar has suggested the problems with business method patents should either be addressed through "the proper standard of review for the grant of a business method by the USPTO" or by Congress creating "another statutory category of protection for certain technologies."[57] Solutions that involve special treatment for business method patents have appeal only if you believe the effects of the reforms can effectively be confined to business method patents. In practice, distinguishing business method from other types of patents can be a nontrivial exercise. For example, the line between software patents and business method patents can be particularly blurry in the Internet services industry. Solutions that discriminate in the protection of patent rights based on "field of technology" may also run afoul of treaty obligations under TRIPS Article 27.1.[58] However, there is precedent for special statutory treatment for business method patents in U.S. law.[59]

Statutory reform to address the special problems presented by business method patents is preferable to judicial discretion to grant equitable relief.[60] A drawback to implementing a bias against business method patents through the equitable discretion of the courts to grant injunctions is that it creates precedent for solving similar doctrinal problems through judicial discretion. This reform mechanism subverts the Federal Circuit's mission to standardize patent law across jurisdictions because it places the doctrinal decisions in the hands of district court judges, subject only to abuse of discretion review. Solving doctrinal problems through equitable discretion of the court is not a good path for patent law reform.

***440** A holdup problem exists when a permanent injunction issues to prevent infringement of a patent covering a small component of an infringing product or service. The power to prevent sales of the entire product places the patentee in a position to appropriate value of the infringing product beyond the value attributable to the invention itself. Lemley and Shapiro have identified and modeled this problem in the context of pre-litigation licensing negotiations.[61] This Article describes the same holdup problem in the context of post-litigation licensing negotiations, occurring after the patent has been determined to be valid and infringed.

The value that a patentee can demand in licensing negotiations is limited by the cost of the infringer's Best Alternative To a Negotiated Agreement, or BATNA.[62] To discuss the costs of the infringer's alternative courses of action, it is useful to start by defining some variables. Let $n \in Z$ be a time index that represents the time elapsed from date of the court's order. Let m be the infringer's marginal profit on each sale of the infringing product or service, and let s[n] be the market demand for the infringing product or service at this price during the nth time period.[63] Let v be the value added to a single instance of the infringing product by the invention relative to the best non-infringing alternative solution.[64] Let C be the total cost of a redesign to the best alternative solution, and let $D \in Z$ be the amount of time required to implement the redesign. Let $L \in Z$ be the remaining life of the patent. And finally let G(x) be a function mapping an interruption of infringing sales of duration x to the less readily measurable and predictable costs of such an interruption, including loss of market share and consumer goodwill.

The cost of the infringer's BATNA in the presence of an immediate permanent injunction will depend on whether there is a

feasible non-infringing alternative design for the infringing product. If such an alternative exists, the cost of the redesign BATNA is given by Eq. 1, if not the cost of the market exit BATNA is given by Eq. 2 below.

Eq. 1: $BATNA = G(D) + C + \Sigma_{[n = 0 \text{ to } D-1]} m\ s[n] + \Sigma_{[n = D \text{ to } L]}\ v\ s[n]$

Eq. 2: $BATNA = G(L) + \Sigma_{[n = 0 \text{ to } L]} m\ s[n]$

A reasonable definition of feasibility is that the quantity in Eq. 1 is less than the quantity in Eq. 2. The above equations assume that there is no existing inventory of the infringing product and therefore all sunk costs the infringer may ***441** have invested in the product are irrelevant to the infringer's prospective strategy. When inventory that still needs to be sold exists, the cost of the infringer's BATNA is further increased because its effective margin on the inventory is the full revenue from those sales.

Even when a feasible non-infringing alternative design exists, the cost of the infringer's BATNA under an injunction can be substantially higher than the value attributable to the patented invention. Most notable from Eq. 1 are the lost profits from sales during the redesign period and the unpredictable costs of the interruption in sales during this period, G(D). These terms can be very large and have little to do with the invention itself, particularly when the invention is a small component of a complex product. In this way, the injunction allows the patentee to extort more value than it is equitably entitled to, at least in cases where the infringer has not acted in bad faith in an attempt to appropriate the invention.

The holdup problem is an artifact of the form of the injunction itself and is properly addressed through remedy reform. The injunction is a blunt instrument that stops all infringing activities regardless of what other sources the value of those activities may have. Ideally a patent infringement remedy would preserve a patentee's right to exclude others from practice of their invention while limiting an innocent infringer's liability to the value directly attributable to infringement of the patent. In cases where the invention is an essential component of the infringing product it is difficult or impossible to achieve this goal. There is arguably still a holdup problem in this case. However, at least the invention is a but-for cause of the product's total value, which makes any holdup problem that exists an inextricable aspect of the design of the patent right rather than an artifact of the remedy. In the case where a non-infringing alternative exists, the invention is not essential. In this case the value of the invention is conceptually separable from the total value of the infringing product. As shown above, even in this case the patentee can use a permanent injunction to extort value from the infringer beyond that attributable to its invention. This scenario creates an opportunity to mitigate the holdup problem in an equitable manner through remedy reform.

IV. A Third Way: Exclusionary License

This section proposes a new remedy designed to balance the hardships between an innocent infringer and a patentee more equitably than injunctions or fixed rate compulsory licenses. It is a tool trial courts can use to assist the parties in settling on fair compensation for continued infringement when that infringement is efficient. The remedy grants the infringer a compulsory license with a royalty rate that increases over time, or a "time-varying compulsory license." The principle is that when the royalty rate gets high enough, continued infringement will become unprofitable and the infringer will be effectively excluded from practicing the invention. Because the time-varying compulsory license is a license that excludes over time, the remedy will subsequently be referred to by the apparently oxymoronic name, "exclusionary license."

*442 A. Principles of Operation and Why It Should Be Used

The exclusionary license vindicates the patentee's right to exclude while mitigating the holdup problem. It is preferable to a fixed rate compulsory license because it allows courts to avoid the business of valuing patent infringement and minimizes the encumbrance on the patent right and associated reduction of incentives to innovate. It is preferable to permanent injunctions because it allows an infringer time to redesign and thus avoids the high, unpredictable, and inequitable costs of a sales interruption. Where a feasible non-infringing redesign exists, the exclusionary license removes the interruption costs from the infringer's best alternative to a negotiated agreement (BATNA). The BATNA is reduced to the sum of three quantities: the cost of implementing the best alternative redesign (C); the cost of continued infringement under the exclusionary license for the duration of the redesign effort (R); and the value of the invention relative to the best alternative accumulated over all sales from the end of redesign effort to the termination the patent (V).[65] In some sense, V is the ideal BATNA for the infringer to have going into negotiations because it represents the value gained by the infringer from using the invention instead of the

best alternative. The exclusionary license will be useful in cases where C + R is substantially less than the collection of costs associated with an immediate cessation of infringement. The extortion or holdup problem is mitigated to the extent of this difference.

The exclusionary license may more closely approximate the ideal BATNA than the simplified analysis above suggests because the ideal BATNA may be higher than V. First, the ideal BATNA should probably include the marginal value of the invention weighted by sales volume during the entire remaining life of the patent and not just after the redesign period. So the R term is only holdup value to the extent it exceeds the true value of the invention during the redesign period. Second, since C is defined as the fixed cost of the redesign to the best alternative it may include a component that is properly assessed against the infringer in valuing the invention relative to the best alternative design. The existence of sunk-cost inventory worsens the BATNA with an immediate injunction more severely than in the case of an exclusionary license, because the infringer has the option to sell off such inventory under the terms of the license and no such option under the injunction. In this way the exclusionary license can significantly mitigate the holdup problem.

Some scholars have suggested the use of stayed injunctions with fixed compulsory licenses in the interim to accomplish the same goal.[66] Indeed, some trial courts have already exercised their equitable discretion to craft such relief in ***443** cases where a transition period was needed to protect public health.[67] The exclusionary license uses the time-varying royalty to ensure exclusion without introducing the discontinuity of the injunction. The exclusionary license is more administrable than a stayed injunction because it is less sensitive to error in the court's evaluation of the required delay and the value of the patent.

The essential feature of the exclusionary license is that the fee increases with time at a fast enough rate to guarantee that infringement will become unprofitable within the life of the patent. The details of the exclusionary license could take countless forms. This Article proposes one form in Eq. 3 below. Here, n is a time index that represents the number of months from date of the court's order; r[n] is the royalty rate applicable during the month starting n months from the order; r_0 is an initial royalty rate that applies in the first month following the order; and T is the number of months it takes for the royalty to double.

Eq. 3: $r[n] = r_0\, 2^{(n/T)}$

With reasonable values of r_0 and T, exclusion is ensured by the exponential growth of r[n].[68] As long as eventual exclusion is ensured, the redesign cost C becomes sunk in the infringer's BATNA. Assuming C is time-invariant, the infringer's optimal strategy is then to initiate redesign as soon as possible if the royalty rate under the license is greater than the value of the invention relative to the best non-infringing alternative (v) and to prolong infringement as long as the royalty rate is lower than v.[69] The holdup value of the license royalty itself is $\Sigma_{[n = 0 \text{ to } D]}(r[n] - v)\, s[n]$. The desire to minimize holdup creates a preference to keep the royalty rates close to v during the redesign period without compromising the other requirements of the exclusive license. The convexity of the proposed license royalty in Eq. 3 helps to achieve this goal and guarantees lower holdup value, for given estimate of m and D (defined below), than a license that grows linearly with time.

***444** The exclusionary license is less sensitive to the courts choice of the initial royalty rate than the stayed injunction. Suppose the break-even royalty rate for continued infringement is m. In the absence of sunk-cost inventory this is the profit margin for the infringing product.[70] Then this exclusionary license will have an effective delay, D', given by Eq. 4 below.

Eq. 4: $D' = T \log_2(m/r_0) = T \log_2(m) - T \log_2(r_0)$

Since the chief goal of the exclusionary license is to eventually exclude, the initial royalty, r_0, can be set to an arbitrary value within a wide range without compromising this objective. This is because the effect of the exclusionary license is not very sensitive to changes in this parameter. As seen from Eq. 4, the effective delay, or exclusion time varies logarithmically with r_0 and the court's estimate of m. Therefore the initial royalty can be set to accomplish secondary goals like assuring at least what the jury or court found to be a reasonable royalty is paid for all infringement. An obvious choice is to set the initial royalty rate to a reasonable royalty, as set for past infringement. In cases where a reasonable royalty has already been set this imposes no additional burden on the court. In cases where lost profits were awarded it imposes a small additional burden. The key point is that the effectiveness of the remedy is insensitive to error in the court's valuation of the patent and the exclusion threshold, an inherently difficult task.

The effectiveness of the exclusionary license is most sensitive to the choice of the time constant of growth or doubling period, T. Given a reasonable value for the initial royalty, setting T is analogous to a court setting the duration of a stay on an

injunction. Ideally, the delay to exclusion is chosen to allow enough time for the infringer to redesign its product to avoid infringement without an interruption in sales, while minimizing the infringer's incentive to delay redesign in order to expropriate value from the invention during the delay. Estimating this delay involves a fact intensive analysis by the court. Court errors in setting the time constant will cost one party or the other money. This Article argues that party outcomes are less sensitive to court errors in setting the delay for the exclusionary license than they are to court errors in setting the duration of a stay for an injunction.

Unlike a stayed injunction, an exclusionary license has the property that the transition to the exclusionary range of the remedy's lifetime is smooth. If the court underestimates the required delay necessary for redesign in its stayed injunction, the infringer will be hit with the high and unpredictable cost of an interruption in practice, including loss of goodwill and market share. If the court overestimates the ***445** required stay and sets a fixed royalty below the value of the invention relative to the best non-infringing alternative (v), then the infringer is allowed to delay redesign efforts until just before the injunction and expropriate value from the patentee. Moreover a longer stay increases the encumbrance on the patent. If the court sets the fixed royalty too high, it is an immediate effective injunction that leaves a significant holdup problem. If the court underestimates the required delay with an exclusionary license, the infringer is still harmed but its harm is the minimum of royalties in excess of its margins for the additional duration or interruption costs of the additional duration. The infringer, who is best situated to evaluate those interruption costs, is empowered to choose. If the court overestimates the required delay, the patentee's harm is infringer delay of the redesign effort during a period where it pays royalties below v. Because the royalty increases quickly the royalty rate is guaranteed to surpass v at some time before the exclusion region is reached. So while a period of infringer delay could exist if r_0 is set below v, its duration will have logarithmic dependence on the error in r_0. For a stayed injunction, the duration of infringer delay will depend in a hit or miss manner on the courts assessment of the fixed royalty. The court has to set a value in the range $v < r_0 < m$ in order to avoid either infringer delay until the end of the stay or holdup. By smoothing the cost of infringement over time, the exclusionary license reduces the sensitivity of party outcomes to court error in evaluating the value of the patent, the exclusion threshold, and the required delay for redesign.

The judicial economy of a compulsory license is comparable to that of the alternative remedies for prospective infringement. The exclusionary license is just a form of compulsory license and thus no more or less costly to administer after the courts order than a fixed-rate compulsory license. Limited post-trial discovery may be required for the court to set the time constant of growth, but scholars have argued that post-trial discovery is also required for the setting of fixed-rate compulsory license terms.[71] The post-order administrative costs may vary for the different injunction schemes if one scheme proves to be more prone to contempt hearings than the other. As a general matter it is not clear which remedy this factor favors. For immediate injunctions, the post-trial, pre-order costs will generally be less than for an exclusionary license because there are no parameters for the court to set. In the case of stayed injunction scheme, these costs will be very similar because of the need for the court to set the length of the stay and the compulsory license during the stay.

More study of the exclusionary license and other tailored remedies is needed. Most notably, the analysis above has ignored the effect of a potential appeal on the strategy of an infringer and its BATNA. The option to appeal cannot make the ***446** infringer's BATNA worse. It could create an incentive for the infringer to delay redesign, which may be beneficial in cases of erroneous district court decisions. In cases of trial court error, the use of a tailored remedy such as the exclusionary license or stay will allow the infringer some time to pursue an appeal without incurring the high costs of a sales interruption.

B. When to Use the Exclusionary License

The first question is when may a court grant an exclusionary license. The short answer seems to be whenever the court wants--with a couple of qualifiers. TRIPS Articles 30 and 31 allow member states to create limited exceptions to patent rights, which would likely authorize compulsory licenses determined in the equitable discretion of the court.[72] A detailed discussion of this point is beyond the scope of this Article. There is also an argument that in cases where a jury demand is made the jury must set the damages for future infringement.[73] Assuming the Seventh Amendment permits, the patent statute states "[u]pon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty. . . . When the damages are not found by a jury, the court shall assess them."[74] This seems to allow a compulsory license, as long as "the infringement" is interpreted to include future infringement. The bottom line is courts have been granting compulsory licenses for many years in rare cases,[75] and since eBay, with increasing frequency.[76] So far granting of compulsory licenses has not been reversed based on a lack of jurisdiction to assess a royalty. A denial of a permanent injunction after eBay could still be reversed under the abuse of discretion standard, but that seems unlikely.

There is a normative question of when should a court grant an exclusionary license. Currently, trial courts are only constrained by the bounds of their equitable discretion under eBay to deny a permanent injunction. The Article will first describe a proposed standard to guide the discretion of the court in selecting a remedy that could be implemented through amendment of the Patent Act. The Article next describes how a court might account for some of the same factors ***447** within the framework of eBay's four-factor test by accounting for the effects of the alternative exclusionary license remedy.

A compelling public need may still call for the granting of a fixed compulsory license to the infringer. Economic hardships to the infringer alone are not sufficient to justify a complete denial of a patentee's right to exclude. An exclusionary license is better suited to balance such economic hardships between the parties. However, in some cases a compelling public need for the invention may make even the risk of a practice interruption caused by market forces or transaction costs unacceptable. This is true when the immediate public need clearly outweighs the long-term cost to the public in the form of reduced incentives to innovate caused by granting an exception to the patent right to exclude.[77] The reduction in incentive to innovate will be minimized if this public need exception is kept narrow and as clearly defined as possible. Congressional guidance of judicial discretion on this point could help further clarify the scope of the exception. A good standard for granting a fixed compulsory license, and one that courts have used in the past, would require the finding of a compelling public need for continued infringement, such as protecting public health or the environment. Whether the patentee practices the invention might be relevant to the analysis of the compelling public need, to the extent that the patentee's ability to fill public demand obviates the need for continued infringement. But, the burden should be placed on the infringer to establish a compelling public need that is beyond the patentee's ability to meet. Outside of this public need exception, the right of the patentee should be vindicated and either and injunction or an exclusionary license should be granted.

Whether a patentee is practicing his invention should not determine whether an exclusionary license or an injunction is used. Some scholars have suggested that the presence of head-to-head competition between a practicing patentee and the infringer should weigh heavily in favor of injunctive relief.[78] However, patentee practice and competition do not relate directly to the applicability of the exclusionary license over an injunction.

First assume that the patentee is practicing and competing with the infringer. If we further assume that the invention is a small non-essential component of the infringing product, then there is still a holdup problem. The infringer and patentee are competing in the market for the product based on a host of features that includes ***448** other inventions and services. An immediate injunction, and the sales interruption that results, will cause a shift in market share from the infringer to the patentee. Again, because the injunction affects the whole product and not just the invention, the patentee will get extra sales and market share beyond what is attributable to its invention. So the patentee still gets a windfall that seems inequitable when the infringer has acted in good faith. If the invention is an essential component then the patentee at least has a colorable argument that she is entitled to the entire market share she they will garner from an injunction.

On the other hand, consider the case where a patentee is not practicing or not competing with the infringer. The patentee is again better off with an injunction than with an exclusionary license, so there should be some justification for denying immediate vindication of the right to exclude. The patent right is undoubtedly encumbered by an exclusionary license; the only question is how much. A lack of patentee practice makes it more difficult to adduce evidence to establish the existence and extent of the harm to the patentee, but the harm is no less real. In cases where the invention is an essential component of the infringing product, the patentee still has a colorable argument that it is entitled to all of the value that the infringer will be denied by an immediate injunction. For the policy reasons described above, it is undesirable to categorically deny property rights to non-practicing patentees.[79]

An exclusionary license should be favored over a permanent injunction when the infringer (1) has acted in good faith and (2) faces a holdup threat that the exclusionary license could mitigate. The burden should be on the patentee to show bad faith by the infringer, while the burden should be on the infringer to establish there is a holdup threat that can be mitigated by the denial of an injunction and the granting of an exclusionary license. Bad faith on the part of the infringer could be grounds for discounting its equitable claim to a balancing of the hardships.[80] The patentee is harmed by the delay of its right to exclude. This is clearly true when the patentee competes in the market with the infringer. It is also true when the patentee has the potential to compete in the market itself or through licensees. Proof that the infringer copied the invention from the patentee would be strong evidence of bad faith.[81] The infringer should have to show that a non-infringing alternative is feasible and that future sales of the non-infringing alternative would be prejudiced by an interruption in its practice of the patent.

***449** However, there is a plausible argument that courts could use an exclusionary license, even in the absence of a

non-infringing alternative design. While the infringer would ultimately still be excluded by the exclusionary license, it would allow the infringer a more graceful exit from the market, including the sale of any inventory. This could mitigate holdup, but at the risk of going to far.

There are two main problems with ordering an exclusionary license in the absence of a non-infringing alternative design. First, the exclusionary license is not serving its primary purpose of facilitating fair settlement by the parties by isolating the value of the invention in the infringer's BATNA. This makes it harder to justify the burden on the patentee's right to exclude imposed by the denial of injunctive relief, especially considering the patentee has an argument that all of the product value is attributable to its invention since it is essential. Second, there is no reasonable basis for setting T. Courts would have to set T to some arbitrary value rather than basing it on a reasonable redesign time. One advantage of requiring a showing that a non-infringing alternative is feasible is that it can limit the impact of this change to cases and industries where it makes the most sense, thus making the change to the patent law more incremental. While it may ultimately be optimal to do away with injunctions against good faith infringers or eliminate them altogether, an incremental approach to reform seems more prudent.

The pharmaceutical industry is unlikely to be affected much by the proposed remedy reform. Patents on drugs tend to be difficult to design around without incurring the high costs associated with regulatory approval.[82] Non-infringing alternative drugs are less likely to be feasible, and therefore, the exclusionary license will generally not be applied in the pharmaceutical industry. The existing balance in this industry will be largely preserved.

Today a trial court could use some of these principles within the context of the four-factor test for injunctive relief. Considering an exclusionary license as an alternative remedy will allow the court to deny a permanent injunction in some cases where it otherwise would have granted an injunction if granting a fixed-rate compulsory license is the only alternative. First, an exclusionary license more directly addresses the second and third factors from the traditional test. Second, an exclusionary license is a form of monetary damages that is more likely to adequately compensate the patentee for its injury than a compulsory license. And, while not as absolute as an immediate injunction, the exclusionary license does ***450** vindicate the patentee's right to exclude--albeit with some imprecisely known, but likely small, delay. Finally, granting an exclusionary license also affects the balance of the hardships between the parties. It reduces the encumbrance on the patent right and thus the hardship of the patentee, making denial of an injunction more likely.

The exclusionary license alternative will only affect the analysis under the four-factor test to the extent that it is a viable alternative remedy in the particular case. Therefore the court will naturally have to consider whether there is a feasible non-infringing alternative and whether future sales of the non-infringing alternative will be prejudiced by an interruption in practice of the invention caused by an injunction. Bad faith by the infringer could similarly affect the four-factor analysis by discounting the hardships of the infringer in the balancing of the hardships factor.

C. Application to the Information Technology Industry

Holdup problems are particularly common in the information technology industry.[83] Cumulative innovation and complex products with many components characterize the industry. And so, it is interesting to consider the application of the exclusionary license in this industry.

Redesign costs, C, for complex products can be significantly higher than initial design costs. This phenomenon has two primary causes. The first is the network of dependencies that develop over time between different components of a complex product. A change in a small component could require changes of other, conceptually independent components in the product that were designed based on an explicit or implicit assumption that the invention was practiced in the product. The second cause is the need for system level testing as part of the quality assurance process for complex products. The need for system testing makes incorporation of small changes outside of the schedule for major product releases inefficient.

Existing incentives for modular design create conditions that minimize redesign cost C, which tends to make exclusionary licenses more effective. "Modularity is a mechanism to coordinate the work of many people around the world, manage interdependencies between their parts of the project, and assemble very complex systems in a reasonably reliable way."[84] Modular design allows development work to be more easily segmented and distributed to smaller groups that can operate on different schedules. Thus globalization is a driver for the use of modular design. By reducing the interdependencies between components in ***451** complex products, modular design also reduces the cost of releasing new versions and product

maintenance more generally. As information technology products become more complex the natural incentives for modular design increase. The increasing prevalence of modular design tends to reduce the costs of redesign, which decreases an infringer's BATNA to levels more closely approximating V, the value of the invention in the context of the infringing product.

Courts can examine release cycle history of an infringer to estimate the appropriate time constant, T. A redesign effort will often be significantly less expensive, and therefore is more likely to be feasible, if the release of the non-infringing version coincides with the release of other features in the infringing product. When setting T, courts may therefore find it useful to examine the infringer's proposed release schedule from company literature or its history of product release dates.

Interoperability standards create challenges for the exclusionary license approach. Standards make previously non-essential features essential, limiting the applicability and efficacy of the exclusionary license. The problem only arises if the patent reads directly on features required for interoperability. Some patents that claim relevance to standards cover particular implementations of the standard, but are not actually essential because alternative compatible implementations exist. Stockwell identified the problem with interoperability standards and suggested that using fixed compulsory licenses is a more efficient policy when a patent reads on a standard.[85] This seems fair when the patentee was a party to the standardization process, but inequitable in cases where the patentee is not a party and had no control over the use of their technology.

V. Conclusion

Choosing remedies for future infringement is an important challenge district courts are facing since eBay. The exclusionary license is a tool courts can use to leverage private information by facilitating a settlement by the parties to a value closely approximating the true value of continued infringement. When a non-infringing redesign is feasible, an exclusionary license can vindicate the patentee's right to exclude while significantly mitigating the holdup problem. Furthermore, an exclusionary license is preferred to a stayed injunction because it is more administrable in that it is less susceptible to unjust outcomes arising from court errors in valuations and estimation of redesign times.

Footnotes

a1 Eric Keller is an associate at Fish & Richardson P.C. He received his J.D. from Stanford Law School in 2007 and has bachelors and masters degrees in electrical engineering. He would like to thank Phoebe Chan for her understanding and support.

1 eBay, Inc. v. MercExchange, L.L.C. (eBay III), 547 U.S. 388, 391 (2006).

2 See 35 U.S.C. §271 (2000).

3 eBay III, 547 U.S. at 392.

4 Mark A. Lemley & Carl Shapiro, Patent Holdup and Royalty Stacking, 85 Tex. L. Rev. 1991 (2007).

5 See id. at 1992.

6 Lemley and Shapiro suggest the use of stayed injunctions to mitigate the holdup problem. Id. at 2035.

7 eBay III, 547 U.S. 388, 395 (2006) (Roberts, C.J., concurring).

8 See id. at 395 (quoting MercExchange, L.L.C. v. eBay, Inc. (eBay II), 401 F.3d 1323, 1338 (Fed. Cir. 2005), vacated and remanded, 547 U.S. 388 (2006)).

[9] eBay II, 401 F.3d at 1338 (quoting Rite-Hite Corp. v. Kelley, Inc., 56 F.3d 1538, 1547 (Fed. Cir. 1995)).

[10] eBay III, 547 U.S. 388 (2006).

[11] Id. at 392 (quoting 35 U.S.C. §283) (emphasis added).

[12] Id. at 391.

[13] 35 U.S.C. §154(a)(1) (2000).

[14] eBay III, 547 U.S. at 392.

[15] MercExchange, L.L.C. v. eBay, Inc. (eBay I), 275 F. Supp. 2d 695, 712 (E.D. Va. 2003), aff'd in part, rev'd in part, 401 F.3d 1323 (Fed Cir. 2005), vacated and remanded, 547 U.S. 388 (2006).

[16] eBay III, 547 U.S. 388, 393 (2006).

[17] Cont'l Paper Bag Co. v. E. Paper Bag Co., 210 U.S. 405 (1908).

[18] eBay III, 547 U.S. at 393.

[19] Id. at 395 (Roberts, C.J., concurring) (internal citations omitted).

[20] Id. (internal quotations omitted).

[21] Id. at 396 (Kennedy, J. concurring).

[22] eBay III, 547 U.S. 388, 396-97 (2006) (Kennedy, J. concurring).

[23] Id. at 397.

[24] Id.

[25] See Yixin H. Tang, The Future of Patent Enforcement After eBay v. MercExchange, 20 Harv. J.L. & Tech. 235, 243-44 (2006).

[26] See eBay III, 547 U.S. at 391.

[27] See e.g., Monsanto Co. v. Scruggs, 459 F.3d 1328, 1342 (Fed. Cir. 2006) (vacating a district court's order granting an injunction, which issued before the Supreme Court's ruling in eBay. The case was remanded for reconsideration in light of eBay.).

[28] The cases ruling on motions for permanent injunctions as of September 15, 2007 are cited below. For each case the classifications made are listed as a comment.
Finisar Corp. v. DirecTV Group, Inc., No. 1:05-CV-264, 2006 WL 2709206 (E.D. Tex. Sept. 1, 2006), vacated, No. 2007-1023, 2008 WL 1757675 (Fed. Cir. Apr. 18, 2008) (Injunction Denied, Non-Practicing Patentee, Method, Willful Infringer);
z4 Tech., Inc. v. Microsoft Corp., 434 F. Supp. 2d 437 (E.D. Tex. 2006) (Injunction Denied, Non-Practicing Patentee, Product, Willful Infringer);
Wald v. Mudhopper Oilfield Servs., Inc., No. 1:05-CIV-04-1693-C, 2006 WL 2128851 (W.D. Okla. July 27, 2006) (Injunction Granted, Practicing Patentee, Product, Willful Infringer);
Telequip Corp. v. Change Exch., No. 5:01-CV-1748, 2006 WL 2385425 (N.D.N.Y. Aug. 15, 2006) (Injunction Granted, Practicing Patentee, Product, Willful Infringer);
Paice L.L.C. v. Toyota Motor Corp., No. 2:04-CV-211-DF, 2006 WL 2385139 (E.D. Tex. Aug. 16, 2006), aff'd in part, rev'd in part, 504 F.3d 1293 (Fed. Cir. 2007) (Injunction Denied, Non-Practicing Patentee, Product, Willful Infringer);
Tivo, Inc. v. Echostar Commc'ns Corp., 446 F. Supp. 2d 664 (E.D. Tex. 2006), aff'd in part, rev'd in part, 516 F.3d 1290 (Fed. Cir. 2008) (Injunction Granted, Practicing Patentee, Product, Willful Infringer);
FLOE Int'l, Inc. v. Newmans' Mfg., Inc., No. 0:04-CV-5120, 2006 WL 2472112 (D. Minn. Aug. 23, 2006) (Injunction Granted, Practicing Patentee, Product, Willful Infringer);
Voda v. Cordis Corp., No. CIV-03-1352-L, 2006 WL 2570614 (W.D. Okla. Sept. 5, 2006) (Injunction Denied, Practicing Patentee, Product, Willful Infringer);
3M Innovative Props. Co. v. Avery Dennison Corp., No. 0:01-CV-1781, 2006 WL2735499 (D. Minn. Sept. 25, 2006) (Injunction Granted, Practicing Patentee, Product, Not Willful Infringer);
Smith & Nephew, Inc. v. Synthes (U.S.A.), 466 F. Supp. 2d 978 (W.D. Tenn. 2006) (Injunction Granted, Practicing Patentee, Product, Not Willful Infringer);
Rosco, Inc. v. Mirror Lite Co., No. 1:96-CV-5658, 2006 WL 2844400 (E.D.N.Y. Sept. 29, 2006) (Injunction Granted, Practicing Patentee, Product, Not Willful Infringer);
Black & Decker, Inc. v. Robert Bosch Tool Corp., No. 1:04-CV-7955, 2006 WL 3446144 (N.D. Ill. Nov. 29, 2006) (Injunction Granted, Practicing Patentee, Product, Willful Infringer);
Transocean Offshore Deepwater Drilling, Inc. v. GlobalSantaFe Corp., No. 0:03-CV-2910, 2006 WL 3813778 (S.D. Tex. Dec. 27, 2006) (Injunction Granted, Practicing Patentee, Method, Not Willful Infringer);
Visto Corp. v. Seven Networks, Inc., No. 2:03-CV-333, 2006 WL 3741891 (E.D. Tex. Dec. 19, 2006) (Injunction Granted, Practicing Patentee, Method, Willful Infringer);
Sundance, Inc. v. Demonte Fabricating Ltd., No. 2:02-CV-73543, 2007 WL 37742 (E.D. Mich. Jan. 4, 2007) (Injunction Denied, Practicing Patentee, Product, Not Willful Infringer);
IMX, Inc. v. LendingTree, L.L.C., 469 F. Supp. 2d 203 (D. Del. 2007) (Injunction Denied, Practicing Patentee, Business Method, Willful Infringer);
MPT, Inc. v. Marathon Labels, Inc., 505 F. Supp. 2d 401 (N.D. Ohio 2007), aff'd in part, rev'd in part, 258 Fed. App'x 318 (Fed. Cir. 2007) (Injunction Granted, Practicing Patentee, Method, Not Willful Infringer);
Novozymes A/S v. Genencor Int'l, Inc., 474 F. Supp. 2d 592 (D. Del. 2007) (Injunction Granted, Practicing Patentee, Product, Willful Infringer);
Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc., No. 0:04-CV-1689, 2007 WL 869545 (D.N.J. Mar. 20, 2007), aff'd, 520 F.3d 1358 (Fed. Cir. 2008) (Injunction Granted, Practicing Patentee, Product, Not Willful Infringer);
Praxair, Inc., v. ATMI, Inc., 479 F. Supp. 2d 440 (D. Del. 2007) (Injunction Denied, Practicing Patentee, Product, Not Willful Infringer);
O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co., No. 2:04-CV-32, 2007 WL 869576 (E.D. Tex. Mar. 21, 2007), vacated, 521 F.3d 1351 (Fed. Cir. 2008) (Injunction Granted, Practicing Patentee, Product, Willful Infringer);
800 Adept Inc. v. Murex Sec., Ltd., 505 F. Supp. 2d 1327 (M.D. Fl. 2007) (Injunction Granted, Practicing Patentee, Method, Not Willful Infringer);
MGM Well Servs., Inc. v. Mega Lift Sys., L.L.C., 505 F. Supp. 2d 359 (S.D. Tex. 2007), aff'd, No. 2007-1367, 2008 WL 450454 (Fed. Cir. Feb. 19, 2008) (Injunction Granted, Practicing Patentee, Product, Not Willful Infringer);
Brooktrout, Inc. v. Eicon Networks Corp., No. 2:03-CV-00059, 2007 WL 1730112 (E.D. Tex. June 14, 2007) (Injunction Granted, Practicing Patentee, Product, Not Willful Infringer);
Sanofi-Synthelabo v. Apotex Inc., 492 F. Supp. 2d 353 (S.D.N.Y. 2007) (Injunction Granted, Practicing Patentee, Product, Not Willful Infringer);
MercExchange, L.L.C. v. eBay, Inc., 500 F. Supp. 2d 556 (E.D. Va. 2007) (Injunction Denied, Non-Practicing Patentee, Method, Willful Infringer);
Johns Hopkins Univ. v. Datascope Corp., 513 F. Supp. 2d 578 (D. Md. 2007) (Injunction Granted, Practicing Patentee, Product, Not Willful Infringer).

[29] Note: Two of the patentees classified as practicing that were denied an injunction were not themselves practicing. One had an exclusive licensee who was practicing and the other had multiple non-exclusive licensees in competition with the defendant. See infra note 32.

[30] Praxair, Inc., v. ATMI, Inc., 479 F. Supp. 2d 440, 442 (D. Del. 2007).

[31] Id. at 444.

[32] See Sundance, Inc. v. Demonte Fabricating Ltd., No. 2:02-CV-73543, 2007 WL 37742, at *2 (E.D. Mich. Jan. 4, 2007) (finding no irreparable harm despite the fact that defendant competes directly with plaintiffs licensees); Voda v. Cordis Corp., No. CIV-03-1352-L, 2006 WL 2570614, at *5 (W.D. Okla. Sept. 5, 2006) (holding that harm to plaintiff's exclusive licensee not relevant to four-factor test because licensee "elected not to sue").

[33] See IMX, Inc. v. LendingTree, L.L.C., 469 F. Supp. 2d 203, 207 (D. Del. 2007) (questioning how directly a business method patentee's practicing website competes with the infringing website).

[34] See Novozymes A/S v. Genencor Int'l, Inc., 474 F. Supp. 2d 592, 612-13 (D. Del. 2007) (concluding that, because Novozymes licensed to its subsidiary, it would have expected an increase in that subsidiary's value in addition to royalty profits and that these circumstances proved irreparable harm and inadequacy of legal remedies).

[35] See IMX, 469 F. Supp. 2d 203.

[36] Mitchell G. Stockwell, Implementing eBay: New Problems in Guiding Judicial Discretion and Enforcing Patent Rights, 88 J. Pat. & Trademark Off. Soc'y 747, 756 (2006).

[37] U.S. Const. art. I, §8, cl. 8 (emphasis added).

[38] See, e.g., Rite-Hite Corp. v. Kelley, Inc., 56 F.3d 1538, 1547 (Fed. Cir. 1995) ("If a patentee's failure to practice a patented invention frustrates an important public need for the invention, a court need not enjoin infringement of the patent."); Vitamin Technologists, Inc. v. Wis. Alumni Research Found., 146 F.2d 941, 944 (9th Cir. 1945); Milwaukee v. Activated Sludge, Inc., 69 F.2d 577, 593 (7th Cir. 1934).

[39] Leslie T. Grab, Equitable Concerns of eBay v. MercExchange: Did the Supreme Court Successfully Balance Patent Protection Against Patent Trolls?, 8 N.C.J.L. & Tech. 81, 105-06 (2006).

[40] Stockwell, supra note 36, at 756 and n. 46.

[41] See, e.g., eBay III, 547 U.S. 388, 394 (2006) (Roberts, C.J., concurring).

[42] Cf. Sedmak v. Charlie's Chevrolet, Inc., 622 S.W.2d 694, 699-700 (Mo. App. 1981) (granting equitable relief in a contract dispute over a unique collector car that could not be readily replaced on open market); Randy E. Barnett, Contracts: Cases and Doctrine 183 (3d ed. 2003); U.C.C. §2-716(1) (2003) ("Specific performance may be decreed if the goods are unique.").

[43] eBay III, 547 U.S. at 393.

[44] Id.

[45] Id. at 396 (Kennedy, J., concurring) (arguing that injunctive relief may be inappropriate for non-practicing patentees).

[46] See supra notes 29-35 and accompanying text.

[47] Julie S. Turner, The Nonmanufacturing Patent Owner: Toward a Theory of Efficient Infringement, 86 Cal. L. Rev. 179 (1998).

[48] Id. at 186-96.

[49] Id. at 196.

[50] Id. at 186-89.

[51] Id. at 189-91.

[52] Id. at 186, 193, 195.

[53] Robert M. M. Seto, A Federal Judge's View of the Most Important Changes in Patent Law in Half-a-Century, 11 J. tech. L. & Pol'y 141, 161 (2006).

[54] Tang, supra note 25, at 249-50 (arguing compulsory licensing significantly benefits large corporations and reduces their incentives to take a license from small entities); see also Raymond P. Niro et al., The Patent Troll Myth, 7 Sedona Conf. J. 153, 157 (2006).

[55] James F. McDonough, The Myth of the Patent Troll: An Alternative View of the Function of Patent Dealers in an Idea Economy, 56 Emory L.J. 189 (2006).

[56] See 35 U.S.C. §§101, 103(a), 112 (2000 & Supp. 2005).

[57] Richard B. Klar, eBay Inc. v. MercExchange, L.L.C.: The Right to Exclude under U.S. Patent Law and the Public Interest, 88 J. Pat. & Trademark Off. Soc'y 852, 858 (2006).

[58] Agreement on Trade-Related Aspects of Intellectual Property Rights art. 27(1), Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, Legal Instruments?Results of the Uruguay Round, 33 I.L.M. 81, 93 (1994) [hereinafter TRIPS Agreement] ("Patent rights shall be enjoyable without discrimination as to the place of invention, the field of technology, and ....").

[59] See 35 U.S.C. §273 (creating intervening user rights against business method patents).

[60] But cf. eBay III, 547 U.S. 388, 395 (2006) (Kennedy, J., concurring) (suggesting judicial discretion to grant equitable relief is well suited to allow courts to adapt to technological and legal developments).

[61] See generally Lemley & Shapiro, supra note 4.

[62] See Lemley & Shapiro, supra note 4, at 1995-96.

[63] For simplicity, it is assumed that the infringer sets one price that does not change in real terms even in response to changing circumstances, including the outcome the licensing negotiations.

[64] Note that v could be negative in cases where, for instance, a superior alternative design has been subsequently developed but not yet implemented.

[65] In terms of the variables introduced in Part III, $V = \Sigma_{[n = D \text{ to } L]} v\, s[n]$.

[66] See Lemley & Shapiro, supra note 4, at 2036; Stockwell, supra note 36, at 755.

[67] See, e.g., Schneider (Europe) AG v. SciMed Life Sys., Inc., 852 F.Supp. 813, 861-62 (D. Minn. 1994), aff'd, 60 F.3d 839 (Fed. Cir. 1995) (staying the permanent injunction for one year and giving infringer a compulsory license with escalating royalties during that term).

[68] This Article ignores edge effects that could arise in cases were the patent would expire before a reasonable redesign period will elapse. If the required redesign period is longer than a couple years, the alternative design is arguably not feasible. If the remaining life of the patent is less than a couple years, there is an interesting problem that merits further study. These cases are expected to be rare.

[69] To be more precise,
$BATNA = C + R + V \rightarrow BATNA = C + \Sigma_{[n=0 \text{ to } D-1]} (r[n]\, s[n]) + \Sigma >_{[n=D \text{ to } L]} (v\, s[n])$
where s[n] is the market volume of infringement in the nth month, D is the duration of the redesign effort in months, and L is the life the patent in months. The infringer can prolong infringement beyond the minimum redesign time. The infringer minimizes the cost of its BATNA by choosing D as close as possible to satisfying r[D] = v.

[70] For simplicity, the following analysis, comparing exclusionary licenses to stayed injunctions, will assume no inventory exists. While existence of inventory will affect the BATNA of the infringer and its rational actions, it is posited that the effect will be similar in both the case of exclusionary license and a stayed injunction.

[71] See Howard Susser & Jerry Cohen, Supreme Court Ends Special Treatment for Patent Injunctions, Boston B.J., Nov.-Dec. 2006, at 11; Stockwell, supra note 36, at 760.

[72] See TRIPS Agreement, supra note 59, arts. 30-31; Paul Goldstein, International Intellectual Property Law: Cases and Materials 380-84 (2001).

[73] See U.S. Const. amend. VII; Stockwell, supra note 36, at 759.

[74] 35 U.S.C. §284 (2000).

[75] See, e.g., Rite-Hite Corp. v. Kelley, Inc., 56 F.3d 1538, 1547 (Fed. Cir. 1995); Vitamin Technologists, Inc. v. Wis. Alumni Research Found., 146 F.2d 941, 944 (9th Cir. 1945); Milwaukee v. Activated Sludge, Inc., 69 F.2d 577, 593 (7th Cir. 1934).

[76] See, e.g., z4 Tech., Inc. v. Microsoft Corp., 434 F. Supp. 2d 437 (E.D. Tex. 2006); Finisar Corp. v. DirecTV Group, No. 1:05-CV-264, 2006 WL 2037617 (E.D. Tex. July 7, 2006), vacated, No. 2007-1023, 2008 WL 1757675 (Fed. Cir. Apr. 18, 2008).

[77] Public need exceptions to the patent right have historically been made in cases where interrupting the infringer's production of the patented invention would create a threat to public health or the environment. See, e.g., Rite-Hite Corp. v. Kelley, Inc., 56 F.3d 1538, 1547 (Fed. Cir. 1995); Vitamin Technologists, Inc. v. Wis. Alumni Research Found., 146 F.2d 941, 944 (9th Cir. 1945);

Milwaukee v. Activated Sludge, Inc., 69 F.2d 577, 593 (7th Cir. 1934).

78 See, e.g., Stockwell, supra note 36, at 752 ("[H]ead-to-head competition between patentee an infringer should tilt strongly in favor of an injunction because the patent owner's loss of sales and market position would be difficult to correctly value and compensate."); see also Lemley & Shapiro, supra note 4, at 2036.

79 See supra notes 43-56 and accompanying text.

80 See Stockwell, supra note 36, at 751 ("[P]olicies that aim to protect innocent defendants and allow them 'to show undue harm from strict legal enforcement are not present' in the case of willful conduct.") (quoting Epstein Family P'ship v. KMART Corp., 13 F.3d 762, 769-70 (3d Cir. 1994)).

81 See Lemley & Shapiro, supra note 4, at 2036-37 (arguing that independent development of the invention, as opposed to copying, should be a prerequisite of a denial of injunctive relief).

82 See Andrew J. Paprocki, Cardiac Pacemakers, Inc. v. St. Jude Medical, Inc.: Can Patent Term Extension of the Hatch-Waxman Act Be Used as Leverage in Drug Patent Infringement Settlements?, 46 Jurimetrics J. 471, 487 n. 142 (2006) ("Drugs patents are typically not as easy to design around. The exact nature of the chemical composition and its biological interaction can make it difficult for an equivalent competing product to be devised that does not infringe the patent."); see also William E. Ridgway, Realizing Two-Tiered Innovation Policy Through Drug Regulation, 58 Stanford L. Rev. 1221, 1238-39 (2006) (arguing that the Hatch-Waxman Act doesn't go far enough to remove regulatory barriers to drug design-around).

83 See Lemley & Shapiro, supra note 4, at 2009.

84 Jaroslav Tulach et al., Rich Client Programming: Plugging into the NetBeans Platform §2.3, at 13 (2007).

85 Stockwell, supra note 36, at 757.