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Removing the Troll from the Thicket: The Case for Enhancing Patent Maintenance Fees in Relation to the Size of a Patent Owner's Patent Portfolio

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REMOVING THE TROLL FROM THE THICKET: THE CASE FOR ENHANCING PATENT MAINTENANCE FEES IN RELATION TO THE SIZE OF A PATENT OWNER'S PATENT PORTFOLIO

David S. Olson[*]

Abstract

This Article proposes a novel solution to part of the problem that large patent portfolios can cause. Both so-called "patent trolls" and firms that commercialize the patents that they own can accumulate and then abuse large patent portfolios, even if most of the patents in the portfolio are of little value. Instead of suggesting reforms to better determine the value and boundaries of individual patents, as many others have already done, this Article proposes that the U.S. Patent and Trademark Office (PTO) multiply the amount owed to keep a patent in force (patent maintenance fees) based on the size of a patent holder's overall patent portfolio. Patent owners themselves will primarily benefit from this reform, as they will have an incentive to determine the value of their patents and to let lapse those patents that are of low value. A second benefit is that it will require patent owners to disclose their practiced and non-practiced patents. The reform proposed in this Article helps alleviate problems in software and high-technology patenting without significant negative effect in other industries, such as pharmaceuticals or biotechnology. It is simple, and the PTO can easily adopt it, or Congress can enact it.

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INTRODUCTION

The legal literature is replete with discussions of the problems that large patent portfolios cause. While non-practicing entities, or "trolls," suing in the software and high-tech industries generate the strongest complaints, large patent portfolios can cause competition and gridlock problems even when held by active industry participants. Many of these problems arise because patent boundaries and validity are often uncertain. Moreover, because patent holders need not register assignments of patents and because trolls often use multiple shell companies, it is difficult to know who owns which patent or how many patents a particular entity owns. Thus, not only must innovators and firms worry about the size of patent portfolios in the hands of their competitors and trolls, they must also be willing to spend substantial time and effort determining potential liability. And even with those efforts, they still may not be able to know all of the potential patent liability they may face and from whom.

A standard economic approach to dealing with unwanted behavior is to try to raise the price of the objectionable behavior. One option for cost-based deterrence comes from the authority granted to the Patent and Trademark Office (PTO) by the 2011 America Invents Act (AIA), which gave the PTO the power to set patent examination and maintenance fees.[1] Pursuant to this authority, the PTO has increased patent maintenance fees required to keep patents in force by up to fifty-four percent for large entities.[2] While these fee increases should encourage some patent owners to allow their patent rights to lapse if they view the patent to be worth less than the fee, more could be done to discourage large patent portfolios.

Now that the PTO has the power to set fees, this Article proposes another adjustment of patent maintenance fees to further discourage excessively large patent portfolios. If adopted, this proposal will reduce problems associated with the abusive use of patent portfolios without significantly reducing incentives to innovate and to disseminate that innovation. This proposal also avoids the problems of other recent patent reform proposals that failed because of strong disagreement among participants in different industries caused by patent law's differing effect

1. *See* Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 10, 125 Stat. 284, 316 (2011). Prior to the AIA, Congress set fees directly in the patent statute at 35 U.S.C. § 41. Section 41 allowed the Director of the PTO to adjust the fees each year after 1992 to account for inflation. 35 U.S.C. § 41(f) (2012).

2. U.S. PATENT & TRADEMARK OFFICE, USPTO SECTION 10 FEE SETTING: TABLE OF PATENT FEE CHANGES 2, http://www.uspto.gov/sites/default/files/aia_implementation/AC54_Final_Table_of_Patent_Fee_Changes.pdf (last visited Oct. 20, 2016). The fee is $1600 at 3.5 years (a 39% increase), $3600 at 7.5 years (a 24% increase), and $7400 at 11.5 years (a 54% increase). *Id.*

on each type of industry. The reform proposed in this Article alleviates problems in software and high-technology patenting without causing significant negative effects in other industries, such as pharmaceuticals or biotechnology. The reform is simple, and the PTO can adopt it or Congress can enact it.

This Article proposes that the PTO or Congress increase maintenance fees according to a sliding scale tied to the number of non-practiced patents a patent owner has in its portfolio. Thus, as the size of a firm's patent portfolio increases, so too does the maintenance fee multiplier charged for all its patents, beginning with the second maintenance fee due date. All patents with common ownership interests would be aggregated in determining the fee enhancement. Because the enhanced fees do not kick in until 7.5 years after issuance, incentives to invent and to disseminate inventions will not be significantly reduced.[3] This proposal will encourage large patent portfolio holders to pare down their holdings by determining which of their older patents are not practiced and are not worth maintaining. This will benefit competitors and new inventors who are currently subject to hold-up problems from large portfolios—many of which are caused by old, low-value patents held *en masse*.

One advantage of this Article's proposal is that non-practicing entities will generally be charged higher maintenance fees than other firms that have the same number of patents but commercialize many of them. By narrowly targeting non-practiced patents, the proposal both raises the costs for non-practicing entities to hold numerous patents and encourages active industry participants to prune their portfolios of non-practiced, low-value patents.

A separate but equally important aspect of this Article's proposal is that, to determine whether maintenance fee enhancements are due, patent owners will need to disclose and identify their practiced and non-practiced patents. This disclosure will be very advantageous to the patent system because there is currently a great deal of opacity and uncertainty as to two important types of patent data: (1) who owns which patents, and (2) whether particular patents are being practiced, and by what products or processes. Because determining patent boundaries is notoriously challenging in some instances, there may be difficulties in determining whether particular patents are being practiced. Moreover, each firm will have an incentive to overstate the number of practiced patents to receive a lower fee enhancement. Nevertheless, simply requiring the firms to go on record about their ownership and the alleged coverage of their patents will be enormously helpful in litigation involving patents and in addressing patent hold-up problems.

3. *See id.*

I. CONTEMPORARY PROBLEMS IN PATENT LAW

The grant of a patent is the grant of a right to exclude others from making, using, or selling one's patented invention.[4] Patent law exists to provide incentives to create and disseminate innovation[5] by overcoming the public goods problem[6] that can occur when it is cheaper to copy an innovation than it was for the inventor to invent it.[7] Patent law also provides incentives to disseminate and commercialize innovation even when it is costly to do so and allows competitors to enter the market at a lower cost once the innovator has created the market.[8]

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4. 35 U.S.C. § 271.

5. *See* Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 146 (1989) ("The Patent Clause itself reflects a balance between the need to encourage innovation and the avoidance of monopolies which stifle competition without any concomitant advance in the 'Progress of Science and useful Arts.'"); Brenner v. Manson, 383 U.S. 519, 533 (1966) ("It is true, of course, that one of the purposes of the patent system is to encourage dissemination of information concerning discoveries and inventions."); Alan Devlin, *Revisiting the Presumption of Patent Validity*, 37 SW. U. L. REV. 323, 362 (2008) ("At its heart, patent law seeks to spur the creation and ultimate dissemination of valuable information."); Katherine A. Helm, Note, *Outsourcing the Fire of Genius: The Effects of Patent Infringement Jurisprudence on Pharmaceutical Drug Development*, 17 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 153, 160 (2006) ("An unresolved tension exists between the two purposes of the U.S. patent system: to disseminate information to the public on one hand and to reward innovation on the other."). The purpose behind patent law is set forth in the Constitution. U.S. CONST. art. I, § 8, cl. 8 ("To 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"). Numerous casebooks also discuss that patent law exists to promote these aims. *See, e.g.*, DONALD S. CHISUM ET AL., PRINCIPLES OF PATENT LAW 1 (3d ed. 2004) (explaining that patent law "offer[s] a potential financial reward as an inducement to invent, to disclose, or to invest"); CRAIG ALLEN NARD, THE LAW OF PATENTS 2 (2008) (explaining that patent law can appear as a system that "offer[s] a potential financial reward as an inducement to invent, to disclose technical information").

6. *See* David S. Olson, *Taking the Utilitarian Basis for Patent Law Seriously: The Case for Restricting Patentable Subject Matter*, 82 TEMP. L. REV. 181, 196 n.52 (2009) ("Public goods are characterized by non-rivalry in consumption . . . . Consumption of information is non-rivalrous because one person's use does not diminish the ability of another to benefit from the information. . . . The policy implication of characterizing a good as a public good is that private markets may not efficiently allocate and encourage the production of public goods. Copyright and patent laws are ways of addressing these market failures." (quoting David W. Barnes, *Trademark Externalities*, 20 YALE J.L. & TECH. 1, 4 (2007) (citations omitted))).

7. CHISUM ET AL., *supra* note 5, at 65 (explaining the theory that in a competitive market, a competitor who charges a price that does not include the cost of inventing will always undersell an inventor).

8. *See* Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 MINN. L. REV. 697, 707–10 (2001) (explaining that first movers—initial group to make investments in bringing a product to the market—bear various costs that second movers—market participants who enter subsequently—do not share in bearing and thus the patent system can appear as an incentive for first movers to bear these costs and commercialize a product that may otherwise not reach the consumer); Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 357 (2010) ("The reward theory . . . justifies patents as necessary to induce the invention and

In this way, patents should encourage invention and dissemination of new products and services.[9] The cost of this increased innovation is the grant of the patent monopoly, which lasts for twenty years from the time of filing.[10] Accordingly, for new inventions that achieve commercial success[11] and for which unpatented substitutes are not available,[12] the patent owner can engage in some level of monopoly pricing for the period of the patent. This tradeoff is assumed to be beneficial to society because a new invention available at a monopoly price is better than no invention at all.[13]

Patents can, however, have social costs beyond monopoly pricing. There is significant literature detailing the ways that excessive numbers of patents in an area, combined with difficulties determining patent boundaries, can delay innovation and commercialization of new

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disclosure of new and non-obvious knowledge, which inventors would otherwise be reluctant to do in the fear that others may free ride off their efforts.").

9. *See* John F. Duffy, *Rethinking Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 439–40 (2004) ("Traditionally, the economic rationale for granting intellectual property rights in innovations has been that the rights provide an incentive or reward for the sizeable investments needed to create the intellectual property disclosed in the patent document. Because such rewards exist, firms have an incentive to generate the valuable intellectual property that otherwise could be easily appropriated by competitors. Implicitly or explicitly, such reward theories embrace backward-looking justifications for awarding rights: The patent serves to protect the investments in innovation made prior to patenting." (citation omitted)); Sichelman, *supra* note 8, at 357.

10. 35 U.S.C. § 154 (2012).

11. The vast majority of patented inventions never achieve commercial success. In a 2005 article, Richard Maulsby, the Director of Public Affairs for the PTO, stated that "[t]here are around 1.5 million patents in effect and in force in this country, and of those, maybe 3,000 are commercially viable." *Avoiding the Inventor's Lament*, BLOOMBERG BUSINESSWEEK (Nov. 9, 2005), http://www.businessweek.com/stories/2005-11-09/avoiding-the-inventors-lament [https://web.archive.org/web/20150407203716/http://www.bloomberg.com/bw/stories/2005-11-09/avoiding-the-inventors-lament].

12. If the patent is for a novel and nonobvious invention that has readily available substitutes, then the patent may give the patent owner the right to exclude others from making, using, or selling her patented invention, but may give no pricing power over the invention. *See* Ill. Tool Works Inc. v. Indep. Ink, Inc., 547 U.S. 28, 45 (2006) (holding that "a patent does not necessarily confer market power upon the patentee"). This is quite common. For instance, an inventor may invent a new water pump that is not of particularly greater efficiency than those already available on the market. In this case, the patent will not give the patent owner the ability to raise prices for his water pump because consumers would simply buy a different, lower-priced pump. If the patent covers an invention for which the only substitute is another patented invention, then above-market monopoly (if the same investor patents the substitute), duopoly, or oligopoly pricing may still be achieved. *See* Rite-Hite Corp. v. Kelley Co., 56 F.3d 1538, 1548–49 (Fed. Cir. 1995) (finding the defendant liable for lost sales of a device not covered by the patent in the suit to afford the plaintiff full compensation for infringement).

13. Obviously it would be better yet if the invention was made and no monopoly grant was necessary to incentivize the invention. In this case, society would suffer no deadweight loss from patent monopoly. *See* Olson, *supra* note 6.

inventions.[14] The term that has developed to describe this problem is "patent thicket"—the idea being that just as a thicket can delay and thwart one's physical progress, a large collection of patents can delay and thwart innovation in a field.[15] Literature also exists disputing the costs and prevalence of patent thickets,[16] with some scholars going so far as to

14. *See, e.g.*, JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK 68–71 (2008) (explaining that because of large numbers of broad patents, inventors face high search costs in addition to high transaction costs for rights to clear those patents); DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT (2009) (noting that in the information technology sector, multiple patents cover a new product and that uncertainty in what a patent covers has led to costs on innovation from holdup, royalty stacking, and litigation); Adam B. Jaffe & Josh Lerner, *Innovation and Its Discontents*, *in* 6 INNOVATION POLICY AND THE ECONOMY 27, 29 (Adam B. Jaffe, Josh Lerner & Scott Stern eds., 2006) (describing how increasing numbers of patent and changes in patent policy making it easier to enforce patents have increased the cost of creating new products); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting*, *in* 1 INNOVATION POLICY AND THE ECONOMY 119, 120 (Adam B. Jaffe, Josh Lerner & Scott Stern eds., 2001) (discussing how payment of royalties to multiple blocking patent holders stifles innovation); Ian Ayres & Gideon Parchomovsky, *Tradable Patent Rights*, 60 STAN. L. REV. 863, 869–76 (2007) (explaining that in fields such as computer software, the Internet, semiconductors, nanotechnology, and biotechnology where innovation is cumulative, inventors must pay both information costs and negotiation costs to avoid potential infringement suits); Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698, 698–99 (1998), http://www.sciencemag.org/content/280/5364/698.full.pdf (explaining that multiple or overlapping patents restrict inventors in biomedical research).

15. Professor Carl Shapiro defined the term patent thicket as "a dense web of overlapping intellectual property rights that a company must hack its way through in order to actually commercialize new technology." Shapiro, *supra* note 14, at 120. *See also* Ayres & Parchomovsky, *supra* note 14, at 869–76 (2007) (arguing that the high costs of patent thickets chill innovation); Linda J. Demaine & Aaron Xavier Fellmeth, *Reinventing the Double Helix: A Novel and Nonobvious Reconceptualization of the Biotechnology Patent*, 55 STAN. L. REV. 303, 421 (2002) ("The natural progression of a patent system that grants monopolies on different components of a unified, functioning organism is a thicket of patents that can be disentangled, if at all, only with a very substantial investment of time and money for transaction costs and litigation.").

16. *See, e.g.*, Robin Feldman & Kris Nelson, *Open Source, Open Access, and Open Transfer: Market Approaches to Research Bottlenecks*, 7 NW. J. TECH, & INTELL. PROP. 14, 16 (2008) ("Using voluntary surveys, the authors conclude that research is not impeded in the majority of cases because patent holders can cope through strategies including inventing around patented technology, obtaining licenses, or simply ignoring the existence of patent rights with the expectation that patent holders will not come after them."); Ronald J. Mann, *Do Patents Facilitate Financing in the Software Industry?*, 83 TEX. L. REV. 961, 1004–07 (2005) (arguing that the presence of patent thickets does not deter innovation in the software and technology industry); John P. Walsh, Charlene Cho & Wesley M. Cohen, *View from the Bench: Patents and Material Transfers*, 309 SCIENCE 2002, 2002–03 (2005), http://www.sciencemag.org/content/309/5743/2002.full.pdf (finding little empirical evidence from a study of biomedical researchers that the growing number of patents and restricted access to intellectual property has impeded research efforts).

dispute that they actually exist in a meaningfully harmful way.[17] Rather than wading into this academic thicket, this Article assumes that the weight of the evidence suggests that patent thickets do exist in some areas, at least to the extent that they create significant transaction and holdup costs for firms in certain industries, such as software and high technology. This Article seeks to alleviate that problem.

Worries that some industries may be so crowded with patents as to deter innovation and competition have recurred over the years. For instance, Professor Adam Mossoff details the fierce patent war fought over sewing machines in the 1850s.[18] The large number of patents on sewing machine technology resulted in real delays in the production and marketing of sewing machines.[19] Only the formation of a large-scale patent-pooling arrangement resolved the problem in 1856.[20] Mossoff suggests that a study of the sewing machine patent war shows that competitors can find private-ordering solutions to patent thickets in an industry without the need for government intervention or changes to patent law.[21] It is important to note, however, that Mossoff's research shows that there was about a decade of retarded innovation during the sewing machine patent war before a private solution was attained.[22]

Mossoff's argument in favor of private-ordering solutions is complementary to a piece of conventional wisdom about how competitors hold and use patents.[23] According to this conventional wisdom, large patent portfolios held by competitors in an industry should not be concerning because competitors hold these large patent portfolios

17. *See, e.g.*, David E. Adelman & Kathryn L. DeAngelis, Symposium, *Patent Metrics: The Mismeasure of Innovation in the Biotech Patent Debate*, 85 TEX. L. REV. 1677, 1729 (2007) (concluding from an empirical study of biotechnology patents that increased biotechnology patenting has not stifled innovation); Mann, *supra* note 16, at 1028–29 (finding that there is no patent thicket in software because research and development spending has not been stifled, and interviews conducted with small firms indicate that the industry is not concerned with a thicket).

18. Adam Mossoff, *The Rise and Fall of the First American Patent Thicket: The Sewing Machine War of the 1850s*, 53 ARIZ. L. REV. 165, 168 (2011).

19. *Id.* at 190–91, 194.

20. *Id.* at 196.

21. *Id.* at 209 ("Moreover, there was no Patent Reform Act of 1856 that prompted the formation of the Sewing Machine Combination by eliminating Howe's ability to obtain injunctions, limiting his royalty payments, or imposing restraints on his or other patentees' commercialization rights. The Sewing Machine Combination was initiated by private actors for their private benefit—within the governing rules of a property system that provided strong protection to the owners of the patented technology. This suggests that it is possible for private-ordering solutions to be formed in the face of patent thickets, and that it is unnecessary to eliminate or 'creatively adapt[] property rights' secured to inventors by the patent system." (internal citation omitted)).

22. *See id.* at 176–78, 194.

23. *See id.* at 200–01.

defensively and use them as deterrents to prevent other competitors from suing.[24] This narrative is analogous to the mutual assured destruction (MAD) theory of nuclear weapons during the Cold War: no company has to worry about patent infringement because if two competitors with large portfolios were to sue each other, it would result in mutually assured destruction of their economic interests.[25] Thus, according to this narrative, competitors do not use patents to exclude competitors with large portfolios nor do they use them to slow innovation or impose transaction costs on other competitors.[26] Nevertheless, as Mossoff's research shows, sometimes major competitors do engage in full-scale patent wars that delay progress.[27] And one does not have to look back 160 years for an example of major competitors with massive patent portfolios going to war. The modern smartphone patent litigation war provides a sobering example.[28]

A. *Large Portfolios of Non-practiced Patents Can Be Problematic*

Note that even under the MAD narrative, large patent portfolios may harm new competitors who lack substantial portfolios of their own. A large company with many patents can afford a protracted lawsuit, while a new start-up may not have the resources to defend a suit. In this way, established competitors with large portfolios can use their portfolios to bludgeon start-ups into submission or even bankruptcy.[29] Whether such behavior is detrimental to society depends on whether the start-ups were innovating or simply copying existing firms. If the threat from established firms with large portfolios deterred the start-ups from engaging in

24. *See id.*

25. John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435, 468–69 (2004) (describing that under "'mutually assured destruction' . . . very few companies actually sue for patent infringement because they know that, if they do, their opponents will also be able to sue them for patent infringement"); *see* James Bessen & Michael J. Meurer, *Lessons for Patent Policy from Empirical Research on Patent Litigation*, 9 LEWIS & CLARK L. REV. 1, 14–15 (2005); James F. McDonough III, Comment, *The Myth of the Patent Troll: An Alternative View of the Function of Patent Dealers in an Idea Economy*, 56 EMORY L.J. 189, 203 (2006) ("Patent portfolios are being used defensively in efforts to . . . create leverage in infringement lawsuits.").

26. Of course, in the MAD scenario, while patents are doing no harm, they are also not doing much good. They are not being used to exclude others and thus are not providing monopoly-pricing incentives.

27. Mossoff, *supra* note 18, at 190–91.

28. See, for example, Apple Computer, Inc.'s judgment against Samsung's smartphones for over $1 billion. *See, e.g.*, Joanna Stern, *Apple v. Samsung: What Verdict Means for You and the Tech Industry*, ABC NEWS (Aug. 27, 2012), http://abcnews.go.com/Technology/apple-samsung-verdict-tech-industry/story?id=17087657#.UEKdqkKeDNs.

29. *See* Mark R. Patterson, *When Is Property Intellectual? The Leveraging Problem*, 73 S. CAL. L. REV. 1133, 1140–41 (2000) (detailing a typical leveraging scenario); Ted Sichelman, *The Vonage Trilogy: A Case Study in "Patent Bullying,"* 90 NOTRE DAME L. REV. 543, 549–50 (2014).

innovation, then such lawsuits are detrimental. On the other hand, if the start-ups were simply copying and competing, then having to wait for valid patents to expire may not be as worrisome. Rather, the patent system would be working as intended, with the portfolio protecting the innovation incentive for new creators.[30] If, however, the patents were not needed to spur innovation, then such lawsuits (and the patents themselves) are problematic because they provide established firms monopoly power, with a monopoly's corresponding deadweight loss, without providing any offsetting benefits to society in the form of new innovation.[31] This would be counterproductive given that the entire reason for a patent system is to incentivize the creation or dissemination of innovation.[32]

Reality is a bit more complicated than the standard narrative. First, while established competitors do hold many patents that they never enforce in court or even license, for most companies such "dormant" patents represent just a portion of their portfolios.[33] In fact, firms often license patents.[34] And while the amount of litigation among established competitors can be quite low for periods of time, patent battles do flare up even among established competitors. Current examples of this include

30. *See* Dariush Keyhani, *Patent Law in the Global Economy: A Modest Proposal for U.S. Patent Law and Infringement Without Borders*, 54 VILL. L. REV. 291, 300 (2009) (stating that though a significant debate exists regarding whether patents are advancing their objectives as intended, patent law does provide incentives for innovation, which increases domestic commercialization and innovation).

31. *Id.* ("[T]he patent holder's quid pro quo for disclosure is a market advantage in the form of a legal monopoly for a limited time to commercialize the subject matter of the invention within the United States.").

32. Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 150–51 (1989) ("The federal patent system thus embodies a carefully crafted bargain for encouraging the creation and disclosure of new, useful, and nonobvious advances in technology and design in return for the exclusive right to practice the invention for a period of years."); King Instruments Corp. v. Perego, 65 F.3d 941, 950 (Fed. Cir. 1995) ("Thus, the Patent Act creates an incentive for innovation."); Keyhani, *supra* note 30, at 293 ("It is important to note the operative language of the Act, 'within the U.S.,' reflects the intent and purpose of the law: that the law provides incentive for innovation within the U.S. territory, the territory in which the U.S. patentee (anyone who owns a U.S. patent) is entitled to a commercial market advantage for the life of the patent as a quid pro quo for the public disclosure of the invention.").

33. *See generally* MICHAEL MILGATE, TRANSFORMING CORPORATE PERFORMANCE: MEASURING AND MANAGING THE DRIVERS OF BUSINESS SUCCESS 299 (2004) (finding that the patent portfolio has been rationalized due to the business costs involved in maintaining them and the dormant or poor quality of the patents).

34. ADAM B. JAFFE & JOSH LERNER, INNOVATION AND ITS DISCONTENTS: HOW OUR BROKEN PATENT SYSTEM IS ENDANGERING INNOVATION AND PROGRESS, AND WHAT TO DO ABOUT IT 59 (2004) ("But innovation does proceed. It is facilitated by the widespread practice of broad 'cross-licensing' agreements among the major companies.").

lawsuits involving patents on liquid crystal displays (LCDs)[35] and smartphones.[36] A number of mobile-phone makers are currently involved in vigorous litigation over smartphone patents.[37] But while some argue that the smartphone litigation war appears much like a patent thicket,[38] others note that the widespread litigation has not stopped the innovation and distribution of mobile phones; instead, it is quite robust.[39] Indeed, given the large amount of innovation in smartphones,[40] it is not surprising

35. *See, e.g.*, Apeldyn Corp. v. AU Optronics Corp., 831 F. Supp. 2d 817 (D. Del. 2011); Semiconductor Energy Lab. Co. v. Samsung Elecs. Co., 711 F. Supp. 2d 913 (W.D. Wis. 2010); LG Display Co. v. AU Optronics Corp., 686 F. Supp. 2d 429 (D. Del. 2010); Honeywell Int'l, Inc. v. Nikon Corp., 589 F. Supp. 2d 433 (D. Del. 2008); Semiconductor Energy Lab. Co. v. Chi Mei Optoelectronics Corp., 485 F. Supp. 2d 1089 (N.D. Cal. 2007).

36. *See, e.g.*, Oracle Am., Inc. v. Google Inc., 750 F.3d 1339 (Fed. Cir. 2014); Apple Inc. v. Samsung Elecs. Co., 881 F. Supp. 2d 1132 (N.D. Cal. 2012); Complaint and Jury Claim at 3, Eastman Kodak Co. v. Apple Inc., 6:12-cv-06020-MAT (W.D.N.Y. Jan. 10, 2012); Complaint and Jury Claim at 3, Eastman Kodak Co. v. High Tech Comput. Corp., 6:12-cv-06021 (W.D.N.Y. Jan. 10, 2012); Apple Inc. v. High Tech Comput. Corp., Nos. 10-166-GMS, 10-167-GMS, 2011 WL 124446 (D. Del. Jan. 14, 2011); Complaint for Patent Infringement and Declaratory Judgment at 1, Nokia Corp. v. Apple Inc., No. 09CV00791 (D. Del. Oct. 22, 2009); Research in Motion Ltd. v. Motorola, Inc., 644 F. Supp. 2d 788 (N.D. Tex. 2008).

37. Apple Inc. v. Samsung Elecs. Co., 786 F.3d 983, 989–90 (Fed. Cir. 2015) (Apple won over a $1 billion patent infringement judgment against Samsung for Samsung's Galaxy line of smartphones as well as Galaxy Tab computer tablet's infringement of seven utility patents and three design patents relating to Apple's iPhone and iPad); Complaint for Patent Infringement at 4, Apple Inc. v. High Tech Comput. Corp., No. 1:10-cv-00167-UNA (D. Del. Mar. 2, 2010) (Apple filed a complaint against High Tech Computer (HTC) alleging that HTC infringed on various patents covering software and hardware in smartphones); Complaint for Patent Infringement and Declaratory Judgment, *supra* note 36, at 24 (Nokia filed a complaint against Apple alleging that Apple's iPhone line of products infringed on numerous patents in wireless data, speech coding, and security and encryption technologies held by Nokia).

38. Mike Masnick, *Wired Takes on the Smartphone Patent Thicket and How It Stifles Innovation*, TECHDIRT (May 13, 2010), http://www.techdirt.com/articles/20100513/0936579414.shtml; Simon Waterfall, *Investigation: Apple vs Nokia vs Google vs HTC vs RIM*, WIRED (May 12, 2010), http://www.wired.co.uk/magazine/archive/2010/06/start/investigation-apple-vs-nokia-vs-google-vs-htc-vs-rim.

39. *See, e.g.*, Kenneth Lustig, *No, the Patent System Is Not Broken*, FORBES: LEADERSHIP FORUM (Feb. 9, 2012, 11:25 AM), http://www.forbes.com/sites/forbesleadershipforum/2012/02/09/no-the-patent-system-is-not-broken/ (explaining that every technological innovation is accompanied by patent litigation and that the amount of smartphone litigation is "actually less than one-fifth the number suits filed during the first 'Telephone Wars' of Alexander Graham Bell's time"); David Zax, *What Smartphone Makers Can Learn from the Sewing Machine Patent War*, WALL ST. J.: DIGITS (Oct. 28, 2010, 8:00 AM), http://blogs.wsj.com/digits/2010/10/28/why-is-a-smartphone-like-a-sewing-machine/ ("Mossoff . . . notes that despite the litigation, the smartphone market isn't caught in a patent thicket yet, with production and marketing [of smartphones] held up indefinitely as happened with the sewing machine.").

40. Jeffrey Paul Jarosch, *Reassessing Tying Arrangements at the End of AT&T's iPhone Exclusivity*, 2011 COLUM. BUS. L. REV. 297, 340 (2011) (finding a "recent explosion in the number of smartphones on the market and the number of tasks and activities that consumers perform with these devices"); Steve Lohr, *Computers That See You and Keep Watch over You*, N.Y. TIMES (Jan.

that innovators would seek to enforce their patents either to protect their devices or to receive royalty compensation for their inventions. A well-functioning patent system with substantial innovation and patenting should produce substantial patent licensing.

B. *Necessary Conditions for a Well-Functioning Patent System Even in the Situation of Large Patent Portfolios*

Despite active licensing, several features of the patent system contribute to the harmful effects that can arise from large patent portfolios. It is important to keep in mind that large patent portfolios are not themselves a problem; they can be consistent with a well-functioning innovation system, so long as three conditions are met: (1) patents are issued only where the incentives to innovate or disseminate innovation outweigh the deadweight loss from any patent monopoly pricing,[41] (2) patent boundaries are clear,[42] and (3) transaction costs are reasonably low.[43] If such conditions are present, the Coase Theorem indicates that parties in a relevant market should be able to efficiently negotiate property rights and interests, even in industries very crowded with patents.[44]

1, 2011), http://www.nytimes.com/2011/01/02/science/02see.html (describing smartphone innovations). Using statistics in patenting as a measure of smartphone innovation indicates a great deal of innovation. The number of mobile-related patents granted by the PTO increased by 390% over the last decade. CHETAN SHARMA, MOBILE PATENTS LANDSCAPE: AN IN-DEPTH QUANTITATIVE ANALYSIS 5 (2012). The percentage of all patents that are mobile-related patents has increased from about 2% in 1991, to 5% in 2001, and to 21% in the first quarter of 2012. *Id.* Simply looking at the changes in technology used in smartphones is indicative of much innovation. The first smartphone was the IBM Simon Personal Communicator, released in 1994, which had a touchscreen and included features such as e-mail, calculator, clock, and a game called Scramble. Ira Sager, *Before IPhone and Android Came Simon, the First Smartphone*, BUSINESSWEEK (June 29, 2012), http://www.businessweek.com/articles/2012-06-29/before-iphone-and-android-came-simon-the-first-smartphone#p1. Today, there are numerous smartphones with different operating systems manufactured by competing companies. Smartphone users can now watch streaming video, check their bank accounts, listen to music, etc. Trends in patenting related to smartphones are also indicative of innovation.

41. Olson, *supra* note 6, 192–93.

42. *Id.* at 236, 236 n.246.

43. *Id.* at 201, 228.

44. *See* R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 34, 43 (1960). To some extent, the high technology industry seems to be an example of this. Thousands of patents can cover complex silicon chips, yet negotiations of patent rights get done and evermore complex chips get produced. *Cf.* Tyler Thorp, Comment, *Testing the Limits of Patent Exhaustion's "Authorized Sale" Requirement Using Current High-Tech Licensing Practices*, 50 SANTA CLARA L. REV. 1017, 1035 (2010) ("To overcome the existence of patent thickets and promote design freedom, high-tech companies should have flexibility in negotiating for patent peace without fear of triggering patent exhaustion.").

1. Failure of Condition One: The Patent's Benefits of Innovation Do Not Outweigh the Costs of a Patent Monopoly

Substantial literature demonstrates current breakdowns of each of the three conditions for a well-functioning patent system. First, in many cases, patents seem to be issued even when they are not needed to incentivize adequate levels of innovation.[45] Business method patents provide a prime example. While thousands of business method patents are issued every year, there is serious doubt that the promise of a patent is needed to prompt companies to innovate their business methods.[46] After all, for the most part, competition is sufficient to spur companies to continually improve their business methods.[47] Also, new methods of doing business generally do not involve the research and development

45. Maayan Perel, *Reviving the Gatekeeping Function: Optimizing the Exclusion Potential of Subject Matter Eligibility*, 23 ALB. L.J. SCI. & TECH. 237 (2013); Stefania Fusco, *The Patentability of Financial Methods: The Market Participants' Perspectives*, 45 LOY. L.A. L. REV. 1, 32 (2011) ("[T]he present investigation shows that after *State Street*, patent protection did not appear to have produced additional innovations within the financial industry. The obvious consequence of this finding is that the Federal Circuit was right in deciding *In re Bilski* because in the past ten years, proprietary rights have been granted on financial knowledge, but society has not received anything meaningful in return.").

46. *See, e.g.*, Megan M. La Belle and Heidi Mandanis Schooner, *Big Banks and Business Method Patents*; 16 U. PA. J. BUS. L. 431 (2014); Rinaldo Del Gallo, III, *Are "Methods of Doing Business" Finally out of Business as a Statutory Rejection?*, 38 IDEA 403, 404 (1998) ("Further, the business method exception is of dubious analytic value."); Rochelle Cooper Dreyfuss, *Are Business Method Patents Bad for Business?*, 16 SANTA CLARA COMPUTER & HIGH TECH. L.J. 263, 274–77 (2000) (arguing that the costs imposed by business methods patents outweigh the benefits); John F. Duffy, *Why Business Method Patents?*, 63 STAN. L. REV. 1247, 1252 (2011) (examining why business method patents arose and acknowledging, though disagreeing with, the view that an activist legal system brought patents into a new field where they were unnecessary); Fusco, *supra* note 45, at 32 (noting that society has not received "anything meaningful in return" for proprietary rights granted on financial knowledge); Olson, *supra* note 6 (arguing that some subject matter should not be patentable because the cost exceeds the benefit, with a particular look at business methods); Leo J. Raskind, *The* State Street Bank *Decision: The Bad Business of Unlimited Patent Protection for Methods of Doing Business*, 10 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 61, 64 (1999) ("[T]he economic analysis of patent protection does not support the extension of patent protection to methods of doing business."); Chad King, Note, *Abort, Retry, Fail: Protection for Software-Related Inventions in the Wake of* State Street Bank & Trust Co. v. Signature Financial Group, Inc., 85 CORNELL L. REV. 1118, 1143 (2000) ("Scholars have criticized the business method exception for a variety of reasons. First, courts have never properly defined the term 'business method.' Furthermore, the analytic value of the exception is suspect." (footnotes omitted)).

47. Fusco, *supra* note 45, at 17–18 ("Furthermore, when asked about the factors that specifically drove their companies to innovate, these study participants reported that the main factor was the need to satisfy clients' demands and generate profits. Other answers pointed more generically to the search for opportunities to increase investment returns, build a profile, and search for ways to get around regulations and competition." (footnotes omitted)).

costs that patents attempt to defray.[48] Additionally, it is in society's interest for competitors to copy business methods.[49] Finally, the monopoly costs of business method patents can be particularly high because allowing one competitor to control a better, more efficient, or cheaper way of doing business prevents all competitors from providing what may be a wide range of goods and services at the lowest price by utilizing the efficient method.[50]

It is not enough to argue that the promise of a patent may provide incentive for development. For example, a fifty-year patent term would surely provide greater incentives to innovate than our patent system's current twenty-year term. Similarly, patents surely provide additional incentives for companies to innovate with regard to their business methods. But if the goal is to optimize the benefit to society, the question is not whether a patent will provide additional incentive; it is whether the innovation would have been created in the absence of that additional incentive. If the answer is yes, then granting the additional patent protection is a mistake.[51] Many scholars have applied this analysis and concluded that patents for business methods impose a net cost on society.[52]

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48. *See, e.g.*, Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1618 (2003) (explaining that "[b]ecause new business methods do not generally require substantial investment in R&D, the prospect of even a modest supracompetitive reward will provide sufficient incentive to innovate"); Michael A. Carrier, *Unraveling the Patent-Antitrust Paradox*, 150 U. PA. L. REV. 761, 826 (2002) (noting that internet business method patents, such as Amazon's "one-click" patent, are "usually simple ideas easily conceived" and therefore do not necessitate patent protection); Olson, *supra* note 6, at 231 (explaining that while developing a new drug has large research and development and Food and Drug Administration approval costs, business methods typically do not have such costs and are instead "developed in the normal course of business").

49. Olson, *supra* note 6, at 233 ("[B]usiness methods are among those things that we most want firms to be able to copy. The very basis of efficient markets is the ability of firms to see an economically profitable business opportunity and move into that market so as to drive economic profits down until all deadweight loss is squeezed out of the market and producer and consumer surplus is maximized . . . .").

50. *Id.* at 234 ("When a firm is issued a patent on a product, its rivals cannot produce that product unless licensed to do so. When a firm is granted a patent on a method of doing business, however, it can prevent its rivals from using the more efficient method, and make the costs of *all* of its rivals' goods relatively more expensive, thus driving up deadweight loss across an industry instead of merely for a particular product.").

51. Professor Robert Merges notes that some of those supporting business method patents tend to forget that a balance is necessary rather than maximized incentive alone. *See* Robert P. Merges, *As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform*, 14 BERKELEY TECH. L.J. 577, 581 (1999).

52. *See, e.g.*, Burk & Lemley, *supra* note 48, at 1618–19 ("[C]ompanies have ample incentives to develop business methods even without patent protection . . . ."); Carrier, *supra* note 48, at 826 ("[P]atents are not necessary for innovation in many industries."); Dreyfuss, *supra* note

Netflix provides an interesting example for the debate over business method patents. Co-founder Reed Hastings conceived of the idea of rental-by-mail after paying forty dollars for an overdue copy of *Apollo 13*.[53] To develop its infrastructure, Netflix incurred significant costs in establishing regional distribution centers.[54] It spent roughly $60,000 on computers, bar code scanners, and printers for each facility.[55] Netflix needed to spend a large sum on marketing because DVDs were still a relatively new technology, and competitors began to experiment with their own online DVD rental store, cutting into Netflix's market share.[56] Although Netflix was founded in 1997, it was not profitable until the fourth quarter of 2003.[57]

Blockbuster and other competitors responded to Netflix's market dominance by entering the market and providing their own internet sites on which consumers could order movies.[58] Although Netflix's business model was fairly easy to copy,[59] Blockbuster was nevertheless somewhat constrained because it worried about "cannibalizing" its retail store revenues.[60] Netflix did not have a patent on online ordering and mail delivery of DVDs.[61] It did have patents on a method for keeping a customer's queue of movie rental choices and on a method for allowing customers to pay a flat fee to have a maximum number of movies out at one time while requiring them to return a given number of movies within

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46, at 276–77 ("The cost of business method patents are very high. The benefits . . . are low. The ratio is terrible."); Clarisa Long, *Information Costs in Patent and Copyright*, 90 VA. L. REV. 465, 543–44 (2004) (explaining that tangible inventions have lower information costs than business methods due to the unclear boundaries and high search costs in examining business methods); Malla Pollack, *The Multiple Unconstitutionality of Business Method Patents: Common Sense, Congressional Consideration, and Constitutional History*, 28 RUTGERS COMPUTER & TECH. L.J. 61, 75–76 (2002) (arguing that business method patents do not promote progress or innovation and instead "raise prices and limit competition"); Raskind, *supra* note 46, at 64 (concluding that "[b]oth economic theory and empirical studies of patent-intensive industries cast doubt on the premise that patent protection of business methods is required either as an incentive for innovation or as an ingredient of the efficient diffusion of business methods in the economy").

53. *Netflix, Inc.*, *in* 115 INTERNATIONAL DIRECTORY OF COMPANY HISTORIES 350 (Derek Jacques & Paula Kepos eds., 2010).

54. *Id.* at 353.

55. *Id.*

56. *Id.* at 351.

57. *Id.* at 354.

58. David J. Teece, *Business Models, Business Strategy and Innovation*, 43 LONG RANGE PLAN. 172, 182–83 (2010), http://www.econ.upf.edu/~lemenestrel/IMG/pdf/2_teece_on_bmi.pdf; Greg Sandoval, *Blockbuster Laughed at Netflix Partnership Offer*, CNET (Dec. 9, 2010, 2:47 PM), http://news.cnet.com/8301-31001_3-2025235-261.html.

59. Teece, *supra* note 58, at 183.

60. *Id.* at 182.

61. *Id.* at 183.

a given time.[62] Most analysts of Netflix believe that Netflix's success was founded on its creation of a new market for online mail-order DVD rentals rather than on its patents.[63] Even with its patents, Blockbuster was able to closely copy Netflix's method—down to the look of Netflix's website for selecting, prioritizing, and ordering DVDs.[64] While the patents probably did not detract from Netflix's decision to innovate, [65] they do not seem to have been necessary either.

Thus, one sees that in some cases, such as business methods, patents likely cost society more, in terms of patent thickets and deadweight loss from monopoly pricing, than they provide benefits from additional innovation. This is especially the case when the patented innovation would have been made even without the patent incentive, given ancillary incentives for innovation. Accordingly, at least for such unnecessary patents, a proposal that eliminates some older or less valuable patents could reduce holdup problems from large patent portfolios, without substantial harm to innovation.

2. Failure of Condition Two: The Property Rights Granted by the Patent Are Not Clear

One of the greatest threats from large patent portfolios arises from a failure of condition two: the property rights granted by patents are often unclear. This lack of clear patent boundaries creates harms that are well documented by scholars in patent literature.[66] The lack of an effective notice system to inform potential infringers of a patent's boundary, validity, or even existence increases transaction costs, decreases certainty, and forecloses some amount of innovation.[67] Without an

62. *Id.*; *see also* U.S. Patent No. 7,024,381 (filed May 14, 2003) (approach for renting items to customers); U.S. Patent No. 6,966,484 (filed Sept. 16, 2002) (mailing a response envelope); U.S. Patent No. 6,584,450 (filed Apr. 28, 2000) (method and apparatus for renting items).

63. *See, e.g.*, Michael Abramowicz & John F. Duffy, *Intelllectual Property for Market Experimentation*, 83 N.Y.U. L. REV. 337, 367–69 (2008) (arguing that the patents were not a main factor in Netflix's success); *cf.* Teece, *supra* note 58, at 183 (explaining the potential factors in Netflix's success, including its patents).

64. Teece, *supra* note 58, at 183.

65. *But cf.* Jay Dratler, Jr., *Does Lord Darcy Yet Live? The Case Against Software and Business-Method Patents*, 43 SANTA CLARA L. REV. 823, 875 (2003) (arguing that because there is market risk but not technological risk associated with implementing business methods, and market risk is not typically avoided by monopoly, patenting business methods is inefficient).

66. *See, e.g.*, BESSEN & MEURER, *supra* note 14; Tun-Jen Chiang, *Fixing Patent Boundaries*, 108 MICH. L. REV. 523 (2010); Peter S. Menell & Michael J. Meurer, *Notice Failure and Notice Externalities*, 5 J. LEGAL ANALYSIS 1 (2013).

67. *See* ROBIN FELDMAN, RETHINKING PATENT LAW 79–84 (2012); BESSEN & MEURER, *supra* note 14, at 46–62; Richard A. Epstein & F. Scott Kieff, *Questioning the Frequency and Wisdom of Compulsory Licensing for Pharmaceutical Patents*, 78 U. CHI. L. REV. 71, 76 (2011) (recognizing defects in the patent system, one being the "obscure boundary lines for individual

effective notice system, similar to the one found in real property, potential inventors must risk waiting until litigation before a court determines whether an invention falls within the boundaries of a patent.[68]

Patent boundaries are generally fuzzy.[69] Unlike the boundaries for real property, it is difficult to map the words in a patent claim to real technologies given the variance in claim interpretation and the possibility of the doctrine of equivalents extending the reach of written claims.[70] As Professor Colleen Chien points out in one example, smartphones can have many different names, such as a "mobile device" or "personal digital assistant."[71] Variance in terminology and the sheer number of patents surrounding smartphone technology makes it difficult to determine which patents cover potential new technology.[72]

Further, while there is a presumption that a one-to-one ratio of patent to invention exists, this is not always the case.[73] Instead, many patents can cover a single innovation product, and many inventions can stem from a single patent.[74] The *Kodak v. Polaroid* case is instructive here.[75] The research and development department of Kodak studied over 250 patents while attempting to work around Polaroid's instant photo technology.[76] Once Kodak finished and commercialized its product, Polaroid sued, citing over twenty claims from numerous patents, and won.[77] Despite receiving many legal opinions from counsel throughout the development process, Kodak was still sued, with the result that it had

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patents [that] make it difficult for other entrepreneurs to know whether their activities infringe on someone else's patents"); Cynthia M. Ho, *Unveiling Competing Patent Perspectives*, 46 HOUS. L. REV. 1047, 1098 (2009) ("Unlike the clear boundaries of real property, the legal boundaries of patents are notoriously unclear unless and until litigated.").

68. *See* BESSEN & MEURER, *supra* note 14, at 46, 53. *But see* Adam Mossoff, *The Trespass Fallacy in Patent Law*, 65 FLA. L. REV. 1687, 1690–91, 1695–96 (2013) (arguing that the application of the trespass standard to show that a lack of stable boundaries has resulted in an increase in patent litigation is "conceptually invalid and empirically unverified").

69. *See* BESSEN & MEURER, *supra* note 14, at 53.

70. *See id.*

71. *See* Colleen V. Chien, *Predicting Patent Litigation*, 90 TEX. L. REV. 283, 290 (2011).

72. *See id.* (noting that the Federal Trade Commission identified trouble in sorting through patents as a major hurdle information technology sector firms face).

73. BURK & LEMLEY, *supra* note 14, at 53. Limits exist, however, for how far the bounds can reach, which are grounded in the invention itself. *See* FELDMAN, *supra* note 67, at 84.

74. *See* Mark A. Lemley & Philip J. Weiser, *Should Property or Liability Rules Govern Information?*, 85 TEX. L. REV. 783, 797 (2007) (opining that "[m]ore and more products incorporate not a single new invention but a combination of many different *components*, each of which may be the subject of one or more patents").

75. Polaroid Corp. v. Eastman Kodak Co., 16 U.S.P.Q. 2d (BNA) 1481, 1990 WL 324105 (D. Mass. 1990).

76. *See id.* at *76.

77. *See id.* at *1.

to exit the instant photography market.[78]

The problem, as James Bessen and Professor Michael Meurer demonstrate, is that these legal opinions hold no weight—true claim construction cannot begin until the patent is in front of a judge.[79] Even when patent boundaries are contested in court, individual judges can construe claims differently.[80] Bessen and Meurer argue that because problems in determining patent boundaries are so severe, the patent system makes every industry worse off save one—pharmaceuticals.[81]

Second, it is often impossible to know a patent's validity without initiating litigation.[82] While patents granted by the PTO are presumed to be valid,[83] scholars contest the value of this presumption.[84] Given the high number of mistakes and the relatively little time the PTO can spend on patent examination, many "bad" patents are granted.[85] Regardless, potential inventors may spend countless hours inventing around a patent, only for a court to later find infringement anyway.[86] To find a patent invalid, the PTO in a post-grant or inter partes review, or a judge during litigation, must examine it.[87] In the *Kodak* case, the court found several

78. *See id.* at *1, *84; BESSEN & MEURER, *supra* note 14, at 48. It is an open question currently whether Apple will be able effectively to force Samsung out of the smartphone market given the $1 billion judgment for patent infringement that Apple won. Youkyung Lee, *Apple Victory Means Soul-Searching for Samsung*, USA TODAY (Aug. 28, 2012), http://www.usatoday.com/tech/news/story/2012-08-28/samsung-future-whats-next/57364050/1.

79. *See* BESSEN & MEURER, *supra* note 14, at 50–51; *see also* Markman v. Westview Instruments, Inc., 517 U.S. 370, 391 (1996) (holding that judges must construe patent claims); Peter Lee, *Patent Law and the Two Cultures*, 120 YALE L.J. 2, 29–30 (2010) ("Accordingly, claim construction—interpreting the meaning and scope of claims—often determines the outcome of patent litigation.").

80. *See* BESSEN & MEURER, *supra* note 14, at 237.

81. *See id.* at 106–07 (arguing that only in the pharmaceutical industry do firms get more benefit from patent exclusivity than they pay in costs of defending and protecting against others' patents).

82. *See id.* at 50.

83. 35 U.S.C. § 282 (2012).

84. *See, e.g.*, BURK & LEMLEY, *supra* note 14, at 133; Doug Lichtman & Mark A. Lemley, *Rethinking Patent Law's Presumption of Validity*, 60 STAN. L. REV. 45, 47 (2007).

85. Lichtman & Lemley, *supra* note 84, at 46–47 ("Given all this, it is hardly a surprise that the PTO makes mistakes during the initial process of patent review, granting patents that, on the merits, should never have been issued."); Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1495 (2001) ("The PTO has come under attack of late for failing to do a serious job of examining patents, thus allowing bad patents to slip through the system.").

86. *See* BESSEN & MEURER, *supra* note 14, at 50 (using a *Kodak* case as an example); *see also* Stewart E. Sterk, *Property Rules, Liability Rules, and Uncertainty About Property Rights*, 106 MICH. L. REV. 1285, 1332 ("Even if a potential user discovers a patent that has been issued, she must still determine not only whether the patent claim covers the desired use, but also whether the patent itself is even valid.").

87. Francisco Castro, *The America Invents Act and Nanotechnology*, 8 NANOTECHNOLOGY L. & BUS. 214, 218 (2011–2012) ("The post-grant review provides an opportunity, albeit one with

of Polaroid's patents invalid during the course of litigation.[88] If Kodak knew that the court would find these patents invalid, it would not have devoted time to inventing around them, and could have instead devoted more time to inventing around the patents it was eventually held to have infringed.[89] High information and transaction costs, indeed.

Further complicating the task of designing around competitors' patents, uncertainty surrounding patent ownership, or the extent of an entity's patent portfolio, may not come to light before litigation.[90] Thus, a firm can never be sure that it has reviewed all of the relevant patents of its competitors. Firms also can use continuation patents to create "hidden claims" that will only be issued after a competitor has brought a product to market.[91] Moreover, because infringement is determined at the time of infringement, not at the time of filing, "claim terms are allowed to change meaning over time as technology advances."[92] This means that patents can end up being infringed by products in technological areas that did not previously exist.[93]

Scholars have proposed numerous solutions to these problems.[94] For example, to solve the boundary and validity uncertainties, Bessen and Professor Meurer propose a procedural reform that would give inventors an opportunity for early, cost-effective review of a patent's merits.[95] This

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a narrow window of time, to invalidate the claims of a patent soon after issuance and without having to go through costly litigation.").

88. *See* Polaroid Corp. v. Eastman Kodak Co., 16 U.S.P.Q. 2d (BNA) 1481, 1990 WL 324105, at *1 (D. Mass. 1990) ("Two patents were found invalid. One was found not infringed. One was found invalid before trial and Polaroid withdrew its claims on another patent before trial.").

89. *See* BESSEN & MEURER, *supra* note 14, at 48; Nathan P. Anderson, *Striking a Balance: The Pursuit of Transparent Patent Ownership*, 30 BERKELEY TECH. L.J. 395 (2015) (arguing that "[c]oncealed and misleading patent ownership information imposes substantial costs on the patent system through both persistent litigation and increased transaction costs.").

90. *See* Chien, *supra* note 71, at 289 ("[T]he task of searching for relevant patents is daunting.").

91. Hidden claims arise when applicants file a patent application then wait to see the direction technology is moving before writing claims that will intentionally cover a broad range of inventions. Bessen and Professor Meurer point out the Rambus example of a firm that participated in an industry's standard-setting organization while secretly pursuing a patent on the same technology. They used information from the organization to draft the broadest claims possible after the standard was set, locking firms into an unfavorable bargaining position. *See* BESSEN & MEURER, *supra* note 14, at 62.

92. *See id.* at 67 (emphasis omitted).

93. *See id.*

94. *See, e.g.*, BESSEN & MEURER, *supra* note 14, at 238–39; BURK & LEMLEY, *supra* note 14, at 131; FELDMAN, *supra* note 67, at 84; Chien, *supra* note 72, at 287–88; Lichtman & Lemley, *supra* note 85, at 72; Mark R. Patterson, *Inventions, Industry Standards, and Intellectual Property*, 17 BERKLEY TECH. L. J. 1043, 1046 (2002); Lemley, *supra* note 85, at 1496.

95. *See* BESSEN & MEURER, *supra* note 14, at 237.

would occur in two steps. First, the U.S. Court of Appeals for the Federal Circuit would defer to the PTO or trial court for claim interpretation, which would centralize construction and increase predictability.[96] Second, the PTO would have the power to draft legal opinions regarding claim construction so that any party could approach the PTO and request an opinion regarding any new technology.[97] With an authoritative opinion in hand stating exactly *what* the boundaries of a patent are, innovators would be free to work around these boundaries without fear of prosecution.[98]

Another method of eliminating uncertainty around validity involves mitigating the presumption of validity under § 282.[99] Professors Doug Lichtman and Mark A. Lemley offer three proposals to solve validity uncertainty: (1) lower an infringer's evidentiary standard of rebuttal from "clear and convincing" to "preponderance of the evidence"; (2) allow applicants to pay more for an increase in patent protection, essentially creating a presumption in favor of validity; or (3) similar to Bessen and Meurer's proposal, grant legal weight and deference to any PTO reexamination of a patent in later judicial proceedings.[100]

Until a formal proposal is adopted, however, firms must mitigate uncertainty risks through alternative means. Firms with large patent portfolios may mitigate their risk from competitors simply through the threat of a countersuit.[101] If a patent holder believes there is a legitimate chance of a countersuit from the owner of a rival patent portfolio, the potential of mutually assured destruction will likely deter the former from initiating a suit.[102]

Even if a firm has not invested the time and research into building a large patent portfolio to use defensively, it may be equipped to buy one if it has the funds. Consider Google's $900 million bid on Nortel's patent portfolio.[103] Google, at the time, was not equipped with sufficient patent

96. *Id.*

97. *Id.*

98. *Id.*

99. *See* BURK & LEMLEY, *supra* note 14, at 133; Lichtman & Lemley, *supra* note 85, at 49 ("Our proposal, therefore, aims not to improve the overall quality of PTO review, but instead to change the presumption of patent validity to more accurately reflect the realities of current patent practice. The goal is to discourage the filing of bad but not good patents, and at the same time to empower the PTO to better distinguish between the two. Our overall point is not that patents should never be accorded a strong favorable presumption. It is instead that presumptions must be earned." (footnote omitted)).

100. Lichtman & Lemley, *supra* note 85, at 49–50.

101. *See* Grant C. Yang, *The Continuing Debate of Software Patents and the Open Source Movement*, 13 TEX. INTELL. PROP. L.J. 171, 198 (2005).

102. *Id.*

103. Claire Cain Miller, *Google Bids $900 Million for Nortel Patent Assets*, N.Y. TIMES (Apr. 4, 2011), http://www.nytimes.com/2011/04/05/technology/05google.html.

protection to ward off companies such as Apple or Microsoft during the smartphone wars.[104] The purchase of the Nortel patents, it stated, would dissuade other companies from suing Google.[105] Unfortunately for Google, a consortium including Apple, Microsoft, and Research in Motion bought the Nortel patents for $4.5 billion.[106] Thereafter, Google bought Motorola Mobility for $12.5 billion, gaining Motorola's nearly 20,000 patents as part of the deal.[107]

But not all entities have the funds to purchase patent protection, and they may instead be anticompetitively deterred or coerced into unfavorable licensing agreements with patent holders.[108] Since patent owners are under no obligation to license their work, they may use their right to exclude others from practicing the invention in any capacity without invoking an antitrust violation.[109] As long as the patent holder is not using its patent to extend its monopoly into other markets or in other ways that would violate the per se or "rule of reason" antitrust tests, the patent holder is free to exclude any and all potential licensees or to charge whatever it would like for use of the invention.[110] This can deter small or upcoming firms that cannot afford expensive licensing fees from using necessary technology, forcing them to exit the market.[111] This cost to new

104. *See id.*

105. *See* Miller, *supra* note 103.

106. Philip Elmer-DeWitt, *Consortium Led by Apple Buys Nortel's Patents for $4.5 Billion*, FORTUNE (July 1, 2011), http://tech.fortune.cnn.com/2011/07/01/consortium-led-by-apple-buys-nortels-patents-for-4-5-billion/.

107. Matthew Panzarino, *Google Keeps 'Vast Majority' of Motorola Mobility Patents in Sale to Lenovo*, TECHCRUNCH (Jan. 29, 2014), https://techcrunch.com/2014/01/29/google-keeps-vast-majority-of-motorola-mobility-patents-in-sale-to-lenovo/.

108. *See generally* Patterson, *supra* note 29, at 1140–41 (arguing that understanding the distinction between products and inventions is a key to addressing the so-called "leveraging problem").

109. *See* United States v. Gen. Elec., 272 U.S. 476, 488 (1926); Image Tech. Servs., Inc. v. Eastman Kodak Co., 125 F.3d 1195, 1218 (9th Cir. 1997); Patterson, *supra* note 29, at 1133–34 ("In *Image Technical Services, Inc. v. Eastman Kodak Co.*, the Ninth Circuit held that although an intellectual property owner's desire to profit from leveraging its intellectual property is presumptively legitimate, the presumption can be rebutted.").

110. *In re* Indep. Serv. Orgs. Antitrust Litig., 989 F. Supp. 1131, 1135 (D. Kan. 1997) ("Xerox's legal right to exclude [independent service organizations] in the service markets from using Xerox's patented inventions arose from its patents, not from an unlawful leveraging of its monopoly power in the parts market.").

111. Melissa E. Horn, Note, *DNA Patenting and Access to Healthcare: Achieving the Balance Among Competing Interests*, 50 CLEV. ST. L. REV. 253, 275 (2002–03) ("Licensing, while not as prohibitive as exclusive licensing, can still retard new information and technologies when it is cost prohibitive. Patent holders can refuse to grant researchers licenses altogether, and when researchers are given the opportunity to purchase licenses, the patent holders set the terms usually charging 'both an upfront usage fee and a per test fee, often at rates that small diagnostic

firms is only worthwhile if the inventing and commercializing that results from the patent incentive is greater than the cost to society in decreased competition. As has been shown above, this is often not the case given fuzzy patent boundaries and large patent portfolios that can be used to deter competing innovation. A proposal that reduced the number of patents that need to be considered in inventing around competitor's patents, or in establishing freedom to operate without threat of suit, would help to mitigate some of the costs of the patent system.

3. Failure of Condition Three: Transaction Costs Are High

Where property boundaries are uncertain, transaction costs will necessarily be higher.[112] The buyer and the seller cannot assign a fair value to a patent until they know its boundaries—a process that, as explained above, can be quite costly.[113] This is not a problem that two parties can simply negotiate away. The patent's value is determined by how every other market participant perceives its boundaries. Even if the buyer and seller reach a mutual agreement as to the patent's property boundaries, they cannot guarantee that other would-be infringers and courts will agree on those boundaries.[114]

Even when property boundaries are clear, which is often not the case, having too many property rights to negotiate can cause aggregate transaction costs to be high and thus can deter parties from engaging in otherwise mutually beneficial agreements. As explained above, some patent law scholars refer to industries or technological fields that are very crowded with patent rights as "thickets."[115] To the extent that the thicket is too dense, then absent transaction cost minimizing strategies such as patent pooling or tailored clearance markets, socially beneficial

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laboratories cannot afford.'" (footnote omitted) (quoting Vida Foubister, *Gene Patents Raise Concerns for Researchers*, *Clinicians*, AM. MED. NEWS (2000))).

112. *See* BESSEN & MEURER, *supra* note 14, at 71–72.

113. *See supra* Subsection I.B.2.

114. *See* BESSEN & MEURER, *supra* note 14, at 107 ("[C]hemical patents might provide stronger exclusion because they might be more likely to be successfully enforced. Conversely, patents on components of complex systems . . . might be less valuable because complex interactions between components might make the boundaries of each component less clear.").

115. Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, *in* 1 INNOVATION POL'Y & ECON. 119, 120 (Adam B. Jaffe, Josh Lerner & Scott Stern eds., 2001) ("Mixing metaphors, thoughtful observers are increasingly expressing concerns that our patent (and copyright) system is in fact creating a patent thicket, a dense web of overlapping intellectual property rights that a company must hack its way through in order to actually commercialize new technology."); Mossoff, *supra* note 18, at 166–67 ("A 'patent thicket' exists when too many patents covering individual elements of a commercial product are separately owned by different entities.").

innovation and competition will not occur.[116]

4. Failure of These Conditions Can Create an Environment Where Holders of Large Patent Portfolios Can Abuse Their Power

Because of the failure of the conditions necessary for a well-functioning patent system, firms with large patent portfolios can engage in behaviors that are undeniably harmful to society. Large firms may use their patent portfolios as cudgels to aggressively impose costs in the form of threats of suit or actual patent lawsuits against their upstart rivals, even when there are not strong patent infringement arguments. By repeatedly threatening suit with one patent after another in their portfolios, large firms can impose crippling costs on start-ups and small businesses, causing them to need more financing than anticipated to get to their next stage of growth.[117] If such additional financing is not forthcoming—and threats of patent litigation tend to deter financing[118]—then start-ups and small firms may go out of business or be sold for a discount. While larger players buy start-ups all the time,[119] some start-ups do not get acquired and instead grow to be formidable competitors that offer better products and services or cheaper prices.[120] Ownership of large patent portfolios by aggressive, established firms, combined with the boundary and notice problems that surround patents and make it difficult to know when a patent might be infringed,[121] gives large firms significant, non-socially

116. *See* Shapiro, *supra* note 115, at 121 ("The vast number of patents currently being issued creates a very real danger that a single product or service will infringe on many patents. Worse yet, many patents cover products or processes already being widely used when the patent is issued, making it harder for the companies actually building businesses and manufacturing products to invent around these patents. Add in the fact that a patent holder can seek injunctive relief, that is, can threaten to shut down the operations of the infringing company, and the possibility for holdup becomes all too real.").

117. Neeraj Arora, *Disabling Patentability for Skill-Based Inventions: Aligning Patent Law with Competition Policy*, 22 SANTA CLARA COMPUTER & HIGH TECH. L.J. 1, 12 (2005) ("Furthermore, the patent holder can use their patent rights to threaten expensive litigation, which may deter venture capital financing and allow the patent holder to maintain their societally inefficient position.").

118. *Id.*

119. Stephen J. Redner, *Thinking of Going Public? Think Twice, Then Read the Sarbanes-Oxley Act of 2002*, 6 J. SMALL & EMERGING BUS. L. 521, 528 (2002) ("As for existing companies seeking alternatives to raising capital by going public, a company may allow itself to be bought out by another as many startups have sold out to Microsoft and other giants."); Eliot Spitzer, *Capital Flight*, WALL ST. J. (Dec. 2, 2006), http://online.wsj.com/article/SB116502041205838610.html ("Today, however, nearly 90% of those venture-capital-backed startups are sold to strategic buyers in private transactions.").

120. *See, e.g.*, Fred Vogelstein, *How Yahoo Blew It*, WIRED (Feb. 2007) http://www.wired.com/wired/archive/15.02/yahoo.html (discussing how Yahoo's decision not to purchase Google allowed Google to grow on its own and develop the concept of AdWords).

121. *See supra* Subsection I.B.2.

beneficial power to intimidate or crush upstart rivals.[122] Such uses of patents contravene patent policy and erode competition, which is the backbone of a market economy.[123] While this use of large portfolios may seem obviously abusive, so long as they can pass the lax Rule 11 test for stating a colorable claim,[124] the rational firm that seeks to maximize shareholder return will probably consider itself under a fiduciary obligation to consider bludgeoning potential competitors with weak patents, just one of its many profit-maximizing tools.[125]

It is even easier for non-practicing entities (NPEs) to abuse large patent portfolios because NPEs do not face the same threat that small practitioners do.[126] As they are not actively practicing the invention, they are not at risk of infringement.[127] This leaves NPEs free to license their patents while suing others who may infringe their patents.[128]

C. *Characteristics of Large Patent Portfolio Holders*

Before attempting to design a proper maintenance fee structure, it is important to understand which organizations own large patent portfolios and how those organizations use their portfolios. The entities holding the most expansive patent portfolios are large corporations that own numerous patents in the fields in which they offer goods and services.

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122. Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L. J. 1255, 1315 (2009) ("Suits may come in the form of 'bullying' by larger competitors trying to put the startup out of business.").

123. Lee B. Burgunder, *Trademark and Copyright: How Intimate Should the Close Association Become?*, 29 SANTA CLARA L. REV. 89, 90 (1989) ("The backbone of the United States market economy is competition.").

124. Jonathan L. Moore, *Particularizing Patent Pleading: Pleading Patent Infringement in a Post-*Twombly *World*, 18 TEX. INTELL. PROP. L. J. 451, 486 (2010) ("Further, the scope of a patent's claim is typically ambiguous and it is difficult to know with any certainty how a court will construe it. This fact benefits nuisance-value plaintiffs, as it allows them to bring actions that lack merit but satisfy the minimal requirements of Rule 11." (footnote omitted)); Ranganath Sudarshan, *Nuisance-Value Patent Suits: An Economic Model and Proposal*, 25 SANTA CLARA COMPUTER & HIGH TECH. L.J. 159, 176–77 (2008) ("The ambiguous nature of patent claim scope is a boon for nuisance-value patent plaintiffs, because it allows them to file suits which, though not meritorious enough to prevail at trial and through appeal, are sufficient to comply with the pre-filing requirements of Fed. R. of Civ. Pro. 11(b).").

125. *Cf.* Kent Greenfield, *Ultra Vires Lives! A Stakeholder Analysis of Corporate Illegality (with Notes on How Corporate Law Could Reinforce International Law Norms)*, 87 VA. L. REV. 1279, 1289–90 (2001) (providing examples of illegal corporate actions consistent with the financial interest of the corporation).

126. *See* Yang, *supra* note 101, at 198 ("A NPE would not be at risk of being sued because they would be outside the industry while still able to enforce their patent portfolios against a larger company.").

127. *Id.*

128. *See id.*

One step down is patent assertion entities (sometimes referred to as patent "trolls")—organizations that accumulate patents not for product development, but to exact licensing fees and litigation settlements.

The largest patent portfolios are found in the high-technology industry, in both hardware and software companies. Measuring by issued patents from 1994 through 2011,[129] IBM had the most U.S. patents—58,692. No other firm has come close: Samsung Electronics holds the next largest patent portfolio, totaling 40,548 patents. Canon K.K. is just behind with 34,132 patents issued. After the top three, there is a significant drop. Sony Corporation, Toshiba Corporation, Hitachi, and Fujitsu each held some 21,000 to 25,000 patents issued in those years. Next are the computer and software firms, with Intel, NEC, Micron, and Microsoft each having between about 17,000 and 20,000 patents issued from 1994 through 2011. Three large and highly diversified firms then show up on the list. Siemens had 18,887 patents issued; GE had 17,483 patents issued; and Mitsubishi had 15,499 patents issued. Beyond that, more software and computer companies appear on the list. Hewlett–Packard, Seiko Epson, Texas Instruments, and Xerox each had between 12,000 and 14,000 patents issued in the period studied.[130]

When it comes to NPEs, or "trolls," Intellectual Ventures stands head and shoulders above the rest with an estimated 25,000 U.S. patents, 4400 patent applications, and a total of 70,000 patents and applications worldwide.[131] Intellectual Ventures both applies for its own patents and acquires them from others.[132] It has reported that it files roughly 500 new patent applications each year.[133] All other NPEs have just a fraction of the patents held by Intellectual Ventures.[134] Only two other NPEs are believed to have more than 1000 patents in their portfolios: Round Rock is estimated to have 3495 U.S. patent publications[135] and 1186 patent

129. *See infra* Appendix.

130. While some firms publicly proclaim the size of their patent portfolios, for those that do not, it can be hard to obtain exact figures on how many patents a particular firm owns, but attempts to determine portfolio size can be made by looking at data from a number of sources, including Securities and Exchange Commission filings, a firm's own statements, and patent office statistics on issued patents. I have done this in making the estimates found in this Article.

131. Tom Ewing & Robin Feldman, *The Giants Among Us*, 2012 STAN. TECH. L. REV. 1, 25; *Largest Patent Holdings*, PATENTFREEDOM (2014), https://web.archive.org/web/20141113191732/https://www.patentfreedom.com/about-npes/holdings/; *Our Patent Portfolio*, INTELLECTUAL VENTURES, http://www.intellectualventures.com/inventions-patents/patent-portfolio/ (last visited March 31, 2016).

132. *See* Ewing & Feldman, *supra* note 131, at 20–21.

133. *Id.* at 6.

134. *See Largest Patent Holdings*, *supra* note 131.

135. *See id.* Patent publications are issued patents and patent applications that the PTO publishes eighteen months after the patent is filed. 35 U.S.C. § 122(b)(1) (2012).

families.[136] Interdigital is estimated to have 3989 U.S. patent publications and 1537 patent families.[137] Other NPEs are estimated to have less than 1000 patents each in their portfolios, with patent publications ranging from a few hundred to just under a thousand.[138]

Thus, one sees that the entities with the largest patent portfolios by far are entities that are actively involved in producing goods and services related to their patents. For all of the alarm that they cause, most NPEs have relatively modest patent portfolios compared to the largest practicing entities.

II. A PROPOSED SOLUTION: A MAINTENANCE FEE STRUCTURE THAT DISCOURAGES LARGE PORTFOLIOS OF NON-PRACTICED PATENTS

In light of the contemporary problems in patent law, this Article proposes a solution. The proposal entails creating tiered maintenance fee enhancements that will discourage patent holders from accumulating large portfolios of non-practiced patents. Furthermore, to effectuate this proposal, this Article suggests requiring disclosure of related entities, portfolio size, and which patents are practiced—resulting in additional benefits beyond discouraging large portfolios of non-practiced patents.

A. *Proposal: Tie Maintenance Fees to the Number of Non-practiced Patents Held by the Patent Owner*

At first glance, it appears the solution is simple: If non-practicing entities are imposing net costs on society with their large patent portfolios, then society should pass these costs onto the non-practicing entities—society should increase the price of being a non-practicing entity with a large portfolio. At the same time, if firms that actively use their patents (practicing entities) can hold large patent portfolios at a net benefit to society, then society should not impose additional costs on

136. *Largest Patent Holdings*, *supra* note 131. Patent families are groups of related patents, i.e., continuations or divisionals of original patent applications. 35 U.S.C. § 120 (granting applications disclosed by Section 112(a) in an earlier application the benefit of the earlier application's filing date); John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435, 454 (2004) ("This result is also confirmed by the relationship between litigation and the number of related patents issued from the same original application as the patent in the dataset, which we refer to as a patent family."). Patent families can become fairly large over time, with a dozen or more patents in the family. Peter S. Menell et al., *Patent Claim Construction: A Modern Synthesis and Structured Framework*, 25 BERKELEY TECH. L.J. 711, 723 (2010) ("Some patents issue from a single application, with a single prosecution history. Other patents are members of large families of related patents, with a web of underlying patent applications, along with counterparts filed in foreign countries.").

137. *Largest Patent Holdings*, *supra* note 131.

138. *See id.*

them. If, however, companies with many non-practiced patents in their portfolios ultimately impose costs on society regardless of whether they practice some of their patents, then these costs should be imposed on all companies with large portfolios.

The current patent system charges patent owners fees at different times and for different reasons.[139] A would-be patent owner must pay a fee to file a patent application, to have the PTO conduct a prior art search and examine the patent application, and to have the PTO issue a patent once it has determined that the invention is patentable.[140] Then, the patent owner must pay regular maintenance fees to maintain the patent in force until its expiration.[141] Specifically, a patent owner who wishes to maintain the patent for its full, twenty-year life must pay maintenance fees 3.5, 7.5, and 11.5 years after the PTO issues the patent.[142] If the owner misses a payment, the patent lapses into the public domain and ceases to be enforceable.[143] These maintenance fees serve two purposes: (1) to collect revenues to fund the PTO, and (2) to encourage patent owners to let lapse patents that are of little value—specifically, those of less value than the maintenance fees. By taking low-value patents out of force sooner, society benefits because others can use and build on the formerly patented technology without having to worry about being sued.

Traditionally, Congress set the fees for patent examination and maintenance directly in the patent statute.[144] The AIA, however, delegated this authority to the PTO.[145] Thus, the PTO now has, for the first time, the authority to set all fees associated with patent examination, grant, and maintenance.[146] Pursuant to this authority, the PTO has lowered the fees for filing a patent, performing a prior art search, and issuing the patent.[147] Conversely, the PTO has raised the fees for

139. 35 U.S.C. § 41.

140. There are also a number of fees that will be charged for certain things related to the patent examination process. For instance, patent applicants must pay additional fees for each of the following: requesting prioritized examination, filing excess claims with the patent application, requesting an extension to respond to PTO actions, requesting continued examination, appealing a decision of the PTO, and requesting a supplemental examination. *See id.*

141. *Id.* § 41(b).

142. *Id.* § 41(b)(1).

143. *Id.* § 41(b)(2). There is a six-month grace period during which the maintenance fee may be paid, although a surcharge may be required at the discretion of the Director. *Id.* After this grace period, the patent expires. *Id.*

144. *See id.* § 41.

145. Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 10, 125 Stat. 284, 316–20 (2011).

146. *Id.* at § 11.

147. *See* U.S. PAT. & TRADEMARK OFFICE, PATENT PUBLIC ADVISORY COMMITTEE FEE SETTING REPORT 8 (2012), http://www.uspto.gov/sites/default/files/aia_implementation/120924-ppac-fee-setting-report2.pdf.

maintaining patents in force.[148] The PTO has stated that its goal is to shift costs from when the patent's value is uncertain—before issuance—to when an owner is better able to calculate the patent's value—after issuance.[149] This seems logical: fees can only serve their function of deterring the patenting of less valuable innovations if the patent owner has enough information on the patent's value to assess whether the patent is worth more than the fees.

The PTO's inclination to increase maintenance fees to clear some patent congestion is sensible. This Article proposes that the PTO go further and use its fee-setting authority not only to discourage the maintenance of low-value patents, but also to address more directly the problems of industry participants and patent trolls holding large portfolios of non-practiced patents as well as the attendant public uncertainty as to which patents are being practiced. This Article proposes that the PTO implement maintenance fee enhancements based on the number of non-practiced patents in a holder's portfolio. The precise structure and thresholds for the fees are of secondary importance; the key is that the PTO create tiered maintenance fee enhancements so as to discourage large low-value patent portfolios. One would expect the PTO to regularly review and adjust the tiers and enhancement values to achieve the correct balance.

The PTO should establish a progressive system of maintenance fee enhancements, assessing no fee enhancement on portfolios below a certain size. The PTO should also create tiered fee enhancements positively correlated to the number of patents that do not cover goods or services made directly by the patent owner or by an entity that it controls. The PTO's definition of patent portfolio should include patents held by any parent, subsidiary, or related entities with common ownership.

Ideally, maintenance fee enhancements will not begin until the 7.5-year renewal date. As the PTO has noted, patent applicants are often uncertain as to the value of their invention at the time of filing and even at the time of issuance.[150] The majority of patents are never commercialized.[151] Even many patents that do become valuable do not

148. *See id.* at 8.

149. *See id.* at 12–13.

150. *See id.* at 13.

151. Sichelman, *supra* note 8, at 362–63 ("As an empirical matter, it appears that less, probably much less, than half of all patented product inventions are commercialized. In addition to several surveys reporting roughly 50% commercialization rates, patentees fail to pay maintenance fees on more than 60% of patents within twelve years after issuance. Unless a product was a complete flop, in many industries, it would have likely survived for at least twelve years in one form or another. Thus, notwithstanding the absent-mindedness of some patentees (or their lawyers) who fail to renew their valuable patents, these low renewal rates are strong evidence that most patented inventions are never commercialized." (footnotes omitted)).

do so immediately, but rather become valuable only after the patent owner makes further investments of time and money to refine the invention so that it is cost effective to produce and market.[152] Charging a patent owner substantial maintenance fees before it knows the value of its patent may decrease the incentive to innovate and delay marketing of new innovations, especially those with uncertain market prospects. The patent owner should generally have a good idea of the patent's value by the 7.5-year maintenance payment deadline. The fee is due 7.5 years after issuance, not after filing.[153] Because patent examination is a slow process[154] and the PTO has a substantial backlog of patent applications,[155] the PTO generally takes several years to issue a patent.[156] Thus, the maintenance fee due 7.5 years after issuance may not come due until ten years or more after the applicant files the patent. Because the patent

152. *See* Aleksandar Nikolic, *Securitization of Patents and Its Continued Viability in Light of the Current Economic Conditions*, 19 ALB. L.J. SCI. & TECH. 393, 396–97 (2009) (stating that value is gained from a patent by actually practicing or producing the invention, or licensing if manufacture is not possible); *cf.* Kristal M. Wicks, Note, *Exhausted or Unlicensed: Can Field-of-Use Restrictions in Biotech License Agreements Still Prevent Off-Label Use Promotion After Quanta Computer?*, 9 U.N.H. L. REV. 157, 162 (2010) ("In most situations, other entities can manufacture, market, or sell an invention better than the patent owner, and the ability to license the invention increases both the value of the specific invention and the general value of inventive efforts because it provides an incentive for people to make inventions regardless of their ability to successfully bring a product to market.").

153. 35 U.S.C. § 41 (2012); 37 C.F.R. § 1.20 (2015).

154. *See* U.S. PAT. & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2015, at 32 (2015), https://www.uspto.gov/sites/default/files/documents/USPTOFY15PAR.pdf (reporting that the average first action pendency in 2011 was 17.3 months, and the total average pendency was 26.6 months); Dennis Crouch, *Addressing the USPTO Backlog*, PATENTLY-O (Mar. 8, 2012), http://www.patentlyo.com/patent/2012/03/backlog-down-and-up.html [hereinafter Crouch, *Addressing*] (noting that on average, an application today receives a first action within 23 months). But Crouch also notes that total application pendency could be longer than reported, because "any request for continued examination (RCE) is counted as an abandonment of an application and a refilling of a new application." Dennis Crouch, *Average Patent Application Pendency*, PATENTLY-O (Dec. 12, 2011), http://www.patentlyo.com/patent/2011/12/average-patent-application-pendency.html [hereinafter Crouch, *Average Patent Application*] (explaining that the PTO's figures may be higher than reported).

155. There are currently 1,147,595 pending utility, plant, and reissue applications. *See* U.S. PAT. & TRADEMARK OFFICE, *supra* note 154, at 162, tbl. 5; *see also* Crouch, *Addressing*, *supra* note 154 (explaining that an increase in the backlog of applications awaiting examination following an RCE actually causes the decrease in unexamined non-provisional patent applications over the past two years, which is roughly 82,000).

156. *See* Crouch, *Average Patent Applicationy*, *supra* note 154 ("The median pendency is 3-4 years"); Crouch, *Addressing*, *supra* note 154 (noting that the PTO estimates applications will receive action twenty-three months after being filed).

applicant obtains priority as of the date of filing,[157] the applicant need not wait for issuance before commercializing the innovation. Accordingly, for most patents, about ten years should be more than adequate to determine whether a patent is valuable and worth keeping in force.

For patent portfolios below a certain size, there will be no maintenance fee enhancements. For patent portfolios above the threshold, the maintenance fee due at the 7.5 and 11.5-year payment dates will be multiplied based on the size of the non-practiced patent portfolio owned by the party paying the maintenance fee. The suggested enhancements are set out in Table 1, but again, the exact numbers are not as important as the tiered approach, and the amounts should be adjusted based on experience. As one can see from Table 1, there are no maintenance fee enhancements for patent portfolios containing 100 or fewer non-practiced patents.[158]

Table 1: Large Entities

Unused Patents in Portfolio	PTO's 7.5-Year Maintenance Fee[159]	Proposed 7.5-Year Multiplier	PTO's 11.5-Year Maintenance Fee[160]	Proposed 11.5-Year Multiplier
< 100	$3600	None	$7400	None
100–1000	$3600	X2=$7200	$7400	X2=$14,800
1000–2000	$3600	X3= $10,800	$7400	X3=$22,200
2000–5000	$3600	X4=$14,400	$7400	X4=$29,600
5000–10,000	$3600	X5=$18,000	$7400	X5=$37,000
10,000–15,000	$3600	X6=$21,600	$7400	X6=$44,400
15,000–20,000	$3600	X7=$25,200	$7400	X7=$51,800
20,000–25,000	$3600	X8=$28,800	$7400	X8=$59,200

157. *See* 35 U.S.C. § 154(a)(2). Note, however, that the patent statute allows for slight extension of the patent term due to issues such as patent office delay. *Id.* § 154(b). Under the AIA, patents filed after March 16, 2013, will have priority as of the date of filing. *See* Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 102(a)(1), 125 Stat. 284, 286 (2011). For patents filed before that date, their presumptive priority is from the date of filing, but patentees may push their priority date back to their invention date so long as certain requirements are met. *See* 35 U.S.C. § 102.

158. The threshold of 100 non-practiced patents is fairly arbitrary, but it does correspond with the number of patents in a portfolio that Patent Freedom asserts can be evaluated for infringement without undue effort and expense. *See Largest Patent Holdings*, *supra* note 131.

159. 37 C.F.R. § 1.20(c)(7) (2015).

160. *Id.* § 1.20(g).

25,000–30,000	$3600	X9=$32,400	$7400	X9=$66,600
> 30,000	$3600	X10=$36,000	$7400	X10=$74,000

The PTO currently charges "small entities" half of what it charges "large entities" to maintain a patent.[161] The proposed fee enhancements follow this same ratio, as illustrated by Table 2.[162]

Table 2: Small Entities

Unused Patents in Portfolio	PTO's 7.5-Year Maintenance Fee[163]	Proposed 7.5-Year Multiplier	PTO's 11.5-Year Maintenance Fee[164]	Proposed 11.5-Year Multiplier
< 100	$1800	None	$3700	None
100–1000	$1800	X2=$3600	$3700	X2=$7400
1000–2000	$1800	X3=$5400	$3700	X3=$11,100
2000–5000	$1800	X4=$7200	$3700	X4=$14,800
5000–10,000	$1800	X5=$9000	$3700	X5=$18,500
10,000–15,000	$1800	X6=$10,800	$3700	X6=$22,200
15,000–20,000	$1800	X7=$12,600	$3700	X7=$25,900
20,000–25,000	$1800	X8=$14,400	$3700	X8=$29,600
25,000–30,000	$1800	X9=$16,200	$3700	X9=$33,300
> 30,000	$1800	X10=$18,000	$3700	X10=$37,000

B. *"Practiced" Versus "Non-practiced" Patents*

Part of this Article's proposal involves distinguishing between "practiced" and "non-practiced" patents in a portfolio. In this Article, a non-practiced patent refers to a patent that does not cover any products or services provided by the patent owner or any entity under its common ownership. Patents merely licensed to others but not used by the owner

161. To qualify as a "small entity," the patent owner must be an individual, a nonprofit, or a small business that meets the size requirements set forth in 13 C.F.R. § 121.801–05 (2015). *See* 35 U.S.C. § 41(h); U.S. PAT. & TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE, 9 MPEP app. R § 1.27 (9th ed., 2014). The standards vary depending on the industry.

162. There is no need to consider "micro entities" because this Article's proposal would not affect them. To qualify as a micro entity, an inventor must have filed no more than four previous patents and may not have assigned any patent being prosecuted. *See* 35 U.S.C. § 123(a) (defining the qualities of a micro entity).

163. 37 C.F.R. § 1.20(f).

164. *Id.* § 1.20(g).

to make products or services are counted as non-practiced patents.[165] This holds even for patents on inventions that are genuinely innovative and may be of benefit to society. Any other formulation would fail to deter patent trolling, as patent trolls often license their patents.[166]

Narrowly defining practiced patents as those directly used provides a bright-line rule and thus reduces administrative burdens for the PTO. This definition also tends to redirect patents to owners who will utilize them, which benefits society. The entity making use of the patented technology is generally the entity best able to value the patent and thus the entity best able to make economically optimal decisions regarding the patent. Maintenance fees also redirect patents away from trolls—who often attempt to monetize a patent not by marketing the patent's innovation, but by extracting fees from those using the patented methods when no copying occurred.[167] The broad definition of non-practiced patents carries certain benefits as well. It prevents patent owners from evading fee enhancements through sham licenses—e.g., issuing licenses for negligible amounts simply to avoid the fee enhancement.

Some might object that maintenance fee enhancements have the unfair effect of pressuring good-faith inventors who are not easily able to commercialize their patents, such as universities, to sell the patents and thus forego revenues from potential licensing deals if others later also want to use the patented technology.[168] This should not be the case, however, given the sophisticated deals that parties can negotiate to address these concerns. For instance, the sale of a patent[169] can be

165. Note that direct use could include use when the patent owner is one of a number of manufacturers in a manufacturing process that makes something covered by the patent. Likewise, the owner of a method patent would be using it directly if the owner were part of a group of entities that provides necessary steps to a patented method. *See generally* Robin M. Davis, Note, *Failed Attempts to Dwarf the Patent Trolls: Permanent Injunctions in Patent Infringement Cases Under the Proposed Patent Reform Act of 2005 and* eBay v. Mercexchange, 17 CORNELL J.L. & PUB. POL'Y 431, 438 (2008) (discussing these questionable licensing practices as those of the patent troll).

166. *See id.* (stating that the licensing practices of patent trolls "drive up the price of new consumer technology because manufacturing corporations forced to take licenses on a troll's patents often pass the costs of royalty payments and patent litigation along to consumers").

167. *See id.* at 437–39 (discussing the questionable business practices of patent trolls).

168. *See generally* Mario Cervantes, *Academic Patenting: How Universities and Public Research Organizations Are Using Their Intellectual Property to Boost Research and Spur Innovative Start-Ups*, WORLD INTELL. PROP. ORG., http://www.wipo.int/sme/en/documents/academic_patenting.html (last visited Oct. 17, 2015) (discussing university gaps between invention and commercialization).

169. Technically, patents are "assigned" to new owners, but to more easily distinguish between transfers of ownership in a patent and licensing a patent, this Article refers to the "sale" of patents where it makes sense to do so. *See* Philip Mendes, *To License a Patent – or, to Assign*

accompanied by conditions granting the seller rights to future licensing revenue from the patent.[170] Alternatively, the patent owner may simply sell the patent for more money if it knows that the buyer will likely receive licensing money as well as value from using the patent.[171]

Others might complain that it can be difficult for a patent owner to know the value of its patent until it is commercialized and in wide use, or even to know if it will ever be widely used. This would seem to be a reason not to sell a patent and instead to license it. This is a good point, but this Article's proposal, which would not begin charging enhanced maintenance fees until the 7.5-year maintenance fee deadline, or about ten years after filing, mitigates any problems related to valuing the patent early in its life.[172] By ten years on, the vast majority of patent owners should be able to value their patents.

Another possible objection is that this proposal will have anticompetitive effects. One could argue that a non-practicing patent owner might prefer to license everyone on nondiscriminatory terms, while a practicing patent owner may want to use the patent to exclude competitors and thus drive up prices. While that may occur in some instances, if a competitor can provide the patented goods or services more cheaply or efficiently, then the value of the patent generally will be greater to that competitor. It thus makes sense for even a competing patent owner to license the competitor and make more money in royalties.[173] The one thing that a practicing patent owner will not do is license the patent to itself and then sell the patent to a patent troll. It is much more in the practicing patent owner's interest to keep the patent, precisely because there may be opportunities to license lower-cost producers of the product down the road, which will be more valuable to the practicing patent owner. Likewise, if a competitor comes up with an improvement to the practicing patent owner's patented product, such that they each have blocking patents[174] *vis à vis* the new and improved

It: Factors Influencing the Choice, WIPO, http://www.wipo.int/export/sites/www/sme/en/documents/pdf/license_assign_patent.pdf (last visited Sept. 22, 2015).

170. *See generally* Cervantes, *supra* note 168 (referencing exclusive and nonexclusive licensing).

171. Mendez, *supra* note 169, at 3.

172. *See supra* notes 151–57 and accompanying text

173. Robert H. Bork, *The Rule of Reason and the Per Se Concept: Price Fixing and Market Division II*, 75 YALE L.J. 373, 471 (1966) ("No rational owner of a valuable patent would use price control in its licenses to protect its own manufacturing operations since his net revenue would decrease.").

174. Blocking patents occur when an initial applicant obtains a patent, and a second applicant obtains a patent that builds on the first patent. Together, the two patent owners are prevented, or "blocked," from fully exploiting the improved invention because of the overlapping exclusive

product, then again it is in the practicing patent owner's interest to own the original patent. It can then engage in licensing to make the improved product, or receive payment for allowing the improver to practice the improved patent.

Thus, one sees that the advantages of having patent users be patent owners far outweigh any disadvantages from encouraging non-practicing patent owners to transfer their patents at the time of the 7.5-year maintenance fee payment. And recall that even at 7.5 years after issuance, so long as the non-practicing patent owner does not have more than 100 non-practiced patents, it will not owe any enhanced maintenance fees.[175]

The proposal also will encourage entities with more than 100 non-practiced patents to transfer them to those who will use them by the 7.5-year maintenance fee payment. If there is no other entity interested in practicing the patents, then the non-practicing owner will be under financial pressure to let the patent lapse because a large-entity owner will face a fee of $7200 to $36,000 to maintain the patent,[176] while a small entity will face a fee of $3600 to $18,000,[177] depending on how many non-practiced patents it owns. The disincentive to renew non-practiced patents is even stronger at the 11.5-year maintenance fee payment, when large entities with more than 100 non-practiced patents will face maintenance fees of $14,800 to $74,000 per patent,[178] and small entities with more than 100 patents will face maintenance fees of $7400 to $37,000.[179] This is all by design. Older, low-value patents are the very patents that may be most susceptible to being used for trolling or transferred to trolls.[180] Especially by the point of the 11.5-year maintenance fee payment, if there are no plans to practice the patent, it seems unlikely that the patent owner will commercialize the patent.[181] It is at the point of this realization that a patent owner is most likely to seek alternate ways of monetizing the patent, which will often result in economically wasteful rent-seeking behavior in the form of trying to

rights. Each will be able to exclude the other from using the improved technology. John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 442–43 (2004).

175. *See supra* note 158 and accompanying text.

176. *See supra* Table 1.

177. *See supra* Table 2.

178. *See supra* Table 1.

179. *See supra* Table 2.

180. Davis, *supra* note 165, at 437–38 (using Acacia Research Corporation as an example of an NPE that purchases patented technology as cheaply as possible from bankrupt companies and then either leverages the patent into an expensive license or engages a competitor in litigation).

181. Drug companies can be an exception, as they may not bring product to market until late in the patent life, depending on the clinical testing and regulatory approval process. But this proposal will not affect pharmaceutical companies by this proposal because they do not have large patent portfolios. *See, e.g.*, U.S. PAT. & TRADEMARK OFFICE, PATENTING BY ORGANIZATIONS pt. B (2011) (showing Pfizer Inc. with forty-three active patents).

extract money from either those who arguably practice the patent or those who simply do not want to pay litigation costs. Increasing the costs of maintaining the patents in force will make it more costly to hold unused patents for rent-seeking behavior. The fact that the maintenance fee enhancements are tiered adds extra incentive not to build up large portfolios of non-practiced patents. At base, the goal of this proposal is to make maintenance fees more effective at their basic purpose—culling non-socially beneficial patents to reduce the number of patent thickets and hold-ups.

C. *Required Disclosures*

The proposal's workability turns on being able to gauge, accurately and consistently, the number of patents under a company's common control. If patent owners can evade enhancement fees by transferring patents to subsidiaries or branches, thereby breaking down large portfolios, the incentive structure will fail. This proposal requires a patent owner to disclose all parent entities and all entities subject to its common control. Misrepresenting these facts would amount to fraud on the PTO, just as misrepresenting small-entity status constitutes fraud on the PTO.[182] The PTO need not start from scratch in developing a definition of common control; it can look to the tests used to evaluate affiliation when determining small entity status,[183] corporate law definitions of ownership and control,[184] and securities and tax law.[185]

Disclosure of related entities, portfolio size, and which patents are practiced by which products will yield benefits apart from discouraging the maintenance of older, low-value patents. As discussed above in Part I, notice problems cause or exacerbate many of the current problems in the patent system. Competitors cannot make informed decisions about designing around their competitor's products when it is not clear what patents the competitor holds or what patents cover which products.[186] Currently, no requirement exists for a patent holder to disclose what patents it has acquired or which patents it believes cover which products. The patent owner may mark certain products so as to give notice to others that the product is patented,[187] but it is not required to do so. Moreover,

182. 37 C.F.R. § 1.56 (2015) (discussing the duty to disclose information material to patentability).

183. 35 U.S.C. § 41 (2012); 13 C.F.R. § 121.801–.805 (2015).

184. *See* Dole Food Co. v. Patrickson, 538 U.S. 468, 474–76 (2003).

185. *See id.*

186. *See* BESSEN & MUERER, *supra* note 14, at 47.

187. By marking the patent, the owner qualifies to receive extra damages from the start of the infringing activity rather than limiting damages to infringement that occurs after another form of notice, such as the filing of an action for infringement or an informative letter, is provided to

without self-identification of ownership by patent holders, the public and competitors have no reliable way to know who owns which patents.[188]

Forcing patent owners to declare which of their patents cover which products and processes will significantly reduce uncertainty as to patent boundaries and coverage. Once a patent owner has listed each patent that reads on a particular product and each product upon which a particular patent reads, it will be much easier for competitors to know which aspects of the patent owner's technology are claimed to be patented. This will provide much greater certainty for competitors, who currently have to guess what patents in a portfolio might be asserted against their attempts to design around a patented invention.[189]

Professor Chien discusses the problems that arise from the inability to know who owns what patents due to lax recordation of assignments.[190] She describes how it is currently impossible to know who owns a particular patent because there are no requirements that companies record assignments of patents.[191] Even companies that do record patent assignments may refer to themselves inconsistently so that the PTO does not attribute the patents to a single entity.[192] In addition, patent owners may assign patents to shell companies without disclosing their affiliation

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the alleged infringer. *See* 35 U.S.C. § 287(a) ("In the event of failure so to mark, no damages shall be recovered by the patentee in any action for infringement, except on proof that the infringer was notified of the infringement and continued to infringe thereafter, in which event damages may be recovered only for infringement occurring after such notice.").

188. FED. TRADE COMM'N, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION 130 (2011) ("PTO records provide poor notice regarding current ownership of patents.").

189. *See* BESSEN & MEURER, *supra* note 14, at 54; Paul J. Heald, *Optimal Remedies for Patent Infringement: A Transactional Model*, 45 HOUS. L. REV. 1165, 1186 (2008) ("[T]he fuzzy boundaries of some patents can make it difficult for firms acting in good faith to answer two important questions: (1) Is the inventive firm's patent valid? and (2) Is my choice of alternative technology infringing?"); Peter S. Menell, *Governance of Intellectual Resources and Disintegration of Intellectual Property in the Digital Age*, 26 BERKELEY TECH. L.J. 1523, 1537 (2011) ("Furthermore, the boundaries of intellectual property rights can be difficult to ascertain. The intangible nature of intellectual property means that boundaries are defined by words as opposed to quantitative, geophysical measurements. The resulting disputes over claim interpretation play a central role in most patent infringement lawsuits."); Harry Surden, *Efficient Uncertainty in Patent Interpretation*, 68 WASH. & LEE L. REV. 1737, 1752 (2011) ("When a patent claim is uncertain because of a wide range of interpretive variability, a third party cannot easily determine its boundaries. This increases the information transaction costs for a firm of estimating and assessing infringement liability risk." (footnote omitted)).

190. Colleen Chien, *The Who Owns What Problem in Patent Law* 5 (Santa Clara Univ. Sch. of Law, Legal Studies Research Paper No. 03-12, 2015), http://ssrn.com/abstract=1995664.

191. *Id.* at 2–3.

192. *Id.* at 3 & n.9 ("One commercial service . . . has assembled a database that includes 2,317 different spellings of IBM.").

with the parent companies.[193] Some companies do this deliberately to disguise the ownership of the patents they intend to assert until the time of assertion.[194] The largest patent assertion firms, such as Intellectual Ventures and Acacia, are well known to have assigned their patents to numerous shell companies so as to disguise the ownership of the patents.[195]

Chien describes the problems that this lack of ownership information creates in the market for buying and selling patents as well as for competitors who might compete in fields arguably covered by the patents.[196] Patent assertion firms that purposely disguise ownership of patents may do so to maintain the element of surprise in asserting patents or to make it difficult for others to target their patent portfolios for reexamination or other validity challenges.[197]

Uncertainty and lack of transparency as to patent ownership do not serve public policy. While it may be advantageous to certain patent assertion firms, uncertainty as to patent ownership is contrary to the goals and purposes of patent law. As discussed in the beginning of this Article,[198] patents are issued to create incentives for invention and dissemination of innovation by allowing inventors to have exclusive rights over their inventions for twenty years.[199] As many scholars have pointed out, for patents to function efficiently in the market, the boundaries, status, and ownership of patents should be clear and transparent.[200] The boundaries of the patent must be known to avoid infringement, but the boundaries are often unclear. This creates uncertainty as to which patents need to be licensed (if they are available for licensing) and how an innovator can design its patent so as not to overlap with existing ones.[201] Patent ownership must be clear if the patent marketplace is to function efficiently. Participants in an industry need to know whom to contact to negotiate licenses.

193. *Id.* at 1.

194. *Id.* at 3–4 (noting that a preliminary analysis of patent litigation filings by "trolls" or "patent assertion entities" revealed that "in about a third of the cases, the plaintiff was not the patent owner of record as of the day the litigation was initiated").

195. *Id.* at 4.

196. *Id.* at 5.

197. *Id.*

198. *See supra* notes 5–13 and accompanying text.

199. Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 151 (1989) ("[T]he ultimate goal of the patent system is to bring new designs and technologies into the public domain through disclosure.").

200. *See supra* note 14.

201. *See* BESSEN & MEURER, *supra* note 14, at 54–56.

Furthermore, because approximately 2.1 million patents are in force,[202] in some industries it is very difficult, if not impossible, for a participant to know of every patent that might be asserted against it.[203] Notwithstanding that some industries include many tens of thousands of patents,[204] sophisticated participants in industries and sophisticated patent search firms are adept at finding patents in force that are directly on point.[205] The problem arises from the difficulty in finding and predicting which patents directed primarily to other products, processes, or industries could have claims that arguably read on the products or processes of an industry participant.[206] Given that fact, industry participants would like to know which patents well-known patent assertion firms own as well as which new patents these firms acquire. Patent assertion firms may prefer to keep this information secret in hopes that industry participants will successfully commercialize products and processes that the firm can then claim infringe its patents, requiring payment. This opportunistic assertion behavior does not serve any socially beneficial purpose. Rather, it is this sort of behavior that leads some to call such patent assertion firms "trolls," after the storybook creature that waits for unsuspecting people to pass over its bridge and then jumps up and makes demands in exchange for letting people cross the bridge.[207]

It makes sense to minimize the ability of assertion firms to take others by surprise. Forcing patent assertion firms to disclose all of the patents

202. *See* Dennis Crouch, *How Many US Patents Are In-Force?*, PATENTLY-O (May 4, 2012), http://www.patentlyo.com/patent/2012/05/how-many-us-patents-are-in-force.html.

203. *See* Albert P. Halluin, *Incorporation of Parts into the Whole: Avoiding Liability When Incorporating Nanotechnology Improvements*, 3 NANOTECHNOLOGY L. & BUS. 25, 29 (2006) ("This large number of patents and patent applications exemplifies the minefield that nanotechnology patents represent, making it difficult for practitioners to know if and which patent or multiple patents they may infringe.").

204. *See infra* Appendix.

205. *See* Jonathan S. Masur, *Patent Liability Rules as Search Rules*, 78 U. CHI. L. REV. 187, 204 (2011) ("In light of these increased incentives for suppliers to engage in search, patent holders would be able to reduce their own expenditures on search accordingly. Because search by patent holders is likely less efficient than search by commercial firms, this would likely reduce the amount of social waste generated as producers and consumers of intellectual property attempt to locate one another.").

206. *See id.* at 194 ("A patent may not contain the key words that a potential infringer would expect to find in a search, or it may concern an invention that appears largely unrelated to the technology at issue.").

207. *See* Tracie L. Bryant, Note, *The America Invents Act: Slaying Trolls, Limiting Joinder*, 25 HARV. J.L. & TECH. 687, 690 (2012) ("In invoking an image of a mythological creature that lies under a bridge and waits to impose a toll on unsuspecting travelers, the term 'patent troll' was popularized in 2001 by Peter Detkin, then Intel's general counsel."); *see also* PAUL GALDONE, THE THREE BILLY GOATS GRUFF (1973) (telling the story of a troll who lives under a bridge threatening to eat the goats that pass overhead).

they own across shell companies, subsidiaries, and other companies they control would help reduce the trolling problem. If industry participants know which patents belong to which patent assertion firms, then the participants can take extra care in searching these portfolios and can give such patents a wider berth, or they can simply attempt to instigate licensing negotiations before commercializing a product rather than afterward.

Requiring prompt registration and disclosure of patent ownership and transfer is beneficial in its own right, and the PTO could implement this separately from any maintenance fee enhancements. The difficulty is determining what penalties to impose for failure to disclose. Should a company be fined for failure to disclose properly? Should some of its patents be deemed unenforceable? Which ones? The problem with a harsh remedy such as unenforceability is that it will create large self-policing and transaction costs for patent owners, who will worry that a minor mistake could forfeit the patent. Adding another ground for patent unenforceability would also likely result in patent defendants spending inordinate time, money, and court resources making assertions of improper disclosure in attempts to make patents unenforceable. It was precisely this kind of litigation tactic that encouraged Congress to liberalize the law as to disclosures of prior art in patent applications.[208] Broadly imposing unenforceability for failing to properly disclose ownership would be contrary to Congress's policy of reducing litigation expenses surrounding technical missteps.

Tying the requirement to disclose this information about patent portfolios to the maintenance fee enhancements proposed in this Article has specific advantages over simply requiring such disclosure. Because each maintenance fee payment is tied to a specific patent, any penalties for nondisclosure that exceed fines can be tied to that specific patent. Thus, for the most egregious nondisclosures, the PTO could treat the patent as not having been maintained.

It is vital, however, not to make the patent-disclosure requirement so burdensome that it paralyzes the system or causes patent owners great costs. This is why it is probably best to require a patent owner to disclose only one product or process practiced by each of its patents rather than requiring disclosure of every version of each covered product. The disclosure system must be designed so that it is not too taxing for owners to disclose which patents they own and at least one product or process per patent that is covered, if any are. A patent owner's worry that it may inadvertently fail to include an affiliate when disclosing can be ameliorated by providing clear rules as to which entities are deemed

208. Robert A. Armitage, *Understanding the America Invents Act and Its Implications for Patenting*, 40 AIPLA Q.J. 1, 110–14 (2012) (describing how the America Invents Act changed patent law relating to prior art disclosures).

under common control and by providing a no-fault opportunity for an owner to correct good-faith errors. Finally, by providing that the owner need only identify one current use per patent, the system can ensure that labeling practiced patents is not too burdensome.

A number of other penalties short of making a patent unenforceable are possible as well. Instead of invalidating patents, the PTO could enhance maintenance fees related to nondisclosures. For example, for any maintenance filings that contain bad disclosures, the PTO could double or triple the already-enhanced maintenance fees as penalty for the lack of disclosure or inaccurate disclosure.

Aggregating patent ownership across related entities presents various challenges. First, there is the question of whether the PTO should require disclosure of all ownership interests. Should patent owners have to aggregate only patents owned by companies in which they have a majority ownership interest? Or should the standard instead be controlling interest? If so, should there be bright-line rules defining what a controlling interest is, or should there be a functional test? Certainly all patents owned directly by a firm and by all parents, subsidiaries, and sibling companies should be included.

But how should the PTO treat patent licenses when aggregating patents across companies to determine patent portfolio size? Should it attribute exclusive licenses to the licensor, the licensee, or both? Legal ownership of the patent plainly resides with the licensor. Licensees that receive nonexclusive licenses should not have the nonexclusively licensed patents considered part of their patent portfolios because a nonexclusive license is basically protection against being sued for using the patent; it gives no right to enforce the patent.[209]

What about exclusive licenses to a patent? The Federal Circuit has distinguished between two types of exclusive patent licenses. For patent licenses that convey "all substantial rights" in a patent, the licensee is, for most purposes, treated as if it owns the patent.[210] For instance, the licensee need not join the patent owner as a plaintiff in a patent suit.[211] For "exclusive" licenses that convey fewer than all substantial patent rights, however, the licensee must join the patent owner to the suit to

209. *See* Abbott Labs. v. Diamedix Corp., 47 F.3d 1128, 1131 (Fed. Cir. 1995) (holding that a licensee with fewer than all substantial rights "may obtain sufficient rights in the patent to be entitled to seek relief from infringement, but to do so, it ordinarily must join the patent owner"); *see also* Intellectual Prop. Dev., Inc. v. TCI Cablevision of Cal., Inc., 248 F.3d 1333, 1348 (Fed. Cir. 2001) ("However, this court has recognized the principle that a patent owner may be joined by an exclusive licensee.").

210. *See Abbott Labs.*, 47 F.3d at 1131.

211. *See id.*

enforce the patent.[212]

It makes sense to treat all licensed patents with all substantial patent rights as part of the licensee's patent portfolio. After all, the licensee is acting in the place of the patent owner for all purposes relevant to determining disclosure and enhanced maintenance fees. Thus, if a firm owns 600 non-practiced patents outright and has exclusive licenses that grant it all substantial patent rights in another 500 non-practiced patents, the firm would qualify for a maintenance fee enhancement of three times base at the 7.5 and 11.5-year maintenance fee payment periods.[213] For a small entity this would amount to $5400, and for a large entity the fee would be $10,800.[214]

Should a patent owner that has granted an exclusive license giving all substantial patent rights to the licensee have that patent counted in its patent portfolio for purposes of calculating maintenance fee enhancements? It would seem that if the patent owner does not have the right to enforce the patent, then it should not have that patent counted as part of its portfolio. But what if patent owners tried to game the system by granting licensees all substantial patent rights in their non-practiced patents while making the license revocable upon demand by the licensor? This would allow a licensor to license its patents to numerous other parties that will fall below the 100 non-practiced patents threshold. If the owner of the patent can revoke the license at any time, then companies could escape paying enhanced maintenance fees by licensing their patents in this way and only revoking the licenses of the patents that they want to enforce at the time of enforcement. For this reason, all patents that a firm owns across its affiliated entities must be counted toward its own patent portfolio. This will prevent gaming the system, and there is no obvious downside to it. If a patent owner is willing to transfer all substantial rights in a patent, then—if it is worried about having too many non-practiced patents in its portfolio—it can simply assign the patent instead, and the patent will no longer be counted as one of the firm's patents.

What if a firm grants an exclusive license that gives all substantial patent rights for a period of time, say five years, and does so irrevocably? In that case, it might seem reasonable not to attribute the patent to the patent owner during the time of the exclusive license. But it is probably unnecessarily complicated to not count such transactions, and so it would be better to simply attribute all owned patents to their owner.

What about the licensees of exclusive licenses? It makes sense to count all patents for which they have exclusive licenses, and which they can therefore enforce, as part of their portfolios—whether or not they have the form of exclusive license that requires them to join the patent

212. *Id.*

213. *See supra* Tables 1 and 2.

214. *See supra* Tables 1 and 2.

owners to any enforcement suits. Obviously, licensed patents that licensees can enforce without naming the owner to the lawsuit are patents the licensee controls for all purposes related to the maintenance fee enhancements proposed in this Article. As for licensees holding "exclusive" licenses that fail to give all substantial patent rights, and that therefore can only be enforced if the owner joins the suit, it still makes sense to count these patents as part of these licensees' portfolios. To do otherwise would again tempt assertion entities to game the system and hold exclusive licenses that fail to give all substantial rights but then to have separate contractual relationships with the patent owners requiring them to join any lawsuits. To prevent this gaming, it makes sense to attribute all patents subject to such licenses to the portfolios of both the owners and the licensees. This will not negatively affect firms that purchase exclusive licenses to patents that they need for their business. The enhanced maintenance fees will penalize only firms that own or license more than 100 non-practiced patents. There are few legitimate reasons to exclusively license patents that one never intends to use.

What about patent pools? Should patents held in a pool be attributed to the portfolios of each member of the pool? In almost any case the answer should be no. The typical patent pool operates as a means for two or more firms to cross-license any patents needed to make products or processes in a particular space. Typically, these licenses are nonexclusive, and therefore only the owners can enforce them. If a case arose in which two parties cross-licensed patents exclusively such that either could actually enforce them, then treating this as an exclusive license and attributing the patents to each entity would make sense, as explained above in discussing dual attribution of exclusively licensed patents.

III. BENEFITS

This Part explains the benefits of the proposed maintenance fee enhancement. This Article's proposal decreases the size of patent portfolios, avoids the standard inter-industry loggerheads, and increases disclosure as to patent boundaries and ownership. Further, the proposal provides more funds for the PTO.

A. *Decrease the Size of Patent Portfolios*

First, increasing the cost of maintaining non-practiced patents at the 7.5 and 11.5-year renewals should decrease the number of non-practiced patents in patent owners' portfolios. Whenever the expected net present benefit of the non-practiced patent is less than the enhanced maintenance fee, it will not make sense to maintain the patent. While the doubling of the fee on a few patents is not a major disincentive, for large entities that hold thousands of non-practiced patents, the enhancements can ramp up

into the high five figures per patent, which should provide real deterrence against maintaining patents held speculatively against future monetization opportunities.

B. *Avoid the Standard Inter-industry Loggerheads*

Another benefit of this Article's proposal is that it overcomes one of the major roadblocks to patent reform: too many proposed reforms have pitted one industry against another.[215] Some industries have favored previously suggested reforms to deal with assertion entities or patent thickets, while others have opposed them.[216] These proposals have included weakening the availability of injunctions, allowing compulsory licenses, raising the standards for patentability, making reexamination and invalidation of patents easier, and changing the presumption of validity.[217] While many have proposed and lobbied these and other suggested reforms over the years, and a number of reform proposals have made it into failed patent reform bills in Congress,[218] the powerful opposition of different industry groups prevented any of these reforms from going into effect.[219] Instead, the AIA took a few modest steps

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215. John R. Allison & Mark A. Lemley, *The (Unnoticed) Demise of the Doctrine of Equivalents*, 59 STAN. L. REV. 955, 972 (2007) ("It is clearer and clearer that different industries experience the patent system in very different terms. They innovate differently, they get patents differently, and they use those patents differently. These differences have manifested themselves most recently in debates over legislative patent reform, which have pitted the biotechnology and pharmaceutical industries against the information technology industries on virtually every issue." (footnote omitted)).

216. Sarah A. Geers, Comment, *Common Sense and the Fact Finder Without Skill in the Art: The Role of Objective Evidence in Achieving Proper Technology Specificity*, 40 SETON HALL L. REV. 225, 259 (2010) ("For these reasons, the computer industry is particularly vulnerable to patent thickets, innocent infringement, and patent trolling, and the computer industry has thus led the call for patent reform." (footnote omitted)).

217. *See* Lemley, *supra* note 85, at 1529 (recommending a lower evidentiary standard for initially granted patents); Raymond A. Mercado, *The Use and Abuse of Patent Reexamination: Sham Petitioning Before the USPTO*, 12 COLUM. SCI. & TECH. L. REV. 92, 98, 155 (2011) (proposing the creation of a cause of action for patent holders "subject to unwarranted reexamination proceedings"); Matthew Sag & Kurt Rohde, *Patent Reform and Differential Impact*, 8 MINN. J.L. SCI. & TECH. 1, 73 (2007) (proposing a variable standard of patent validity such that unchallenged patents "receive a weak presumption of validity" and patents that pass post-grant review receive "a strong presumption of validity").

218. *See* Greg H. Gardella & Emily A. Berger, *United States Reexamination Procedures: Recent Trends, Strategies and Impact on Patent Practice*, 8 J. MARSHALL REV. INTELL. PROP. L. 381, 408 n.223 (2009) (citing Patent Reform Act of 2009, H.R. 1260, 111th Cong. § 6(a) (as referred to H.R. Comm. on the Judiciary, Mar. 3, 2009)) (noting that the Patent Reform Act of 2009 proposed new procedures for reexamination to improve patent quality).

219. *See* John M. Golden, *Principles for Patent Remedies*, 88 TEX. L. REV. 505, 505 (2010) ("On Capitol Hill, Orwellian-named entities representing a variety of industry heavy-weights have poured millions into lobbying for or against patent reform bills, with a major focus of dispute

toward reform because those were the only reforms that could attract enough support.[220] Thus, while the AIA has somewhat revamped post-grant review and reexamination processes,[221] and added some prior user rights,[222] it passed no major reforms addressing issues of patent thickets, trolling, or the aggressive and chilling use of large patent portfolios.[223] Typically, the pharmaceutical and biotechnology industries opposed the kinds of reforms that interested the high-technology and software industries.[224] The benefit of the solution this Article proposes is that it affects only those with large portfolios of non-practiced patents. The industries with the largest patent portfolios are high technology and software.[225] These are also the industries most desperate for reform,[226] so they should not oppose this proposal. In the meantime, pharmaceutical, biology, and life-sciences firms typically have smaller patent

being legislative language regarding damage awards."); David W. Opderbeck, *Patent Damages Reform and the Shape of Patent* Law, 89 B.U. L. REV. 127, 136 (2009) ("Opposition to the damages reform proposals comes from many small and mid-size technology companies, particularly those that manufacture and sell components that are incorporated into end-user products by other manufacturers, and from academic research institutions, labor unions, the pharmaceutical and biotechnology industries, and the American Bar Association's Section on Intellectual Property Law.").

220. *See* Gregory N. Mandel, *Patents: Will America Reinvent Itself? Patent Reform in 2011*, A.B.A: BUS. L. TODAY (Aug. 18, 2011), http://apps.americanbar.org/buslaw/blt/content/2011/08/keepingcurrent-patents.shtml ("To date, none of the patent reform bills have passed. Patent legislation introduced this year, the 'America Invents Act', incorporates a more modest set of reforms and has been met with broader backing." (citations omitted)).

221. *See* Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 6, 125 Stat. 284, 299–300 (2011).

222. *See id.* at § 5, 125 Stat. at 297.

223. Mike Masnick, *Patent Office Seeking Comments on How to Implement a 'First to File' Regime Instead of 'First to Invent*,*'* TECHDIRT (July 31, 2012, 10:58 PM), http://www.techdirt.com/articles/20120731/01341819888/patent-office-seeking-comments-how-to-implement-first-to-file-regime-instead-first-to-invent.shtml ("Nothing in the AIA actually dealt with the problems of patent trolls or patent thickets.").

224. *See* Opderbeck, *supra* note 219, at 187 ("The principal architects of reform are established computer technology companies for which patents are not a significant form of protection. They wish to squeeze patents further into the shape of a narrow contract-like right subject to a liability rule. The principal opponents of reform are patent-rich industries, such as pharmaceuticals and biotechnology, which wish to retain a broad patent franchise subject to a property rule.").

225. *See infra* Appendix.

226. *See* Opderbeck, *supra* note 219, at 187; *see also* Carl E. Gulbrandsen et al., *Patent Reform Should Not Leave Innovation Behind*, 8 J. MARSHALL REV. INTELL. PROP. L. 328, 329 (2009) ("More recently, the major driver for reform has been a coalition of large information technology and financial service companies . . . .").

portfolios;[227] thus, this proposal is less likely to affect them, and they should not find it terribly objectionable. In addition, an advantage of the PTO using its fee-setting authority to adopt this Article's proposed enhanced maintenance fee system is that neither legislation nor industry approval is needed.[228]

C. *Increase Disclosure as to Patent Boundaries and Ownership*

The effect that this proposal will have on patent disclosures may be just as beneficial as the effect it will have on decreasing the number of non-practiced older patents. Part II, above, discusses the numerous problems that exist with inadequate patent disclosure. This Article's proposal will alleviate many of the problems associated with this lack of clarity by requiring disclosure of patent ownership and practice as well as by making available the determination of patent boundaries without resorting to litigation.

Under the terms of this Article's proposal, patent owners will have to identify the patents in their portfolios when they pay maintenance fees. As explained above, patent owners will have to submit a list of all patents they own and that any entity they control owns when they make maintenance fee payments. In that submission, patent owners will have to identify which patents they are practicing and which they are not. The fact that some patent assertion firms purposely create numerous shell companies to hide the true ownership of the patents they control provides the best evidence that patent ownership information is important to potential defendants.[229] If a potential defendant knows which patents a patent assertion firm holds, the defendant can take steps to better protect itself from rent-seeking patent assertion behavior. First of all, potential defendants can try to give a wider berth to patents held by assertion firms. Being more careful about designing around the patents held by assertion firms is one strategy; simply avoiding certain areas in which assertion firms have patents is another. Many potential defendants, however, will not want to change their business strategies simply to avoid potential lawsuits over patents that may be infringed, especially given the number of patents out there and the uncertainty of patent boundaries.

Perhaps more importantly, companies can search the portfolios of patent assertion firms to determine whether they should initiate licensing discussions ahead of time, before they make major investments in a potentially infringing product. This would help mitigate the hold-up problem that can occur when assertion firms wait to assert their patents

227. *See* Adelman & DeAngelis, *supra* note 17, at 1697 ("The small patent portfolio sizes also provide indirect evidence that patent anticommons are uncommon in the biotechnology sector.").

228. *See supra* notes 145–49 and accompanying text.

229. Chien, *supra* note 190, at 6.

until a company has made substantial investments in developing, manufacturing, and marketing a product. Currently, even if a company conducts a prior art search, it can be time consuming and difficult to find the current owner of any potentially problematic patents, sometimes because the owners do not want to be found prior to infringement. Allowing companies to monitor the portfolios of assertion entities will help decrease an information asymmetry that is costly to active industry participants and is only beneficial to patent owners in ways that are socially detrimental.[230]

D. *More Funding for the PTO*

Another advantage of the proposal is that it better funds the PTO. By charging high maintenance fees to those with large portfolios of non-practiced patents, the PTO will also be providing itself with enough income to meet its goals of increasing hiring and decreasing the patent application backlog.

IV. COSTS, DISADVANTAGES, OBJECTIONS

This Part addresses some potential objections to the maintenance fee solution that this Article proposes. Some may think this proposal will make the patent system more expensive, while others might worry that it will increase the burden on patent holders. Possible gaming concerns also exist as well as concerns that patent assertion entities will move toward portfolios of young patents. This Part attempts to ameliorate these concerns.

A. *Objection: Just Increase Maintenance Fees Across the Board*

Some might argue that all of the disclosure and non-practiced patent portfolio size calculations called for in this Article are a waste of time and that if decreasing the size of patent portfolios is desired, then it would be better just to increase patent fees across the board. But sizeable across-the-board increases would decrease patenting. It is better to let patents bloom young and then weed out the non-practiced patents later. This is also in keeping with the PTO's proposed approach of increasing maintenance fees but decreasing the initial costs of getting patents.[231] A focus on making patent filing and prosecution less expensive, and only increasing the costs significantly about halfway through the life of a patent, is an approach that encourages innovation and dissemination while also weeding out low-value patents that may be used in ways that

230. Patent assertion firms can acquire more patents at any time and any patent owner may choose to assert its patents if it thinks they are being infringed. But the greatly increased transparency created by this proposal will make such strategic behavior a much smaller problem.

231. *See supra* notes 145–49 and accompanying text.

are not beneficial to society.

B. *The Proposal Makes the Patent System More Expensive, Which Decreases Incentives to Innovate*

Another possible objection is that this Article's proposal makes the patent system more expensive, which will decrease the incentive to innovate. This objection need not occupy anyone long, however, because as explained above, the costs of patenting will not increase for the first half of the patent's life. Thereafter, patentees will be encouraged to get rid of low-value patents. A firm can maintain any non-practiced patent that it plans to practice in the future, or which the firm otherwise knows is valuable, if its net present value is greater than the enhanced maintenance fee. Moreover, any practiced patent will not be subject to enhanced maintenance fee payments.

C. *The Proposal Burdens Patent Holders*

Another possible objection is that this Article's proposal will be expensive and burdensome for patent holders. It is true that there will be some significant expenses for firms with large portfolios, especially at first, as firms spend time analyzing which of their patents they practice and which products or processes the patents cover. This burden should not be understated. Accordingly, it may make sense to give a fairly long lead-in time to allow firms to comply. But it should also be noted that while this will be burdensome to patent owners, the current system with all of its uncertainty as to patent ownership and coverage is already burdensome and costly to others. Thus, because the burden of determining patent ownership and coverage cannot be eliminated, it makes sense to assign that determination to the party that can calculate it at the lowest cost—the patent owners. In the aggregate, shifting these burdens to the patent owners should increase social welfare.

D. *Participants Will Game the System*

Another possible objection is that the proposal is susceptible to gaming. For instance, patent owners may assign their patents to unrelated entities with a right to a portion of any profits that are gained from enforcing the patent. This should not be worrisome, however, because if the owner assigns the patents to patent assertion entities, then they will be subject to the increased maintenance fees as their portfolios of non-practiced patents grow. A contractual obligation to share profits does not change the incentive structure set out by the maintenance fee enhancements proposed in this Article.

E. *NPEs Will Collect Portfolios of Young Patents*

Another effect of this Article's proposal may be to encourage patent assertion entities to move toward portfolios of young patents. An assertion firm with young patents will not incur the enhanced maintenance fees that only begin 7.5 years after the PTO issues the patent. It is true that assertion firms may try to avoid older patents, but this is not a problem. If assertion firms are not buying older patents, and it becomes more expensive to maintain them if a firm has more than 100 non-practiced patents, then the decreased market for these older patents will mean that fewer of them will be maintained. This will be true even if the patent owners do not qualify for enhanced maintenance fees because just paying the unenhanced fees will not be worthwhile if the patent is nearly worthless. And even if older patents are maintained, as a practical matter, if assertion firms are not holding them, then the chances of socially harmful enforcement are greatly decreased. Thus, industry participants will be able to breathe easier despite potentially being covered by old, non-practiced patents. Finally, owners of young patents, much like parents of young children, tend to be very hopeful for the future of their babies. They are unlikely to part with these young patents as cheaply as they will if they are unsuccessful at commercializing them for ten years. Thus, while assertion entities may want larger portfolios of young patents, the costs of these patents should drive the assertion entities toward smaller portfolios than would be required for efficient operation under the status quo. Finally, to the extent that patent assertion entities increase their demand for young patents, this increases the incentive to invent and patent new technology, rather than to focus on extracting rent from old patents. This should be a socially beneficial shift.

CONCLUSION

This Article recommends that the PTO take full advantage of its fee-setting authority by enhancing patent maintenance fees as a way to discourage patent owners from keeping large portfolios of non-practiced patents. The Article explains that it is beneficial to discourage large portfolios of non-practiced patents regardless of whether the patent owner is an NPE or an industry participant that practices many of its own patents. In the current environment, NPEs may buy a number of older, non-practiced patents cheaply and then try to monetize the patents through rent-seeking behavior. The current environment also allows industry participants to use their large patent portfolios, including their non-practiced patents, in ways that are socially detrimental if not anticompetitive. This Article's proposal would decrease the number of older, non-practiced patents and thus would help alleviate both of these harms. This Article's proposal has another major benefit. In the course of

certifying their practiced and non-practiced patents for purposes of determining maintenance fee enhancements, patent owners will provide the PTO and the public with very valuable information as to patent ownership and patent coverage of existing products and processes. This Article also considers objections to the proposal and rejects them as either not significant or vastly outweighed by the benefits of this proposal. Accordingly, this Article maintains its position that the proposal made herein could provide major benefits to participants in the patent system.

APPENDIX

Patent Issuances 1994–2011

Firm	Issued U.S. Patents 1994–2011
IBM	58,692
Samsung Electronics Co., Ltd	40,548
Canon K. K.	34,132
Sony Corp.	24,538
Toshiba Corp.	24,445
Hitachi Ltd.	22,805
Fujitsu Limited	20,845
Intel Corp.	20,184
NEC Corp.	19,569
Micron Technology, Inc.	19,101
Microsoft Corp.	17,587
General Electric Co.	17,483
Mitsubishi Denki K.K.	15,499
Hewlett–Packard Co.	13,900
Seiko Epson Corp.	13,226
Texas Instruments, Incorp.	12,668
Seimens Aktiengsesellschaft	12,162
Xerox Corp.	11,331
Honda Motor Co., Ltd.	10,547
Ricoh Co.	10,211
Sharp Corp.	9998
Robert Bosch GmbH	9599
LG Electronics Inc.	8879
Philips	7968
Infineon Technologies AG	7435
Panasonic Corp.	6990
Cisco Technology, Inc.	6703
Du Pont	6663
Toyota Jidosha K. K.	6420
Hon Hai Precision Ind. Co., Ltd.	6252
Honeywell International Inc.	5951
Sanyo Electronic Co., Ltd.	5837
Telefonaktiebolaget LM Ericsson	5696
Broadcom Corp.	5678

Firm	Issued U.S. Patents 1994–2011
Boeing Co.	5487
Semiconductor Energy Laboratory Co., Ltd.	5439
Brother Kogyo K. K.	5188
Nokia Corp.	4837
Hynix Semiconductor Co.	4813
Qualcomm, Inc.	4344
Apple	3416
Medtronic Inc.	3179
AT&T Intellectual Property I, L.P.	1752
Boston Scientific Scimed, Inc.	1,658
GM Global Technology Operations, Inc.	1,092
Renesas Electronics Corp.	984
Fujifilm	963
Google, Inc.	900
Silverbrook Research Pty. Ltd.	812
Research In Motion	663
LG Display Co., Ltd.	643
Denso Corp.	631
Fuji Xerox Co. Ltd.	582
Marvell International Ltd.	517
Electronics and Telecommunications Research Inst.	505
Hong Fu Jin Precision Industry (Shenzhen) Co. Ltd	495
Freescale Semiconductor, Inc.	483
SAP Aktiengesellschaft	477
Oracle America, Inc.	475
Industrial Technology Research Inst., Taiwan	462
3M Innovative Properties Company	457
Tokyo Electron Limited	456