# HOW WEAK ARE STRONG PATENTS: PATENT HOLDOUT AND SMALL(ER) TECHNOLOGY FIRMS

*Bowman Heiden*[†] *and Matthew Rappaport*[††]

## ABSTRACT

Most of the academic and policy attention in the past two decades has been focused on patent holdup theory that posits how weak patents asserted under the threat of injunctive relief can extract greater value than their true worth. This is peculiar given that the *eBay* ruling in 2006, and its subsequent interpretation by the courts, has greatly reduced the opportunity for injunctive relief in the United States. This Article presents a study that instead investigates the symmetrical theory of patent holdout whereby strong patents asserted in a regime of weak injunctive relief are only able to extract value below their true worth. The focus of the study is on small(er) technology firms (STFs), which are generally understood as critical to economic growth, in contention with much larger incumbent market actors.

The Article's study finds that because there are no patent police, the high cost and long timeframes of U.S. litigation combined with the subjective nature of patentability and infringement create an intrinsic patent holdout bias in the U.S. patent system, especially for STFs, as the burden of enforcement falls on the patent holder. In addition, this intrinsic bias is exacerbated by recent extrinsic judicial and legislative changes that reduce access to injunctive relief and increase opportunities for invalidity, which has created a systematic incentive for patent holdout beyond circumstantial bad-faith behavior by individual actors.

Preliminary statistical results show that: (1) both operating companies (OPCOs) and non-practicing entities (NPEs) litigate as a means to settle licensing-based infringement disputes; (2) very few small firms in the past ten years have received court-awarded damages, and fewer have ever received an actual payment; (3) the time in litigation ranged from 30 to 98 months, with most still ongoing; and (4) several $100M+ cases were vacated after years of litigation over legal technicalities that could have been known at the outset. This implies that the more ways a patent holder can potentially lose, the more incentive for patent holdout.

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† Executive Director of the Tusher Initative for the Management of Intellectual Capital, Institute of Business Innovation, Haas School of Business, University of California, Berkeley.

†† Lecturer and Program Manager, Tusher Initiative for the Management of Intellectual Capital, Institute of Business Innovation, Haas School of Business, University of California, Berkeley. This project has been supported by the 4iP Council. The authors are grateful for comments from Irving Rappaport and the participants of the Berkeley-NYU Symposium on The Impact of the Patent System on Markets for Technology.

In addition, two case studies were conducted, *Sonos v. Google* and *Centripetal v Cisco*. The results described in this Article show that: (1) both *Sonos* and *Centripetal* provide evidence of systematic patent holdout that incentives litigation over settlement; (2) the court in the *Centripetal* case also cited bad-faith behavior leading to enhanced damages for willful infringement; (3) both STFs and large companies are willing to use the Patent Trial and Appeal Board (PTAB) in litigation (e.g. Sonos as well as Google and Cisco filed IPRs); (4) the result of the appeal of Sonos's preliminary win at the International Trade Commission (ITC) will provide evidence on whether extra-judicial orders can facilitate settlements in place of traditional court injunctions; and (5) the enhanced damages award in the *Centripetal* case raises the question as to whether the use of willful infringement can provide adequate remedies in equity for a patent holder and disincentivize patent holdout *ex ante*.

The study also develops an enhanced theoretical framework for patent holdout in the STF context. Further empirical research is required to better measure the systematic scale and systemic economic impact of patent holdout for STFs, especially given that much of the evidence of systemic patent holdout will manifest in STFs unable to litigate, accepting forced settlements, or failing to receive venture capital (VC) investment.

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## I. THE WEAKENING OF THE U.S. PATENT SYSTEM AND THE IMPACT ON SMALL(ER) TECHNOLOGY FIRMS (STFS)

From 10,000 feet, the patent system appears to be an elegantly designed institutional marvel that facilitates innovation by balancing ownership and access through a time-limited property right. However, on the ground, especially when conflict arises, it is a complex system of trench warfare—expensive, lengthy, and unpredictable, which can be an invitation for bad-faith behavior by both patent holders and infringers. In parallel, the jurisprudence of patent enforcement continues to oscillate over time between states of relative strength and weakness. Thus, it could be said that the patent system faces challenges both intrinsic and extrinsic in nature:

- Intrinsic challenges—fundamental difficulties inherent in the nature of a technology-based property right system, including[1]:
    - The cost of judicial action
    - The length of time of adjudication
    - The subjective nature of patentability and infringement
- Extrinsic challenges—the evolution of technology as well as patent jurisprudence, legislation, and political appointments that can impact the

1. The cost and timeframe of patent litigation is different in other countries (e.g., Germany and China), but are treated as fundamental feature of the U.S. legal system in the context of this Article.

efficacy of existing and future R&D investments and patents, including[2]:

- Changes to patentability criteria, such as eligibility and non-obviousness
- Changes to equitable remedies, such as injunctions, damages, and declaratory judgment availability
- Changes to administrative procedures at the USPTO or district courts
- Technological change and convergence

In addition, these challenges can be exacerbated by globalization as patent system norms differ across countries and regions with their own intrinsic and extrinsic challenges as well as potential geopolitical strategies. All-in-all, an effective patent system needs to manage equity in the face of growing actor heterogeneity and technology and political change.

However, the patent system has historically fluctuated between eras of strength and weakness. In recent years, starting at the beginning of this century, the pendulum began to swing again toward a weaker patent regime, departing from the formerly pro-patent era that began in the early 1980s with the establishment of the Court of Appeals for the Federal Circuit (CAFC). This swing, starting roughly with the *eBay* decision in 2006, was primarily prompted by the rise in litigation by non-practicing entities (NPEs), who could sue operating companies (OPCOs) for patent infringement without the risk of counter-assertion. This patent-based business model launched the narrative of the "patent troll," characterized as wielding low-quality patents in an overly patent-friendly legal environment to extract unfair settlements from innocent OPCOs. While bad-faith actors existed, the patent troll narrative painted the entire patent licensing ecosystem with a pejorative brush. As political support mounted, the rhetoric changed from patents as a tool to incentivize innovation to patents as a thicket to block innovation.

Starting with the *eBay* decision in 2006, both the U.S. Supreme Court and Congress have generated opinions and legislation that, in aggregate, have weakened the patent system by:

- Reducing the scope of patentable subject matter (e.g. *Mayo, Bilski, Alice, Myriad*)[3]

2. For example, the *Alice* case on patent eligibility of software-related patents not only impacted future R&D and patenting decisions, but also previous decisions that were made in good-faith in a pre-*Alice* world. *See* Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 573 U.S. 208 (2014).

3. Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc., 566 U.S. 66, 67–69(2012); Bilski v. Kappos, 561 U.S. 593, 593–96 (2010); Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 573

- Increasing the ease and opportunity to invalidate patents (e.g. *KSR,* AIA/PTAB*, Nautilus*)[4]
- Reducing the availability of injunctive relief (e.g. *eBay*)[5]
- Reducing the availability of venue choice (e.g. *TC Heartland*)[6]
- Increasing the ease to bring declaratory judgment actions by those accused of infringement (e.g. *Medimmune*)[7]

Table 1.1 below provides an overview of several key judicial and legislative changes to the U.S. patent system in the past two decades with empirical evidence of the impact to the patent system.

**Table 1.1: Summary of key judicial and legislative changes impacting the patent system from 2006.**

| Precedent | Date | Subject matter | Impact on patent system |
|---|---|---|---|
| *eBay*[8] | 2006 | Injunctive relief | Reduced injunctive relief as a remedy[9]:<br>Total injunction rate reduction: From 95% to 72.5%<br>Patent assertion entity (PAE) injunction rate reduction: From 95% to 16% |
| *KSR*[10] | 2007 | Validity (Obviousness) | Greater invalidation by obviousness[11]:<br>CAFC invalidation: From 40% to 57.4%<br>District court invalidation: From 6.3% to 40.8% |

U.S. 208, 212–14 (2014); Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576, 578 (2013).

4. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 400–404 (2007); Leahy-Smith America Invents Act, Pub. L. 112-29, 125 Stat. 284-853, at 313–15(2011); Nautilus, Inc. v. Biosig Instruments, Inc., 572 U.S. 898, 899–900 (2014).

5. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 388 (2006).

6. TC Heartland L.L.C. v. Kraft Foods Group Brands L.L.C., 581 U.S. 258, 262 (2017).

7. MedImmune, Inc. v. Genentech, Inc., 549 U.S. 118, 118–19 (2007).

8. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006).

9. Christopher B. Seaman, *Permanent Injunctions in Patent Litigation After* eBay*: An Empirical Study*, 101 IOWA L. REV. 1949, 1983–88 (2016).

10. KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007).

11. Ali Mojibi, *An Empirical Study of the Effect of* KSR v. Teleflex *on the Federal Circuit's Patent Validity Jurisprudence*, 20 ALB. L. J. SCI. & TECH. 559, 581–84 (2010).

| | | | |
|---|---|---|---|
| AIA[12] | 2011 | Validity | Increased invalidation at USPTO[13]:<br>PTAB challenged claims: 20,247 claims (2019)<br>PTAB invalidated claims: 25% (2019) |
| *Alice*[14] | 2014 | Validity (Eligibility) | Reduced patent applications at USPTO and increased Federal Circuit invalidation rate:<br>USPTO application reduction: 29.6%[15]<br>CAFC § 101 invalidations: 78.8%[16] |
| *TC Heartland*[17] | 2017 | Venue | Shifted venue choice from plaintiffs to defendant's jurisdiction. |

However, not all judicial rulings during this period have negatively impacted patent holders. The CAFC's ruling in *Berkheimer* may reduce early invalidation orders based on eligibility, the *Microsoft* case affirmed that invalidity must be proven by clear and convincing evidence, and the *Halo Electronics* case lowered the barrier for enacting enhanced damages for willful infringement.[18] Some rulings also have differentiated impacts on specific industries (e.g., *Alice* on IT, *Mayo* on medical diagnostics, *Bowman* on agricultural biotech, and *Myriad* on genetics). Furthermore, a more detailed investigation is necessary to better

12. Leahy-Smith America Invents Act, Pub. L. 112-29, 125 Stat. 284-853 (2011).

13. USPTO, BOARDSIDE CHAT: NEW DEVELOPMENTS (2020), https://www.uspto.gov/sites/default/files/documents/PTAB_boardside_chat_new_trial_stats_sas_and_operational_faqs_06_11_2020.pdf.

14. Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 573 U.S. 208 (2014).

15. Jay P. Kesan & Runhua Wang, *Eligible Subject Matter at the Patent Office: An Empirical Study of the Influence of* Alice *on Patent Examiners and Patent Applicants*, 105 MINN. L. REV. 527, 563 (2020).

16. *See* C. Graham Gerst & Paul Choi, *Lessons From a Quantitative Analysis of the Federal Circuit's Section 101 Decisions Since* Alice, IP WATCHDOG (Sept. 2, 2020), https://ipwatchdog.com/2020/09/02/lessons-quantitative-analysis-federal-circuits-section-101-decisions-since-alice/id=124790/; *see also* Mark A. Lemley & Samantha Zyontz, *Does* Alice *Target Patent Trolls?*, 18 J. EMPIRICAL LEGAL STUD. 47, 63 (2021) (finding a 63.1% invalidation rate in U.S. federal court).

17. TC Heartland L.L.C. v. Kraft Foods Group Brands L.L.C., 581 U.S. 258 (2017).

18. *See* Michael Cicero, *Piercing* Halo*'s Haze at Year Five: Smoke Clearing on Enhanced Damages*, IP WATCHDOG (June 13, 2021), https://ipwatchdog.com/2021/06/13/piercing-halos-haze-year-five-smoke-clearing-enhanced-damages/id=134534/ for preliminary evidence of an increase in enhanced damage awards post-*Halo*.

understand the likely varied impact of the current patent system across the heterogeneous actors that use the patent system.

**Figure 1.1: Overview of U.S. patent litigation activity from 2005–2020.[19]**

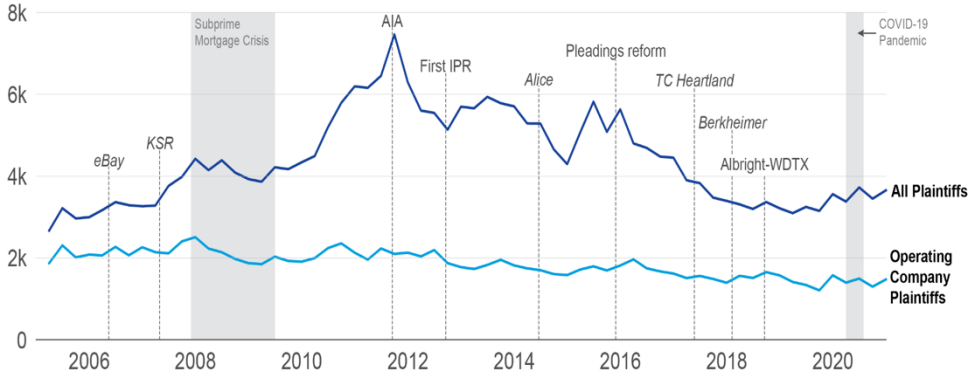



Figure 1.1 above provides an overview of patent litigation activity in the United States from 2005–2020, annotated with key judicial and legislative events that have impacted the patent system over that period.[20] In the aggregate, OPCO-initiated litigation is rather flat, with a small overall decline, while NPE-initiated litigation has both risen and fallen during the period. However, digging deeper into the litigation details reveals two insights that are important for this study[21]:

1. 70–80% of the NPE litigation involved patents from OPCOs, which means that between 82–92% of all the litigation in the period involved technology developed by OPCOs.
2. The growth of litigation finance to support high-quality patent portfolios.

One of the most important constituents of the patent system is the small(er) technology firm (STF) that often relies on patent protection as an important tool to compete against larger incumbent actors that can have much greater market power.[22] While the patent system is a means to democratize

19. *What 15 Years of US Patent Litigation Data Reveal About the IP Market*, RPX INSIGHTS (Jan. 25, 2021), https://insight.rpxcorp.com/news/65081-what-15-years-of-us-patent-litigation-data-reveal-about-the-ip-market.

20. *See id.*

21. *See id.*

22. *See* JONATHAN M. BARNETT, INNOVATORS, FIRMS, AND MARKETS: THE ORGANIZATIONAL LOGIC OF INTELLECTUAL PROPERTY (2020). Elon Musk's statement that "patents are for the weak" is one key reason why they are important and necessary for many small technology firms in competition with larger established actors. *See* Nicolas Vega, *Elon Musk Says 'Patents Are for the Weak' As He Talks Starship Rocket, Tours SpaceX Starbase With Jay*

invention and facilitate innovation, the high cost and inherent delay in the U.S. court system discussed above is a deterrent to efficient enforcement, especially for smaller actors lacking both time and money. A patent system that does not provide for adequate enforcement for actors with valid patents in a timely manner is not economically effective in its primary objective to facilitate investment in innovation. While efficient enforcement is important for all actors, it is existential for STFs to attract financing, enter markets, and deliver innovation and economic growth to society.[23] In addition, STFs are also likely to face greater challenges from an uncertain property rights system as they are less able to participate in policy development and control their intellectual property through other means, especially in relation to companies with much greater resources.

One could argue that the patent system's intrinsic challenges mentioned above, such as high costs and long timeframes of uncertainty over key assets, already place a very high burden on STFs to compete. Unfortunately for STFs who rely on patents, the legislative and judicial changes of this new patent era have further weakened the entire patent system for all actors, not only bad-faith actors. The question now is whether the attempt to reduce the strength of weak patents in the hands of PAEs has concomitantly lowered the strength of the entire patent system, making it effectively impossible for small(er) firms to enforce strong patents. To mix metaphors, have we thrown the golden goose out with the bath water?

Building on previous research on patent holdout in the context of standard essential patents (SEPs), the focus of this Article's study explores the nature and potential economic impact of patent holdout on STFs.[24] The Article is divided into six Parts, including: Part I, this introduction to the weakening of the U.S. patent system and the impact on small(er) technology firms (STFs); Part II, a presentation of several foundational elements of patent holdout theory; Part III, a description of the empirical scope of analysis; Part IV, the *Sonos*

*Leno*, CNBC (Sept. 21, 2022), https://www.cnbc.com/2022/09/21/why-elon-musk-says-patents-are-for-the-weak.html.

23. Previous research has shown that larger firms can rely on other sources of market power beyond patents to maintain competitive advantage. *See, e.g.*, BARNETT, *supra* note 22; Welsey M. Cohen, Richard R. Nelson & John P. Walsh, *Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or not)*, (Nat'l Bureau of Econ. Rsch., Working Paper No. 7552, 2000).

24. *See generally* Bowman Heiden & Nicolas Petit, *Patent Trespass and the Royalty Gap: Exploring the Nature and Impact of Patent Holdout*, 34 SANTA CLARA HIGH TECH. L. J. 179 (2017) (describing patent holdout in the context of standard essential patents in the information and communication technology (ICT) sector).

and *Centripetal* case studies; Part V, the development of a theory of patent holdout in the STF context; and finally Part VI, a conclusion.

## II. PATENT HOLDOUT THEORY

### A. PENDULUM SHIFT FROM PATENT HOLDUP TO HOLDOUT

The concepts of opportunism and holdup have their origin in the study of transaction cost economics associated with contracting versus vertical integration.[25] Klein, Crawford, and Alchian describe opportunism (and holdup) as a case of appropriable quasi-rents to contracted specific assets, where opportunism can take place in either direction (i.e., the buyer or the seller).[26] The concept of opportunism not only implies transactional issues of rent shifting of producer surplus among market actors but also systemic issues of economic inefficiency that raise antitrust concerns.

The development of patent holdup theory evolved out of the anticommons and patent thicket literature in the late 1990s,[27] growing into its own theory in the mid-2000s,[28] with the latter only loosely associated with the

25. *See generally* R.H. Coase, *The Nature of the Firm*, 4 ECONOMICA 386 (1937) (building a transaction cost economic theory to explain the fundamental reasons for the organization of activities within a firm as opposed to contractual market transactions); Oliver Williamson, *The Vertical Integration of Production: Market Failure Considerations*, 61 *AM. ECON. REV.* 112 (1971) (describing the link between hold-up opportunities and relationship-specific assets).

26. *See generally* Benjamin Klein, Robert G. Crawford & Armen A. Alchian, *Vertical Integration, Appropriable Rents, and the Competitive Contracting Process*, 21 J. L. & ECON. 297 (1978).

27. *See generally* Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621 (1998) (describing the tragedy of anticommons as a situation when too many rights owners lead to the underuse of a resource); Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCI. 698 (1998) (suggesting that the proliferation of intellectual property rights in biomedical research may lead to fewer useful products for improving human health); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting*, 1 INNOVATION POLICY & ECON. 119 (Adam B. Jaffe, Josh Lerner & Scott Stern eds., 2001) (describing collective market mechanism to overcome the anticommons problem associated as patent thickets in the ICT sector).

28. *Compare* Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991 (2007) (first to define the concept of "patent holdup"), *and* Joseph Farrell, John Hayes, Carl Shapiro & Theresa Sullivan, *Standard setting, patents, and hold-up*, 74 ANTITRUST L. J. 603 (2007) (further extending the concept of "patent holdup" to the context of technology standards), *with* Alexander Galetovic & Stephen Haber, *The Fallacies of Patent-Holdup Theory*, 13 J. COMPETITION L & ECON. 1 (2017) (questioning the theoretical foundation of "patent holdup"), *and* Bowman Heiden & Nicolas Petit, *Patent trespass and the royalty gap: Exploring the nature and impact of patent holdout*, 34 SANTA CLARA HIGH TECH. L. J. 179 (2017) (showing the incongruence of "patent holdup" in relation to both hold-up and hold-out in mainstream economic theory).

received economic theory on holdup and opportunism described above.[29] The seminal paper on patent holdup theory by Lemley and Shapiro in 2007 links the potential for patent holdup to the availability of injunctive relief, stating "the threat of an injunction can enable a patent holder to negotiate royalties far in excess of the patent holder's true economic contribution."[30] The logic of their economic model is built on the business model of patent assertion entities (PAEs), which they define as "patent trolls" in their paper.[31] A typical PAE is characterized in their model as a patent owner with minor or weak patents covering one feature of a multi-technology product that is seeking an injunction against the infringing producer.

Several authors have challenged the theoretical model and highlighted the lack of empirical evidence of patent holdup.[32] The extrapolation of patent holdup theory from the context of PAEs to the open innovation ecosystem of standard essential patents (SEPs) has also drawn significant scrutiny.[33] To date, the authors are not aware of any study that empirically shows the existence of patent holdup in the market beyond the anecdotal case. Interestingly, the main component of patent holdup theory, injunctive relief, was largely curtailed in the United States in the *eBay* case in 2006—the year before the formal publication of the paper by Lemley and Shapiro.[34]

Given that injunctive relief is a major pillar of remedies in equity for any property right system, the *eBay* ruling and its subsequent application by the courts introduced a major systemic change to patent enforcement. In effect, the decision altered the patent system from a property-based to a liability-based

29. Galetovic & Haber, *supra* note 28, at 11–12; Heiden & Petit, *supra* note 28, at 191–209.

30. Lemley & Shapiro, *supra* note 28, at 1993.

31. *Id.* at 2008. It should be noted that there is no requirement in Article 1, Section 8 of the U.S. Constitution requiring the owner of a U.S. patent to make, use, or sell the patented invention.

32. *See* Einer Elhauge, *Do Patent Holdup and Royalty Stacking Lead to Systematically Excessive Royalties?*, 4 J. COMPETITION L. & ECON. 535 (2008) (questioning the conclusion that patent remedies result in systematically excessive royalties due to patent holdup and royalty stacking problems); J. Gregory Sidak, *Holdup, Royalty Stacking, and the Presumption of Injunctive Relief for Patent Infringement: A Reply to Lemley and Shapiro*, 92 MINN. L. REV. 714 (2007) (showing the results of the patent holdup and royalty stacking theory are unsupported as it does not take into account the potential loss to dynamic efficiency); Alexander Galetovic, Stephen Haber & Ross Levine, *An Empirical Examination of Patent Holdup*, 11 J. COMPETITION L. & ECON. 549 (2015); Galetovic & Haber, *supra* note 28 (providing empirical evidence that disputes the predictions of patent holdup).

33. *See, e.g.*, Damien Geradin and Miguel Rato (2007), *Can Standard-Setting Lead to Exploitative Abuse? A Dissonant View on Patent Hold-Up, Royalty Stacking and the Meaning of FRAND*, 3 EUR. COMPETITION J. 101 (2007); Heiden & Petit, *supra* note 28.

34. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006).

entitlement system. This decision, combined with numerous other decisions described in Table 1.1 above, effectively ended the pro-patent era that started in the early 1980s and swung the pendulum from concerns over the strength of the patent system to concerns over its weakness.

This weakening of patent enforcement ushered in theories of patent holdout, built symmetrically but oppositely to the contentions of patent holdup theory.[35] In general, patent holdout is described as the opportunistic delay or refusal to take a license by a producing firm that is infringing on another's patent(s).[36] Epstein and Noroozi provide greater specificity in defining patent holdout as the case when

> an implementer refuses to negotiate in good faith with an innovator for a license to valid patent(s) that the implementer infringes, and instead forces the innovator to either undertake significant litigation costs and time delays to extract a licensing payment through a court order, or else to simply drop the matter because the licensing game is no longer worth the candle.[37]

Others have described this practice as reverse patent holdup,[38] patent trespass,[39] and efficient infringement.[40]

### B. PATENT HOLDOUT—BAD FAITH, RATIONAL BEHAVIOR, OR BOTH

Bad faith is both a legal and political concept in that bad-faith behavior has both historical statutory implications as well as future policy consequences that can impact new legislation and renewed interpretation of existing statutes. As described in Part I, the "patent troll" narrative as a bad-faith PAE spurred the creation of patent holdup theory and laid the foundation for much of the judicial and legislative decisions of the past two decades. Even numerous states

35. The authors acknowledge that patent holdup and holdout are not perfectly symmetrical given their different treatment in patent, contract, and antitrust law. This is beyond the scope of this Article.

36. *See* Anne Layne-Farrar, *Why Patent Holdout Is Not Just a Fancy Name for Plain Old Patent Infringement*, COMPETITION POL'Y INT'L N. AMERICA COLUMN 2, 3 (2016); Richard A. Epstein & Kayvan B. Noroozi. *Why Incentives for 'Patent Holdout' Threaten to Dismantle FRAND, and Why It Matters*, 32 BERKELEY TECH. L J. 1381, 1384 (2017); Heiden & Petit, *supra* note 28, at 182.

37. Epstein & Noroozi, *supra* note 36, at 1384.

38. Damien Geradin, *Reverse Hold-Ups: The (Often Ignored) Risks Faced by Innovators in Standardized Areas*, SWEDISH COMPETITION AUTH. (Nov. 12, 2010), http://dx.doi.org/10.2139/ssrn.1711744.

39. Heiden & Petit, *supra* note 28, at 182.

40. David Kappos, Richard Ludwin & Marc Ehrlich, *From efficient licensing to efficient infringement*, N.Y.L.J. (Apr. 4, 2016).

have passed laws in an attempt to curtail the "bad faith assertion of patent infringement."[41]

The focus of the bad-faith patent troll narrative can be premised on three foundational claims:

1. The illegitimacy of their granted patent rights—based on the conjecture that the asserted patents are either minor, weak, or invalid.
2. The use of deception against weaker parties—by using their information asymmetry and advantaged litigation position.
3. The demand for unreasonably high royalty payments in an unreasonably short time period—leveraging the cost and time aspects of litigation to generate a superior bargaining position.

Certainly, beyond any potential bad-faith behavior, the first claim is a swipe at patent eligibility and capabilities of the U.S. Patent and Trademark Office (USPTO), while the second and third claims are a consequence of the complexity and cost of the U.S. legal system (i.e., intrinsic challenges). While much of the patent troll narrative is publicly focused on the harm to small, mom-and-pop companies, the greatest value of limiting patent assertion is gained by large technology firms. Ironically, the weakening of the patent system based on the troll narrative benefited the same operating companies that were responsible for supplying 70–80% of all patents litigated by PAEs as described in Part I.

However, the goal here is not to investigate the validity or propriety of these claims, but instead, to build a symmetric model of patent holdout based on the current patent system that has resulted from the belief in these claims. Therefore, if the claims of bad-faith PAEs above were legitimate enough to foster patent reform, then the following symmetric claims—and questions—by current patent holders also merit consideration and investigation in the current liability-based patent system[42]:

1. *The legitimacy of granted patent rights.*

41. Jason E. Stach & C. Brandon Rash, *States Take on Bad-Faith Patent Assertion*, FINNEGAN (Sept. / Oct. 2014) (quoting VT. STAT. ANN. tit. 9 § 4197), https://www.finnegan.com/en/insights/articles/states-take-on-bad-faith-patent-assertion.html.

42. For further research on the nature and impact of PAEs, see FEDERAL TRADE COMMISSION, PATENT ASSERTION ENTITY ACTIVITY (2016), https://www.ftc.gov/reports/patent-assertion-entity-activity-ftc-study, and EUROPEAN COMMISSION JOINT RESEARCH CENTRE, PATENT ASSERTION ENTITIES IN EUROPE: THEIR IMPACT ON INNOVATION AND KNOWLEDGE TRANSFER IN ICT MARKETS (Nikolaus Thumm & Garry Gabison eds., 2016), https://publications.jrc.ec.europa.eu/repository/handle/JRC103321.

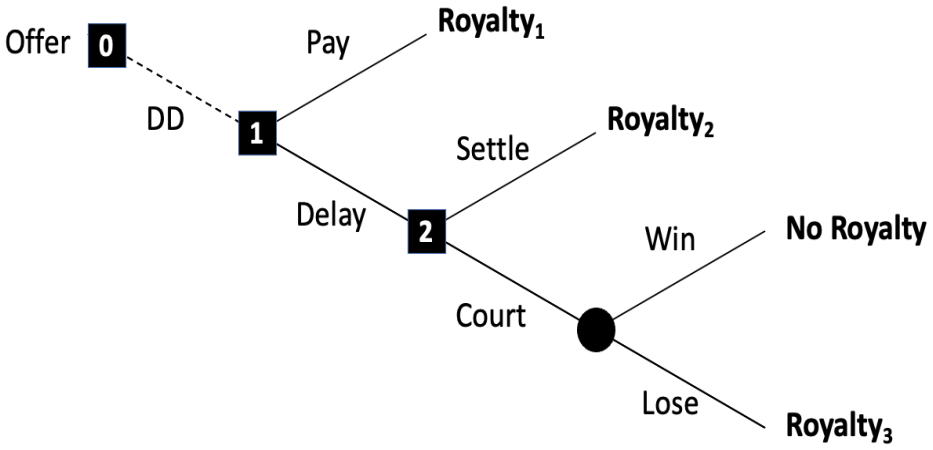
a. Are all patents now treated as minor, weak, or invalid (i.e. are even strong, valid patents considered weak in the current patent regime?)
b. Is there an incentive for alleged infringers to challenge all patents given the likelihood of success across multiple legal venues?
c. If so, does this implicitly suggest that only firms that can successfully litigate have valid patents?
d. When does the challenging of an alleged infringement become bad-faith behavior or is bad-faith behavior now institutionalized in the system?

2. *The use of market power against weaker actors.*
   a. Does the lack of injunctive relief asymmetrically benefit actors with greater market power?
   b. Do greater financial resources create an unfair advantage with respect to patent enforcement (i.e., fundamentally alter the risk-reward balance of the system in favor of the firm with more money and market power)?
   c. When does the use of a superior market power position constitute bad-faith behavior or is bad-faith behavior now institutionalized in the system in the form of "rational" infringement?

3. *The lack of reasonable royalty payments in a reasonable period of time.*
   d. Do the high costs and long timeframes of litigation implicitly indemnify infringers from liability up to the level of transaction costs?
   e. Are there sufficient remedies in equity for the patent holder to receive reasonable economic value?
   f. Are there sufficient penalties and costs for alleged infringers to avoid unnecessary delay and litigation?
   g. When does the delay of payment for an alleged infringement become bad-faith behavior or is bad-faith behavior now institutionalized in the system through its inherent complexity, cost, and lack of timeliness?

One key recurring theme in patent holdout is whether the strategic use of the intrinsic challenges of the patent system (see Part I) represents bad-faith behavior or simply rational decision-making in the face of risk and uncertainty. In other words, is there a point where the patent system is so weak that holdout is built into the system? Figure 2.1 below provides a simple patent holdout decision model to test the conditions where this is theoretically possible.

**Figure 2.1: Patent holdout decision model.**[43]




The model depicts an initial offer ($Royalty_1$) at (point 0), after which a reasonable due diligence (DD) phase is initiated, followed by the decision to accept or delay (point 1). The current royalty offer is viewed in comparison with the risk-adjusted value of what the future royalty payment would be given further delay in negotiation or litigation. If delay is chosen, this strategy continues until a settlement is agreed upon ($Royalty_2$) or a final court decision is adjudicated ($Royalty_3$). When $Royalty_3 \leq Royalty_2 \leq Royalty_1$ is perceived as true, delay and litigation will be preferred over payment until the point when the certainty of the outcome (e.g., in relation to court decision) makes settlement a better financial choice than delay or delay in no longer avoidable.[44]

As the U.S. patent system weakens (e.g., through a decreased opportunity for injunctive relief, increased opportunity for patent invalidation, decreased patent damages, etc.), the lower the future risk-adjusted value of patents becomes, which in turn strengthens the incentives for patent holdout. Taken to the extreme, the value of patents is zero in a system where enforcement is not

43. Adapted from Heiden & Petit, *supra* note 28, at 218.

44. It should be noted that it is not unreasonable for such a scenario to take ten or more years if the Supreme Court ultimately hears the case.

possible (i.e., everyone would hold out and refuse to pay).[45] This is due to the nature of the time value of technology being a function of both its (1) functionality and (2) exclusivity or control. Take the clear example of a patented small molecule drug. The value of the drug is the product of both the efficacy of the molecular compound and its exclusivity on the market. Once the patent lapses, the drug may continue to be efficacious, but the business value drops appreciably (e.g., over 90% depending on the number of generic competitors).[46] Below are several direct and indirect consequences of the removal of injunctive relief that significantly weakened patent enforceability and the value of patents as a whole, thus tipping the scale towards patent holdout as a rational business strategy:

- The removal of injunctive relief lowers the risk of litigation for the potentially infringing actor and disincentivizes settlement. Without injunction as a remedy, the only downside is the cost of litigation, which is also borne by the patent holder in the United States and other common law jurisdictions.
- The application of enhanced damages, which could provide a disincentive for patent holdout, has not often been successfully argued in patent litigation, historically.[47]
- Given the probabilistic nature of patents, extended litigation offers many opportunities to either invalidate the patent or delay to the point where the patent holder is willing to settle for less.[48] Once the threat of injunction is reduced, all other measures that reduce validity only increase the incentive to litigate given the increased opportunity to invalidate a patent leveraged over serial legal motions, venues, and appeals (i.e., probabilistic patents are a product of different probabilities that have been reduced by recent court decisions, etc. that are reduced even further by multiple bites at the apple). Probability of validity $p = (a*b*c*d*e\ldots)^N$, where $N$ is the number of serial adjudications and $a$, $b$, $c$, $d$, $e$, etc. are the individual probabilities that each respective

45. The same would be true for commercial agreements if the government stopped enforcing contracts.

46. *See* RYAN CONRAD & RANDALL LUTTER, GENERIC COMPETITION AND DRUG PRICES: NEW EVIDENCE LINKING GREATER GENERIC COMPETITION AND LOWER GENERIC DRUG PRICES 3 (2019), https://www.fda.gov/media/133509/download.

47. *See* Karen E. Sandrik, *An Empirical Study: Willful Infringement & Enhanced Damages in Patent Law After* Halo, 28 MICH. TECH. L. REV. 61, 112 (2021).

48. This is true because patent validity is an institutional fact with no absolute objective measurement combined with the many ways an infringer has for invalidating a patent in the current system.

adjudication maintains the patent's validity.[49] In essence, *eBay* has a multiplier effect on other decisions as it incentivizes rolling the dice. In other words, litigation in a post-*eBay* world creates a valuable put option for the alleged infringer.

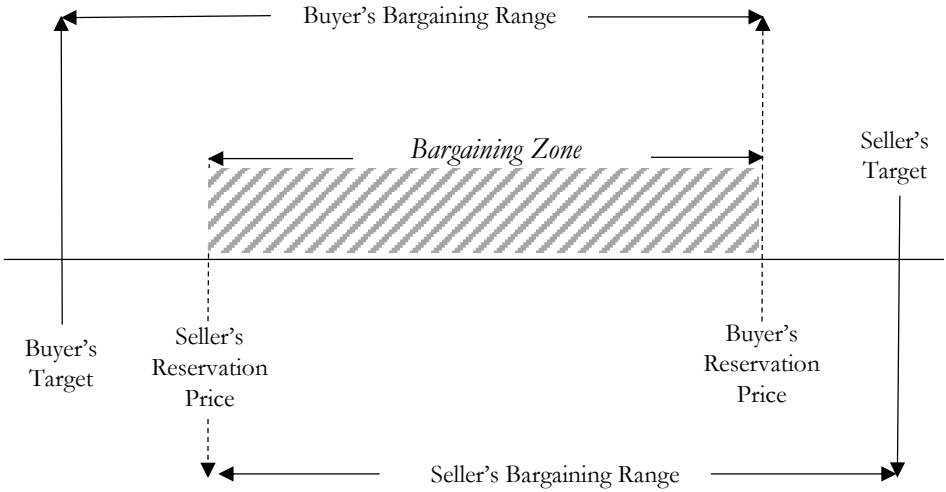
- Without injunction, the rational decision is to delay no matter whether the patent is considered strong or weak. In other words, all patents look weak without the downside risk of injunction.
- Financially, the lack of injunctive relief combined with a weakened patent system increases the discount rate on the future risk-adjusted value of potential royalty payments. This makes it more likely that $\text{Royalty}_3 \leq \text{Royalty}_2 \leq \text{Royalty}_1$ in the decision model shown in Figure 2.1.

### C. THE ECONOMICS OF BARGAINING AND THE IMPACT OF PATENT HOLDOUT

The basic components of the economics of bargaining are shown in Figure 2.2 below. As is typical, the buyer's target price is much lower than the seller's target price when the price is not set by the market. There is then a bargaining zone determined by the buyer's reservation price (i.e., maximum price) and the seller's reservation price (i.e., minimum price) or the overlap of the buyer's and seller's bargaining ranges. If a settlement is reached within this bargaining zone, the surplus value for the buyer and seller is calculated as the difference between the settlement price and respective reservation prices.

49. *See* Matteo Sabattini, *PTAB Challenges and Innovation: A Probabilistic Approach* (Aug. 6, 2020) (working paper) at 2, http://dx.doi.org/10.2139/ssrn.3668216.

**Figure 2.2: Simple bargaining model in an imperfect market.**




In the theoretical case of patent holdup, the licensor (i.e., the seller) is hypothetically able to use its bargaining power to compel the licensee (i.e., the buyer) to accept a settlement price near or above the patent implementer's reservation price based on the threat of injunctive relief. Symmetrically, in the theoretical case of patent holdout, the licensee (i.e., the buyer) is hypothetically able to use its bargaining power to compel the licensor (i.e., the seller) to accept a settlement price near or below the patent holder's reservation price based on the lack of injunctive relief and the intrinsic time, cost, and uncertainty of patent litigation.[50]

**Figure 2.3: Patent bargaining power spectrum.**[51]

| Patent Licensor Bargaining Power (Patent Holdup) | | | Patent Licensee Bargaining Power (Patent Holdout) | | |
|---|---|---|---|---|---|
| Systemic | Systematic | Circumstantial | Circumstantial | Systematic | Systemic |

50. It should be noted in the context of patent holdout, injunction is not necessarily meant to block sales but to more importantly equalize buyer bargaining power to facilitate a reasonable settlement.

51. Adapted from Heiden & Petit, *supra* note 28, at 228.

As with patent holdup theory, limited empirical investigations of patent holdout have been conducted to understand the impact on society.[52] Figure 2.3 above provides a holistic patent bargaining power spectrum creating a theoretical range of market impact from systemic patent holdup to systemic patent holdout, briefly defined below:

1. *Circumstantial effect*

A bargaining position is determined by the specific circumstances of the parties. A purely circumstantial effect produces a surplus that is evenly distributed between licensors and licensees (i.e., sellers and buyers).

2. *Systematic effect*

A pattern of settlement prices based on an institutional context in the market or policy sphere (e.g., the patent system). A systematic effect produces a surplus that favors a specific class of market actors (i.e., either licensors or licensees) predominantly.

3. *Systemic effect*

A systematic effect that significantly reduces economic welfare through either a loss in static or dynamic efficiency. A systemic effect would likely entail systematic settlement pricing beyond the reservation price level could enhance the surplus of certain actors at the expense of aggregate economic welfare both in the short and long term.

The importance of this framework is to discipline the economic analysis toward societal impact instead of a rhetorical battle of anecdotal (i.e., circumstantial) stories as a foundation for evidence-based policy formation. The goal of this Article's study is to investigate potential cases of circumstantial patent holdout from which to build a framework to test for evidence of both a broader systematic and systemic impact.

## III. DEFINING THE EMPIRICAL SCOPE OF ANALYSIS

The focus of this Article's study is on developing a better qualitative understanding of the nature of patent holdout in the context of STFs from which to further investigate the systemic level of economic impact from a broader quantitative approach. To achieve this study's goal, two in-depth case studies

52. In the context of FRAND, see Heiden & Petit, *supra* note 28, for a survey-based quantitative investigation; and Brian J. Love & Christian Helmers, *Patent Hold-Out and Licensing Frictions: Evidence from Litigation of Standard Essential Patents*, INT'L J. OF INDUS. ORG. (2023) (studying pre- and in-litigation hold-out using data from U.S. patent cases filed from 2010 to 2019).

were chosen based on their relevance and availability of public information. Below is a discussion on the overall perimeter required to investigate patent holdout in STFs, a list of potential case study candidates, and the two chosen case studies.

### A. THE STF EMPIRICAL SCOPE OF ANALYSIS

Figure 3.1 below provides a graphical characterization of the overall pool of market actors that seek to license or otherwise monetize their patented technology, which could experience patent holdout. There are two key dimensions: (1) the origin of the intellectual property (IP) and (2) the organization type. The origin of the IP refers to whether the actor is the original inventor of the patented technology that they are seeking to enforce or a third-party acquirer. The organizational type is differentiated by operating companies (OPCOs) and non-practicing entities (NPEs) as simply a distinction of the primary business model of the firm. The arrows in the figure represent how patented technology flows from the original inventors to third-party actors. Below is a short description of the different types of actors represented by this model:

#### 1. *Hybrid firms*

These are operating firms that produce products and services but also seek to enforce their own IP to receive compensation for their commercial use (e.g., through licensing). As patent holdout is a transactional concept based on compensation for use, the focus here is on OPCOs that seek to license in addition to sell products and services (i.e., a hybrid technology business model). Examples of larger firms that employ this hybrid model include IBM and Qualcomm. Smaller firms include companies such as Sonos and Centripetal.

#### 2. *Specialized R&D Organizations*

These are organizations that specialize in research and technology development but do not produce and sell products and services on the market. In other words, patented technology is their product, and licensing is their business model. This includes specialized R&D firms (e.g., ARM, Palo Alto Research Center, Interdigital, and most small and medium sized biotech ventures), universities, and individual inventors, among others.

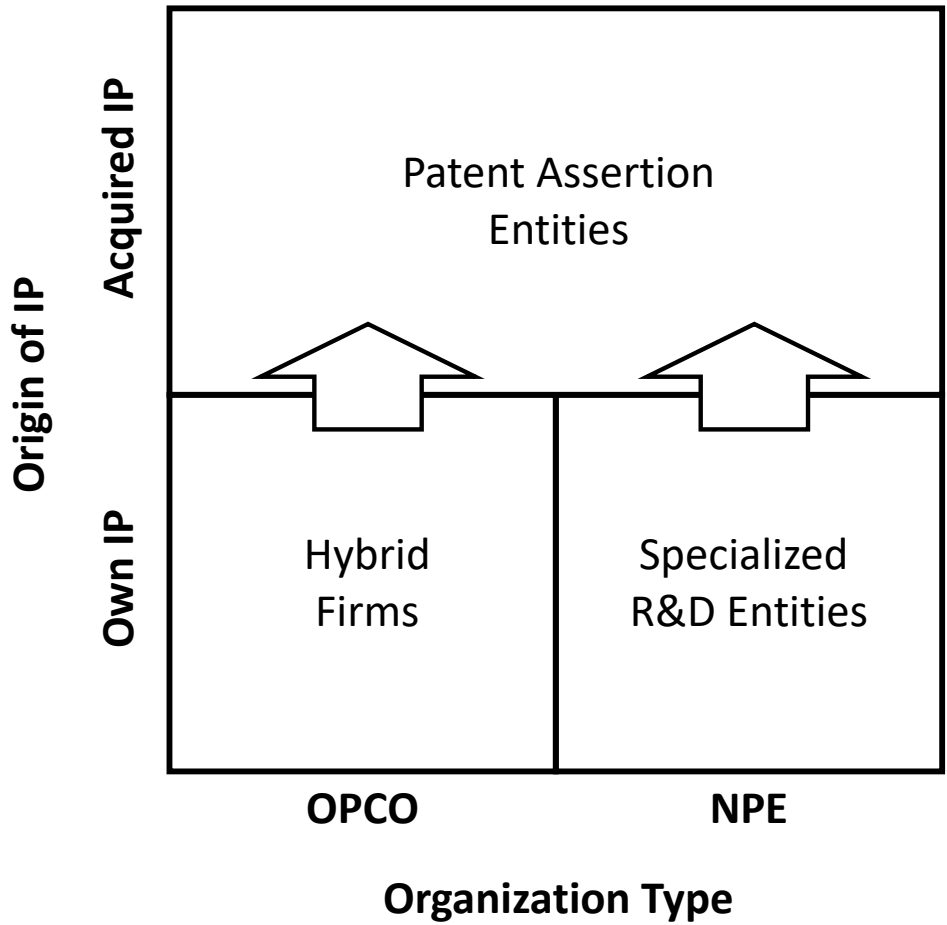
#### 3. *Patent Assertion Entities (PAEs)*

These entities are typically commercial firms that acquire (buy or consign) patents from OPCOs and NPEs and assert them against other OPCOs on the global market. When hybrid firms and specialized R&D organizations sell or

consign their patents, the PAE acts primarily as an agent, facilitating the original firm's business model. PAEs can also acquire patents from failed OPCOs as well as from successful OPCOs looking to monetize part of their portfolio.

Technically, both specialized R&D organizations and patent assertion entities are NPEs if "practicing" is defined as the production of products and services. In other words, NPEs trade in knowledge, not in physical or virtual goods.

**Figure 3.1: Patent monetization contexts.**




While the scope of patent holdout could cover all patent enforcement contexts, the primary interest of this Article is to ultimately ascertain whether the current patent system is capable of adequately supporting markets for technology in the context of innovative STFs. Therefore, the scope of STFs for this study is delineated by the following characteristics:

- The firm should be a small-medium sized enterprise (SME) or a much smaller company compared to its infringing competitor. This scopes the market power imbalance that the patent system is meant to address by leveling the playing field for STFs.

- The firm should have created its own patented technology for commercialization as a hybrid OPCO or an NPE.[53]

To summarize, the scope of this study is focused on technology firms enforcing their own IP that are small or much smaller than the opposing infringing firm (i.e., lower quadrants of Figure 3.1 above).

### B. IDENTIFYING THE REFERENCE CASE STUDIES

To identify potential case study targets, a search of patent litigations in U.S. district courts was conducted and parsed with the following parameters:

1. Plaintiff is an operating company or non-practicing entity;
2. Defendant is a large highly patent-litigated firm in the IT or consumer electronics industry;[54]
3. Plaintiff is orders of magnitude smaller than the defendant; and
4. The case resulted in court-awarded damages or consent decree in the ITC.

The decision to choose cases with court-awarded damages or ITC consent decree was done to ensure that sufficient public documentation was available to investigate the full litigation strategy of both parties and to interpret the nature of patent holdout in the context of the intrinsic challenges of the patent system. Including cases resulting in damage awards was helpful in understanding the ability of the patent system to provide adequate remedies to infringed patent holders through financial compensation. In other words, can patent holders that win in court still be victims of patent holdout?

Table 3.1 below is a subset of cases involving STFs between 2012-2020 that resulted in multimillion-dollar patent damage awards or ITC consent decrees:

53. To comprehensively examine the impact of patent holdout on STFs, one should also include STFs that relied on a PAE as a monetization agent. The latter category is important as the cost, time, and expertise required for litigation is difficult for most STFs to manage themselves.

54. For example, one of the searches screened for the following specific firms: Alphabet, Amazon, Apple, AT&T, Cisco, Dell, HP, HTC, Intel, LG, Meta, Microsoft, Samsung.

**Table 3.1 List of significant STF patent litigation cases.**

| Start Date | Plaintiff | Defendant | Type | Venue | Award | Time (m) | Status |
|---|---|---|---|---|---|---|---|
| 2012-11-06 | VirnetX[55] | Apple | NPE | EDTX | $368M | 98+ | Appeal pending |
| 2013-04-02 | Mobile Communications Technology[56] | Apple | NPE | EDTX | $24M | 25 | Settlement |
| 2015-07-03 | Personalized Media Communications[57] | Apple | NPE | EDTX | $308M | 73 | Unenforceable by prosecution laches |
| 2016-05-17 | Prisua Engineering[58] | Samsung | NPE | SDFL | $4.3M | 56 | Invalidated by PTAB |
| 2018-02-13 | Centripetal[59] | Cisco | OPCO | EDVA | $2.75B | 56+ | Vacated for conflict of interest |
| 2019-03-01 | Express Mobile[60] | Shopify | NPE | DE | $40M | 30+ | Appeal pending |

55. VirnetX Inc. v. Apple Inc., 925 F. Supp. 2d 816, 825 (E.D. Tex. 2013).

56. Mobile Telecommunications Technologies, L.L.C. v. Apple, Inc., Case No. 2:13-cv-258-RSP (E.D. Tex. Nov. 21, 2014) at 2.

57. Personalized Media Communications, L.L.C. v. Apple, Inc., 552 F. Supp. 3d 664, 668 (E.D. Tex. 2021), *aff'd*, 57 F.4th 1346 (Fed. Cir. 2023).

58. Prisua Engineering Corp. v. Samsung Electronics Co., Ltd., 472 F. Supp. 3d 1183 (S.D. Fla. 2020). Damage award is found at Civil Action No.1-16-CV-21761-KMM S.D. Florida.

59. Centripetal Networks, Inc. v. Cisco Sys., Inc., 492 F. Supp. 3d 495, 608 (E.D. Va. 2020), *vacated*, 38 F.4th 1025 (Fed. Cir. 2022).

60. Shopify, Inc. v. Express Mobile, Inc., 2021 WL 4288113 (D. Del. Sept. 21, 2021). Damages verdict cited in case 1:19-cv-00439-RGA.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2019-04-16 | Vocalife[61] | Amazon | OPCO | EDTX | $5M | 39 | Vacated on appeal |
| 2019-04-25 | Cirba[62] | VM Ware | OPCO | DE | $235M | 41+ | Vacated for lack of standing |
| 2019-11-15 | VideoShare[63] | Google | NPE | WDTX | $26M | 34 | Final judgement |
| 2020-01-07 | Voxer[64] | Meta | OPCO | WDTX | $175M | 33+ | Verdict Appeal likely |
| 2020-01-07 | Sonos[65] | Google | OPCO | CDCA | N/A | 33+ | Stay pending ITC appeal |
| 2020-01-31 | Ecofactor[66] | Google | OPCO | WDTX | $20M | 32+ | IPR appeal pending |

61. Vocalife L.L.C. v. Amazon.com, Inc., 534 F.Supp.3d 698 (E.D. Tex. 2021), *reversed in part, dismissed in part*, 2022 WL 2986786 (Fed. Cir. 2022). Damage verdict cited in case 2:19-cv-00123-JRG.

62. Cirba Inc., v. VMWare, Inc., 2020 WL 2992348 (D. Del. June 3, 2020), *petition for writ of mandamus denied*, In re Cirba, Inc., 2021 WL 4302979 (Fed. Cir. 2021). Damage verdict cited in case 1:19-cv-00742-LPS.

63. VideoShare, L.L.C. v. Google, L.L.C., 2021 WL 4712692 (W.D. Tex. Oct. 8, 2021). Damage verdict cited in case 6:19-cv-00663-ADA.

64. Voxer, Inc. v. Meta Platforms, Inc., 2023 WL 2806283 (W.D. Tex. Feb. 21, 2023). Damage verdict cited in case 1:20-cv-00655-LY.

65. Joint Status Report, Sonos, Inc. v. Google L.L.C., No. 20-169 (C.D. Cal. June 23, 2022), ECF No. 49. One of Sonos' infringement suits resulted in a $32.5 million verdict at the district court. *See* By Emma Roth & Chris Welch, *Sonos Wins $32.5 Million Patent Infringement Victory Over Google*, VERGE (May 26, 2023), https://www.theverge.com/2023/5/26/23739273/google-sonos-smart-speaker-patent-lawsuit-ruling.

66. EcoFactor, Inc., v. Google L.L.C., 2022 WL 2380332 (W.D. Tex. May 26, 2022). Damage verdict cited in case 6:20-cv-00075-ADA.

A quick review of Table 3.1 above provides the following insights:

1. A mix of OPCO (hybrid) and NPE (pure licensing) plaintiffs.
2. Significant litigation history ranging from 30 to 98 months and counting.
3. Only one case has resulted in an actual payment to the STF (*MCT v. Apple*).
4. Three cases were vacated on procedural grounds after years of litigation (*Centripetal*, *Cirba*, and *Personalized Media Communications*).
5. Defendants in most cases employed PTAB to invalidate the patents in suit.
6. One case involved the ITC (*Sonos*).

## IV. CASE STUDIES

The following two STFs were chosen for in-depth case analysis:

1. Sonos: a public OPCO with substantial revenue up against a bigtech competitor operating in the same product market. The Sonos case also allows for the investigation of the use of multiple jurisdictions and the ITC as part of holistic litigation strategy by both parties. Furthermore, the significant financial resources of Sonos allow for an understanding of the minimum capital needed for patent enforcement in a full litigation campaign with a corporation with nearly unlimited resources.

2. Centripetal: a VC-backed OPCO with multi-use technology up against a very large telecommunication actor operating in a large adjacent market. The Centripetal case provides a better understanding of the role that the limited resources of SMEs play in effective patent enforcement against a large incumbent actor. In addition, the case allows for the investigation of willful infringement and enhanced damages as an adequate remedy for patent infringement.

The two case studies represent significant and current examples of litigation between smaller and larger technology actors in the context of hybrid business models where the defendant is both a potential collaborator and competitor.

## A. SONOS V. GOOGLE

### *1. Commercial Context*

The general commercial context of this case is characterized as a small operating company (Sonos) seeking licensing revenue for the infringement of patented technology from a very large direct competitor and collaborator (Google). With over 1,500 employees and $1.3B in revenue in 2021, Sonos is not technically a small to medium-sized enterprise (SME). However, its relative size difference in relation to Google, which has over 100x as many employees, approximately 200x more revenue, and a market cap over 700x greater, is the relevant factor for this study—see Table 4.1 below.

**Table 4.1: Comparative company information for Sonos and Google (2021).[67]**

| Firm | Founded | Employees | Revenue | Patents | Mkt Cap |
|---|---|---|---|---|---|
| Sonos | 2002 | 1,844 | 1.3B | ~500 | 3.8B |
| Google | 1998 | 156,500 | 257B | 33,000+ | 1,960B |

Sonos was founded in 2002 as a pioneer in the development of multi-room wireless audio products, now referred to as smart speakers or smart home sound systems.[68] Their main competitors include traditional audio equipment manufacturers, such as Bang & Olufsen, Bose, Samsung (and its subsidiaries Harman International and JBL), Sony, and Sound United (and its subsidiaries Denon and Polk), as well as voice-enabled smart speakers from Big Tech firms, such as Amazon, Apple, and Google.[69] Sonos launched its first product in 2005.[70] In 2021, Sonos held a 92% market share in the wireless speaker

67. *Alphabet Inc. (GOOG)*, STOCKANALYSIS, https://stockanalysis.com/stocks/goog/ (last visited July 27, 2023); *Sonos, Inc. (SONO)*, STOCKANALYSIS, https://stockanalysis.com/stocks/sono/ (last visited July 27, 2023); GOOGLE PATENTS, https://patents.google.com/?assignee=sonos&country=US&status=GRANT&type=PATENT&oq=assignee:sonos+country:US+status:GRANT+type:PATENT (last visited July 27, 2023); GOOGLE PATENTS, https://patents.google.com/?assignee=google&country=US&status=GRANT&type=PATENT (last visited July 27, 2023).

68. Sonos, Inc., Annual Report (Form 10-K) (Oct. 2, 2021), at 4, https://d18rn0p25nwr6d.cloudfront.net/CIK-0001314727/1fd393f1-f7a5-4c9d-8ce1-4e6adfd53205.pdf.

69. *Id.* at 9.

70. *Id.* at 4.

category among audio industry professionals but less than 2% share of the consumer smart speaker market.[71] Figure 4.1 shows the growth of product sales for Sonos of 3.4–6.5 million units from 2015–2021.

**Figure 4.1: Sonos unit sales (2015–2021).[72]**

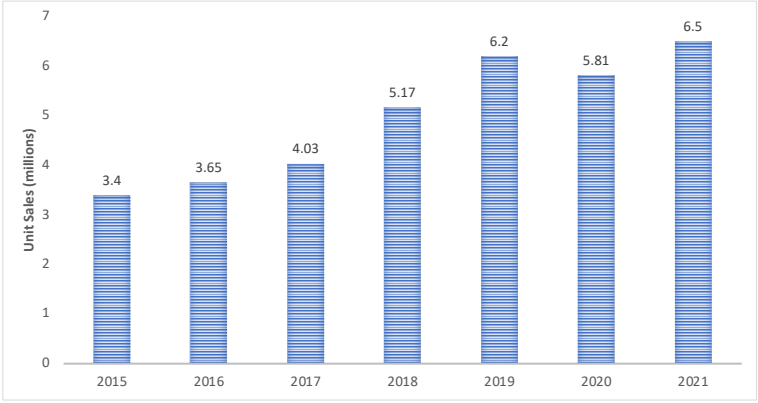
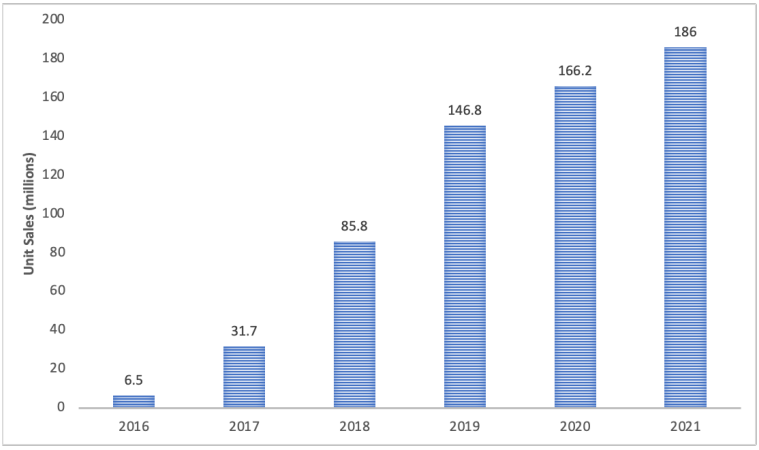



**Figure 4.2: Global smart speaker unit sales (2016–2021).[73]**




Google was founded in 1998 and has grown to become an Internet giant focused originally on search technology but now diversifying into many technology fields through its parent company, Alphabet, which was established in 2015. Google entered the smart speaker market in 2015 with the launch of

71. *Id.* at 7.

72. *Unit Sales of Sonos' Audio Products Worldwide from Fiscal Year 2015 to 2022*, STATISTA, https://www.statista.com/statistics/1109203/global-unit-shipment-sonos-products.

73. Statista. 2021 is a forecast.

Chromecast Audio.[74] In the following year, 2016, they introduced the Google Home product line, which is now sold under the name Google Nest.[75] In 2021, Google held a 25% share of the installed base in the U.S. smart speaker market.[76] Figure 4.2 above shows the rapid growth of global smart speaker sales from 2016–2021.

### *2. Overview of Collaboration and Litigation Activities*

Sonos and Google had a history of collaboration regarding smart speaker functionality from 2013 to 2019, including the following key activities[77]:

1. 2013–14: Integration of Google Play Music into the Sonos platform.
2. 2016–19: Integration of Google Assistant into the Sonos platform.

The second collaboration starting in 2016 also coincided with Google's launch of its own smart speaker products, Chromecast Audio (2015) and Google Home (2016), which competed directly with Sonos in the consumer segment. In particular, Sonos contends that Google integrated Sonos's multiroom audio technology in their products after learning of the technology during their first collaboration in 2013–14.[78] In 2016, Sonos first put Google on notice of infringing 28 patents, adding notice of over 100 more patents in 2018–19.[79]

In 2020, after failed licensing negotiations to settle the dispute, Sonos filed a patent infringement lawsuit against Google in the Central District of California, which in turn has generated a number of subsequent lawsuits and legal

74. Complaint at 1, Sonos, Inc. v. Google L.L.C., No. 2:20-cv-00169 (C.D. Cal. Jan. 7, 2020).

75. Frederic Lardinois, *Google Home Will Go On Sale Today for $129, Shipping November 4*, TECHCRUNCH (Oct. 4, 2016), https://techcrunch.com/2016/10/04/say-hello-to-google-home/.

76. Todd Bishop, *Amazon Maintains Big Lead Over Google and Apple in U.S. Smart Speaker Market, New Study Says*, GREEKWIRE (Aug. 4, 2021), https://www.geekwire.com/2021/amazon-maintains-big-lead-google-apple-u-s-smart-speaker-market-new-study-says/.

77. *See* Complaint at 1, Sonos, Inc. v. Google L.L.C., No. 2:20-cv-00169 (C.D. Cal. Jan. 7, 2020); Complaint at 2–3, Google L.L.C. v. Sonos, Inc., No. 3:20-CV-3845 (N.D. Cal. June 11, 2020).

78. *See* Complaint at 7, Sonos, Inc. v. Google L.L.C., No. 2:20-cv-00169 (C.D. Cal. Jan. 7, 2020).

79. *See* Complaint at 12, Sonos Inc. v. Google L.L.C., No. 2:20-cv-00169 (C.D. Cal. Jan. 7, 2020).

actions.[80] Table 4.2 below provides an overview and status of the different U.S. litigation activities filed by both Sonos and Google at California district courts, the International Trade Commission (ITC), and the Patent Trial and Appeal Board (PTAB) at the U.S. Patent and Trademark Office (USPTO).

Currently, only the ITC complaint filed by Sonos under the Tariff Act of 1930 § 337, 19 U.S.C. § 1337 (2006) ("section 337"), has reached a decision. In January 2022, the ITC found that specific claims of each of the five patents-in-suit were valid and infringed by Google, which led to an exclusion order. Both Google and Sonos have filed appeals on certain aspects of the ITC decision to the Federal Circuit. Google has also developed ITC-approved, non-infringing alternate solutions that it has started to implement through software updates to its smart speaker product line. In June 2022, U.S. Customs and Border Protection ruled that Google was violating its importation ban.[81] In August 2022, Google retaliated by filing two new patent infringement complaints in the Northern District of California that cover seven patents in total on voice-assistant technology and added that it would file a related complaint at the ITC.[82]

Sonos has also previously litigated its patents against D&M Holdings and Lenbrook Industries, where the former settled after 43 months[83] and the latter settled after ten months.[84]

80. Daisuke Wakabayashi, *Google Infringed on Sonos Speaker Technology, Trade Court Rules*, N.Y. TIMES (Jan. 6, 2022), https://www.nytimes.com/2022/01/06/technology/google-sonos-patents.html.

81. Ashley King, *Google Is Actively Violating Sonos Patents, Rules US Customs Service*, DIGITAL MUSIC NEWS (July 4, 2022), https://www.digitalmusicnews.com/2022/07/04/google-violating-sonos-patents-us-customs.

82. Blake Brittain, *Google Sues Sonos Over New Voice-assistant Technology*, REUTERS (Aug. 8, 2022), https://www.reuters.com/legal/litigation/google-sues-sonos-over-new-voice-assistant-technology-2022-08-08.

83. Richard Lloyd, *Sonos Settlement with Denon Underlines the Strength of Its Patents in Burgeoning Speaker Market*, IAM (May 25, 2018), https://www.iam-media.com/article/sonos-settlement-denon-underlines-the-strength-of-its-patents-in-burgeoning-speaker-market.

84. Press Release, Sonos, Sonos and Lenbrook Reach Settlement in Patent Infringement Case (July 30, 2022), https://investors.sonos.com/news-and-events/investor-news/latest-news/2020/Sonos-and-Lenbrook-Reach-Settlement-In-Patent-Infringement-Case/default.aspx.

**Table 4.2: Overview of U.S. litigation between Sonos and Google.**

| Case | Date | Patents | Venue | Status |
|---|---|---|---|---|
| *Sonos v. Google*[85] | 01-07-2020 | 8,588,949<br>9,195,258<br>9,219,959<br>10,209,953<br>10,439,896 | Central District of California | Stay pending ITC appeal |
| Sonos section 337[86] | 01-07-2020 | As above | ITC | Exclusion order granted under appeal |
| *Google v. Sonos*[87] | 06-11-2020 | 7,899,187<br>8,583,489<br>10,140,375<br>7,065,206<br>10,229,586 | Northern District of California | Ongoing discovery for '187 only |
| Sonos IPRs[88] | 05-20-2021 | 10,140,375<br>10,229,586 | PTAB | All but one petitioned claims unpatentable |
| *Sonos v. Google*[89] | 09-29-2020 | 9,967,615<br>10,779,033<br>9,344,206<br>10,469,966 | Northern District of California | Jury verdict for Sonos awarding |

85. Sonos, Inc. v. Google L.L.C., No. 2:20-cv-00169 (C.D. Cal. Jan. 7, 2020).

86. Certain Audio Players and Controllers, Components Thereof, and Products Containing the Same, Inv. No. 337-TA-1191, 2022 WL 100272 (Jan. 6, 2022).

87. *See* Complaint, Google L.L.C. v. Sonos, Inc., No. 3:20-CV-3845 (N.D. Cal. June 11, 2020).

88. Sonos, Inc. v. Google L.L.C., No. IPR 2021-00962, 2022 WL 16704720 (P.T.A.B. Nov. 3, 2022); Sonos, Inc. v. Google L.L.C., No. IPR 2021-00964, 2022 WL 5265117 (P.T.A.B. Oct. 6, 2022).

89. Jury Verdict, Sonos, Inc. v. Google L.L.C., No. 3:21-cv-07559 (N.D. Cal. May 26, 2023).

| | | | | |
|---|---|---|---|---|
| | | 10,848,885 | | $32.5M in damages[90] |
| Google IPR[91] | 09-28-2021 | 9,967,615 | PTAB | All petitioned claims unpatentable |
| *Google v. Sonos*[92] | 08-08-2022 | 10,593,330<br>10,134,398<br>7,705,565<br>11,024,311<br>9,812,128<br>9,632,748<br>11,050,615 | Northern District of California | Stay pending ITC decision |
| Google section 337[93] | 08-09-2022 | As above | ITC | Pending before ALJ |
| Sonos IPR[94] | 09-29-2022 | 11,024,311<br>9,812,128 | PTAB | Pending final decision |
| Sonos IPR[95] | 10-27-2022 | 10,593,330<br>10,134,398 | PTAB | Pending final decision |
| Sonos IPR[96] | 04-05-2023 | 11,050,615 | PTAB | Pending institution decision |

90. The final judgement was vacated to allow for decisions regarding injunctive relief and affirmative defenses. Order Vacating Final Judgment, Sonos, Inc. v. Google L.L.C., No. 3:21-cv-07559 (N.D. Cal. June 14, 2023).

91. Google L.L.C.. v. McMillin, Terrence, No. IPR 2021-01563 (P.T.A.B. Apr. 10, 2023).

92. Google L.L.C. v. Sonos, Inc., No. 3:22-cv-04552 (N.D. Cal. Aug 8, 2022); Google L.L.C. v. Sonos, Inc., No. 3:22-cv-04553 (N.D. Cal. Aug 8, 2022).

93. ITC Certain Audio Players and Components Thereof I, Inv. No. 337-TA-1329 (Sept. 9, 2022); ITC Certain Audio Players and Components Thereof II, Inv. No. 337-TA-1330 (Aug. 9, 2022).

94. Sonos, Inc. v. Mixter, No. IPR 2022-01592 (P.T.A.B. Sept. 29, 2022); Sonos, Inc. v. Mixter, No. IPR 2022-01594 (P.T.A.B. Sept. 29, 2022).

95. Sonos, Inc. v. Sharifi, Matthew, No. IPR 2023-00118 (P.T.A.B. Oct. 27, 2022); Sonos, Inc. v. Sharifi, Matthew, No. IPR 2023-00119 (P.T.A.B. Oct. 27, 2022).

96. Sonos, Inc. v. Matthews, Jeffreyp, No. IPR 2023-00806 (P.T.A.B. Apr. 5, 2023).

In addition to the U.S., Google and Sonos filed international lawsuits in Germany, Canada, France, and the Netherlands in 2020. In summary, the patent infringement cases initiated by Google have been dismissed or found non-infringing pending appeals. In Europe, these results have been consistent for the two patents (EP 491 and EP 621) asserted in all three jurisdictions. At the end of 2020, Sonos responded with an infringement suit of its own in Germany. Their preliminary injunction was withdrawn, and validity is pending. Table 4.3 below provides information on the specific cases and their current status.[97]

**Table 4.3: Overview of international litigation between Sonos and Google.**

| Case | Date | Patents | Venue | Status |
|---|---|---|---|---|
| *Google v. Sonos* Europe[98] | 07/2020 | EP 27 64 491<br>EP 1 579 621 | Munich Higher Regional Court | EP 491: validity challenge pending.<br>EP 621: Dismissed; appeal pending. |
| *Google v. Sonos* Europe | 08/2020 | EP 27 64 491<br>EP 15 79 621 | France | EP 491 validity pending, infringement claims dropped.<br>EP 621 found non-infringed, appeal pending. |
| *Google v. Sonos* Europe | 08/2020 | EP 27 64 491<br>EP 15 79 621 | District Court for Central Netherlands | EP 491: found non-infringed.<br>EP 621: Dismissed |

97. *See* Sonos, Inc., Annual Report (Form 10-K) (Nov. 22, 2021), https://d18rn0p25nwr6d.cloudfront.net/CIK-0001314727/1fd393f1-f7a5-4c9d-8ce1-4e6adfd53205.pdf; Amy Sandys, *Dutch Judges Deny Google Injunction Request Against Sonos,* JUVE PATENT (Feb. 11, 2022), https://www.juve-patent.com/news-and-stories/cases/dutch-judges-deny-google-injunction-request-against-sonos/.

98. Oberlandesgericht [OLG] München [Munich Higher Regional Court] June 23, 2021, No. 21 O 7265/20, https://www.gesetze-bayern.de/Content/Document/Y-300-Z-GRURRS-B-2021-N-44671?hl=true.

| | | | | |
|---|---|---|---|---|
| | | | | as infringement claims not substantiated; appeal pending. |
| *Google v. Sonos*[99] | 08/2020 | CA 2,545,150 | Canada | Found non-infringed, appeal pending. |
| Sonos v. Google Germany[100] | 12/2020 | EP 35 54 005 | Hamburg Regional Court | PI applications withdrawn. Validity pending. |

*3. Specific Litigation Behavior and Results*

This Section IV.A.3 provides a deeper look into the specific legal proceedings that define the overall litigation campaign between Sonos and Google in the United States. In particular, this includes specific information regarding the venue, patents-in-suit, key dates, key motions, and current status/results that define the litigation behavior in the commercial context of a small operating company (Sonos) versus a very large operating company (Google). Figure 4.3 below summarizes much of this information.

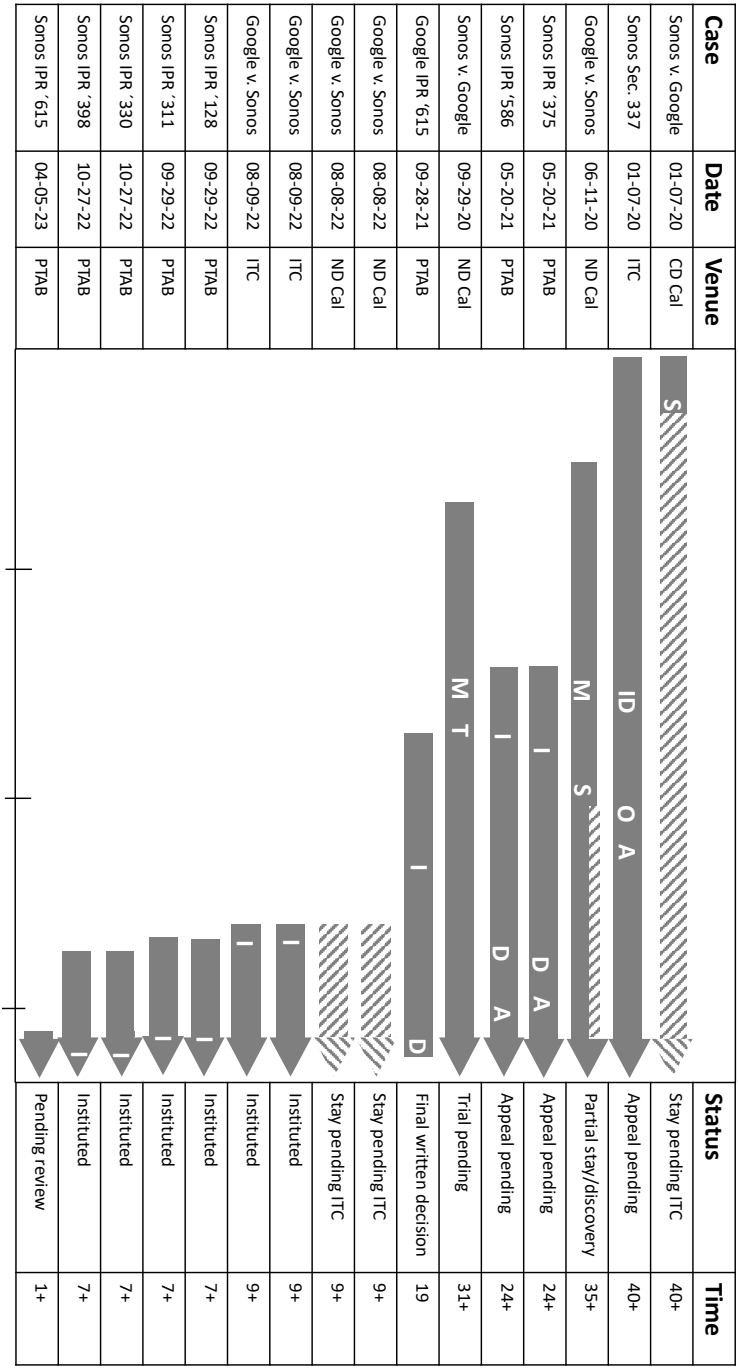
There have been four patent infringement lawsuits filed in the U.S. district court system—two by each Sonos and Google. Each lawsuit has asserted a specific set of patents. Section IV.A.3 is organized around these four asserted patent sets, including the associated proceedings at the ITC and PTAB in order to better understand the litigation behavior at the patent level.

**Figure 4.3: Timelines of specific U.S. litigation activities between Sonos and Google. Time = months.**

99. Google L.L.C. v. Sonos, Inc., 2021 FC 1462 (Can.), https://decisions.fct-cf.gc.ca/fc-cf/decisions/en/item/521052/index.do.

100. Landgericht Hamburg [LG] [Hamburg District Court] Feb. 2, 2021, 327 O 378/20, https://www.landesrecht-hamburg.de/bsha/document/KORE209052021; Landgericht Hamburg [LG] [Hamburg District Court] Apr. 29, 2021, 327 O 36/21, https://www.landesrecht-hamburg.de/bsha/document/KORE224092021.

**(S=Stay, O=Opinion, A=Appeal, I=Instituted, M=Markman, T=Trial, D=Decision, ID=Initial Determination)**



a) *Sonos v. Google*: January 2020

On January 7, 2020, Sonos filed a patent infringement complaint in the Central District of California against Google.[101] Simultaneously, Sonos also filed a second complaint against Google alleging a violation of section 337 of the Tariff Act of 1930 to the U.S. International Trade Commission (ITC).[102] Both complaints claimed infringement of the five patents shown below in Table 4.4. The '949, '258, and '959 patents were also previously asserted in previous litigation against D&M Holding (2016) and Lenbrook Industries (2019). Google answered claiming non-infringement and invalidity of all patents-in-suit under §§ 101, 102, 103, and 112.[103]

**Table 4.4:** *Sonos v. Google* **patents-in-suit (CDTX and ITC).**

| U.S. Patent # | Priority/ Grant | Description | Total Claims (Independent Claims) | Validity/ Infringement |
|---|---|---|---|---|
| 8,588,949 | 2003/ 2013 | Method and apparatus for adjusting volume levels in a multi-zone system. | 20 (1,8,15) | ITC: claims 1, 2, 4–5 valid and infringed. |
| 9,195,258 | 2003/ 2013 | System and method for synchronizing operations among a plurality of independently clocked digital data processing devices. | 26 (1,11,17) | ITC: claims 17, 21, 24, 26 valid and infringed. |

101. Sonos, Inc. v. Google L.L.C., No. 2:20-cv-00169 (C.D. Cal. Jan. 7, 2020).

102. Certain Audio Players and Controllers, Components Thereof, and Products Containing the Same, Inv. No. 337-TA-1191, 2022 WL 100272 (Jan. 6, 2022).

103. Google's Answer to Sonos's Complaint, Sonos, Inc. v. Google L.L.C., No. 2:20-cv-00169 (C.D. Cal. Mar. 11, 2022).

| | | | | |
|---|---|---|---|---|
| 9,219,959 | 2006/ 2015 | Multi-channel pairing in a media system. | 22 (1,14) | ITC: claim 10 valid and infringed. |
| 10,209,953 | 2003/ 2019 | Playback device. | 30 (1,7,25) | ITC: claims 7, 14, 22–24 valid and infringed. |
| 10,439,896 | 2004/ 2019 | Playback device connection. | 20 (1,13,20) | ITC: claims 1, 5, 6, 12 valid and infringed. |

In March 2020, the parties agreed to stay the district court case pending the completion of the proceedings at the ITC.[104] Sonos's complaint to the ITC was instituted in February 2020, and an Initial Determination (ID) was issued in August 2021. In January 2022, the ITC issued its order establishing a section 337 violation on specific claims of all five patents-in-suit as shown in table 4.4 above.[105] In total, the ITC found 17 of the 118 claims-in-suit (14.4%) valid and infringed. The remedies included a limited exclusion order and cease-and-desist order.[106] The limitation was based on Google's implementation of the ITC-approved product redesigns that were determined not to infringe the asserted patents.[107] In March 2022, following the completion of the Presidential Review, the Federal Circuit undertook Google's appeal and granted Sonos's motion to intervene the following month.

b) *Google v. Sonos*: June 2020

On June 11, 2020, Google filed a patent infringement suit against Sonos in the Northern District of California.[108] The suit includes the five patents shown in Table 4.5 below, which covers a broad range of technical fields associated with smart speakers. Two of the patents were removed—one for eligibility ('489) and one by joint dismissal ('206)—while two others were instituted by the PTAB ('375 and '586). The PTAB found unpatentable all the claims

104. Joint Status Report at 1, Sonos, Inc. v. Google L.L.C., No. 2:20-cv-00169 (C.D. Cal. June 23, 2022).

105. *Id.*

106. *Id.*

107. *Id.* at 1–2.

108. Complaint, Google L.L.C. v. Sonos, Inc., No. 3:20-CV-3845 (N.D. Cal. June 11, 2020).

challenged by Sonos for both patents. The final patent ('187) is pending discovery in the district court.

**Table 4.5** *Google v. Sonos* **patents-in-suit (NDCA and PTAB).**

| U.S. Patent # | P/G | Description | Total Claims (Independent Claims) | Validity/ Infringement |
|---|---|---|---|---|
| 7,899,187 | 2002/ 2011 | Domain-based digital-rights management system with easy and secure device enrollment. | 17 (1,7,10) | Pending discovery. |
| 8,583,489 | 2011/ 2013 | Generating a media content availability notification. | 20 (1,8,15) | Ineligible under § 101 (*Alice*).[109] |
| 10,140,375 | 2003/ 2018 | Personalized network searching. | 20 (1,17) | IPR: C1–11, 13–17 all found unpatentable.[110] |
| 7,065,206 | 2003/ 2006 | Method and apparatus for adaptive echo and noise control. | 20 (1,9,19) | Joint dismissal.[111] |
| 10,229,586 | 2004/ 2019 | Relaying communications in a wireless sensor system. | 20 (1,9,15) | IPR: C1–5, 7–12, 14–16, 18, 20 all found |

109. Order Granting Defendant's Motion to Dismiss, Google L.L.C. v. Sonos, Inc., No. 3:20-CV-3845 (N.D. Cal. Nov. 2, 2020).

110. Sonos, Inc. v. Google L.L.C., No. IPR 2021-00962, 2022 WL 16704720 (P.T.A.B. Nov. 3, 2022).

111. Stipulation of Dismissal of '206 Infringement Claim, Google L.L.C. v. Sonos, Inc., (docket number or case reporter?) (N.D. Cal. June 4, 2021).

| | | | | |
|---|---|---|---|---|
| | | | | unpatentable.[112] |

c) *Sonos v. Google*: September 2020

On September 29, 2020, Sonos filed a second patent infringement suit against Google in the Western District of Texas.[113] Google's writ of mandamus was granted by the Federal Circuit, which moved the case to the Northern District of California on September 27, 2021. Table 4.6 below shows the additional five patents asserted by Sonos. One patent ('206) was jointly dismissed by the parties. The '615 patent had all challenged claims invalidated by the PTAB, while claim 13 was found not infringed and invalid by the district court. The '033 patent was also found invalid. On summary judgement, the '885 patent survived a Google motion for noninfringement and invalidity, and the court granted Sonos's motion regarding infringement of claim 1, which was eventually found valid and infringed by the jury, resulting in an award of $32.5 million. On June 14, 2023, the judge vacated the judgement to allow for the determination of injunctive relief and affirmative defenses.[114]

**Table 4.6:** *Sonos v. Google* **patents-in-suit (NDCA and PTAB).**

| U.S. Patent # | P/G | Description | Total Claims (Independent Claims) | Validity/ Infringement |
|---|---|---|---|---|
| 9,967,615 | 2011/ 2018 | Networked music playback. | 29 (1,13,25) | NDCA: C13 found not infringed and invalid (§ 103) but not |

112. Sonos, Inc. v. Google L.L.C., No. IPR 2021-00964, 2022 WL 5265117 (P.T.A.B. Oct. 6, 2022).

113. Complaint, Sonos, Inc. v. Google L.L.C., No. 6:20-cv-881 (W.D. Tex. Sept. 29, 2020).

114. Order Vacating Final Judgment, Sonos, Inc. v. Google L.L.C., No. 3:21-cv-07559 (N.D. Cal. June 14, 2023).

| | | | | |
|---|---|---|---|---|
| | | | | invalid under § 102.[115] IPR: C1, 2, 6–14, 18–25, and 27–29 held unpatentable.[116] |
| 10,779,033 | 2011/2019 | Systems and methods for networked music playback. | 16 (1,12,15) | Found invalid.[117] |
| 9,344,206 | 2006/2016 | Method and apparatus for updating zone configurations in a multi-zone system. | 20 (1,12,17) | Joint dismissal.[118] |
| 10,469,966 | 2006/2019 | Zone scene management | 20 (1,9.17) | Found non-infringed[119] |
| 10,848,885 | 2006/2020 | Zone scene management | 20 (1,8,15) | Claim 1 found valid and infringed.[120] |

d) *Google v. Sonos*: August 2022

On August 8, 2022, Google filed an additional two patent infringement suits against Sonos in the Northern District of California, implicating seven patents in total. Google followed up the next day with two parallel complaints

115. Order Granting Motion for Partial Summary Judgment, Sonos, Inc. v. Google L.L.C., No. 3:20-cv-06754 (N.D. Cal. Aug. 2, 2022).

116. *See* Google L.L.C. v. Coburn, No. IPR 2021-01563 (P.T.A.B. Apr. 10, 2023).

117. Order Regarding Motions for Summary Judgment, Sonos, Inc. v. Google L.L.C., No. 3:21-cv-07559 (N.D. Cal. Apr. 13, 2023).

118. Joint Stipulation and Order of Partial Dismissal, Sonos, Inc. v. Google L.L.C., No. 3:21-cv-07559 (N.D. Cal. Feb. 5, 2022).

119. Jury Verdict Form, Sonos, Inc. v. Google L.L.C., No. 3:21-cv-07559 (N.D. Cal. May 26, 2023).

120. *Id.*

to the ITC. On September 29 and October 27, 2022, Sonos challenged five of the seven patents at the PTAB. Table 4.7 below describes the patents in suit and the current status regarding validity and infringement.

**Table 4.7:** *Sonos v. Google* **patents-in-suit (NDCA).**

| **U.S. Patent #** | **P/G** | **Description** | **Total Claims (Independent Claims)** | **Validity/ Infringement** |
|---|---|---|---|---|
| 10,593,330 | 2014/ 2020 | Hotword detection on multiple devices. | 18 (1,9,17) | ITC: pending. IPR: 1–18 pending. |
| 10,134,398 | 2014/ 2020 | Hotword detection on multiple devices. | 21 (1,9,16) | ITC: pending. IPR: 1–5, 7–13, 15–20 pending. |
| 7,705,565 | 2003/ 2010 | Method and system for wireless charging. | 18 (1, 8, 9, 16-18) | ITC: pending. |
| 11,024,311 | 2014/ 2021 | Device leadership negotiation among voice interface devices. | 20 (1, 10, 16) | ITC: pending. IPR: 1–3, 8–12, 14–18, 20 pending. |
| 9,812,128 | 2014/ 2017 | Device leadership negotiation among voice interface devices. | 15 (1, 6, 11) | ITC: pending. IPR: 1–3, 5–8, 10–13, 15 pending. |
| 9,632,748 | 2014/ 2017 | Device designation for audio input monitoring. | 20 (1, 7, 11) | ITC: pending. |
| 11,050,615 | 2019/ 2021 | Apparatus and method for | 20 (1,11,21) | ITC: pending. IPR: 1–3, 5–12, 15–19 pending. |

| | | | | |
|---|---|---|---|---|
| | | seamless commissioning of wireless devices. | | |

*4. Case Discussion*

Below is a short discussion of several key aspects of the Sonos-Google litigation from a patent holdout perspective.

a) Intrinsic Patent Holdout Challenges

*Sonos v. Google* is a classic example of the intrinsic challenge in settling patent disputes through the U.S. court system in a timely and cost-effective manner. The initial action at the ITC is now greater than 33 months old and pending appeal at the Federal Circuit. Given that Sonos put Google on notice in 2016, the dispute is soon in its seventh year without a settlement. Additionally, the total cost of litigation across all venues is likely tens of millions of dollars on both sides. While Sonos is orders of magnitude smaller than Google, it appears big enough to manage the extensive costs and timeframe necessary to participate effectively in U.S. patent enforcement.

b) Extrinsic Patent Holdup Challenges

The extrinsic challenges impacting the patent system over the past two decades are visible in the litigation behavior in this dispute, including the following:

- The use of the ITC exclusion order as a substitute for the difficulty to obtain injunctive relief in federal court after *eBay*.
- The use of the PTAB to challenge patent validity through an IPR at the USPTO instead of federal court, which applies a higher burden of proof.
- The growth in multi-technology convergence from wireless speakers to smart speakers has created both new business opportunities and increased patent exposure, facilitating both collaboration and competition on overlapping, adjacent market segments.[121] Given the cross-exposure between Sonos and Google products, both parties could exchange patent

121. For a discussion of the growing interrelationship of different product, features, and services in the smart speaker value chain, see Jack Nicas & Daisuke Wakabayashi, *Sonos, Squeezed by the Tech Giants, Sues Google*, N.Y. TIMES (Aug. 13, 2021), https://www.nytimes.com/2020/01/07/technology/sonos-sues-google.html.

> infringement suits indefinitely at five to seven patents per suit.[122] However, Google has by far the greater exposure due to its much larger sales base across multiple potential infringing products.

c) Patent Holdout Behavior

Google has specifically been accused of bad-faith patent holdout behavior in its dispute with Sonos.[123] While the potentiality for bad-faith behavior exists on the part of Google, without the benefit of discovery, it is difficult to make a clear determination of intent as Google's behavior in this case can be seen as rational given the current weakened state of the U.S. patent system. It is also possible that a district court could determine that the former collaboration and notice, combined with a finding of validity and infringement, rises to the level of willful infringement. However, without an understanding of the range of the settlements offered by both sides during negotiations, the current ITC ruling under appeal is insufficient alone to make a determination of bad-faith patent holdout. Given that no large patent damage awards to STFs have resulted in actual payments in the past ten years (see Table 3.1), it is rational for Google to set a lower target price and choose litigation over settlement for offers significantly above this price.

On November 20, 2020, Judge Alsup gave the following admonition to both parties in his ruling.[124]

> This action and the accompanying international campaign are emblematic of the worst aspects of patent litigation. In just nine months, these parties have managed to escalate their dispute seemingly without bound, filing suits in the ITC, twice in this district, in the Central District of California, in the Western District of Texas, in Canada, France, Germany, and the Netherlands, all about home speaker systems. The resources invested into this dispute already are doubtless enormous. By the end, our parties' legal bills will likely

122. Nigel Swycher, *Look Before You Leap – Is Litigation the Best Strategy for Sonos?*, LINKEDIN (June 18, 2023), https://www.linkedin.com/pulse/look-before-you-leap-litigation-best-strategy-sonos-nigel-swycher/.

123. *See* Eddie Lazarus, *When it Comes to Patent Reform, Watch What Google Does – Not What it Says*, IP WATCHDOG (July 7, 2022), https://www.ipwatchdog.com/2022/07/07/comes-patent-reform-watch-google-not-says/id=150090/; Adam Mossoff, *Google's Loss to Sonos Settles It: Big Tech Has an IP Piracy Problem*, TECHCRUNCH (Jan. 13, 2022), https://techcrunch.com/2022/01/13/googles-loss-to-sonos-settles-it-big-tech-has-an-ip-piracy-problem/.

124. Order Staying Case, Google L.L.C. v. Sonos, Inc., No. 3:20-cv-06754 (N.D. Cal. Nov. 20, 2020).

> have been able to build dozens of schools, pay all the teachers, and provide hot lunches to the children.

While this statement is directed to the behavior of the litigants, it is likely better understood as an indictment of the patent system itself.

d) Patent Holdout Impact

Whether bad-faith or inherent in the patent system, an argument can be made for circumstantial patent holdout, whereby Sonos may be unable to obtain the actual economic benefit commensurate to the breadth and strength of its patented technology. The following factors could exacerbate the impact of patent holdout:

1. **Cost of litigation**—as U.S. litigants rarely receive compensation for litigation costs, even a reasonable damage award will be undercompensated by the cost of litigation. For this case, that number will be in the tens of millions of dollars.
2. **Disruption of business operations**—the impact of the length and importance of the case is asymmetrically more disruptive to Sonos than Google. By comparison, the case isn't even mentioned in Google's 10-K report. The cost of the disruption to Sonos's business operations, including the direct loss of delayed payment and the indirect costs of ongoing uncertainty, must be subtracted from any final award or settlement.
3. **Loss of product market share**—because Sonos and Google also compete directly on the product market, patent infringement also can result in a loss of market share. This occurs when Sonos's products must compete against infringing features in competing products. This market share loss has both a short- and long-term component due to switching costs and lock-in once customers have chosen a specific brand. The loss of market share was cited by the court in *Pilot v. Coolman* as justification for injunctive relief.[125]

The following factors could mitigate the impact of patent holdout:

1. Settlement under threat of exclusion order or international injunction.
2. Enhanced damages.

Even with a finding in U.S. court of valid and infringed patents, the damages are typically limited to the level of a reasonable royalty, which would not

125. "Unfair competition through patent infringement is contrary to the interests of the public." Pilot Inc. v. Coolman Outdoor Corp., 2019 WL 2620723, at *5 (C.D. Cal. Apr. 10, 2019).

compensate Sonos for the costs and business impacts discussed above. This implies that a liability-based system requires enhanced damages to adequately compensate a patent owner and incentivize early settlements over extended litigation. However, the ability of potential infringers to wait and redesign their products through software updates, if necessary, based on any exclusion order or foreign injunction reduces its incentive to settle early before rolling the dice in litigation.[126]

In addition, the U.S. district courts could add enhanced damages based on willful infringement that could overcome the total economic impact of the cost and delay of litigation.

## B. CENTRIPETAL V. CISCO

### *1. Commercial Context*

The general commercial context of this case is characterized as a VC-backed startup, Centripetal Networks (Centripetal) up against Cisco Systems (Cisco), a publicly held behemoth of network infrastructure. Centripetal was initially seeking a partnership or a strategic investment from Cisco, which sells switches and routers. Centripetal does not market and sell switches and routers; however, Cisco embedded the patented software functionality from the Centripetal patents into the infringing switches and routers that provides the same functionality as Centripetal's RuleGate product.

According to Pitchbook, Centripetal has raised approximately $34M to date and has approximately 100 employees.[127] Cisco, on the other hand, has nearly 80,000 employees and $50B in annual revenue.[128] The size difference between Centripetal Networks and Cisco is the relevant factor for this study - see table 4.8 below.

**Table 4.8: Comparative company information for Centripetal and Cisco (2022).**

126. This ability to redesign, in particular, through software updates limits any potential patent holdup impact from injunctive relief or similar measures. If inventing around causes a loss of functionality related directly to the patents in suit, this is a sign that the infringed patents were of some value. *See* Lauren Goode, *Sonos' Patent Win Will Change Google's Smart Speakers—for Now*, WIRED (Jan. 7, 2022), https://www.wired.com/story/sonos-google-patents/; Mitchell Clark, *Your Google Home Speakers Are About to Get Slightly Worse Because Sonos Sued and Won*, VERGE (Jan. 7, 2022), https://www.theverge.com/2022/1/6/22871304/google-home-speaker-group-volume-control-changes-sonos-patent-decision.

127. *Centripetal*, PITCHBOOK, https://my.pitchbook.com/profile/59179-78/company/profile#, https://perma.cc/L4AB-2XKD (last accessed July 20, 2023).

128. *Id.*

| Firm | Founded | Employees | Revenue | Patent Families | Mkt Cap |
|---|---|---|---|---|---|
| Centripetal | 2009 | 100 | $10-20M | 24 | $92M [129] |
| Cisco Systems | 1984 | 80,000 | $52B | 16,000+ | $187B |

Centripetal was founded in 2009 and claims to maintain the "largest threat intelligence partner ecosystem, providing community based solutions to defeat sophisticated cyberattacks."[130] Their main competitors include cybersecurity and threat intelligence software firms such as ThreatConnect, CarbonBlack, Attivo Networks, Aruba Networks, and publicly traded companies such as CrowdStrike.[131] Centripetal launched its RuleGate Network Protection System (NPS) 2.4 in 2015, building on earlier NPS products going back to 2014.[132]

Cisco was founded in 1984 and is the world's largest provider of network infrastructure. Beyond networking equipment, including switches and routers, Cisco markets and sells wireless access points, controllers, and network management devices, along with a variety of security solutions, including firewalls and endpoint protection software. Cisco sells many products that use its IOS XE 16.6 Networking software. These include Cisco's Catalyst Switches, Cisco's ASR and ISR Series Routers, Cisco ASA with FirePOWER Services Products, and Cisco's Stealthwatch Products.[133] Each of these product lines contains several models that Centripetal alleged infringed its patents.

*2. Overview of Collaboration and Litigation Activities*

Centripetal and Cisco had several interactions between 2014 and 2018 prior to Centripetal asserting its patents against Cisco. The earliest interactions discussed in the complaint started on or around 2014, when Centripetal

129. Post valuation after last funding round in 2016.

130. *See* Complaint at 1, Centripetal Networks, Inc. v. Cisco Systems, Inc., No. 2:18-cv-0094 (E.D. Va. Feb. 13, 2018).

131. *Centripetal*, PITCHBOOK, https://my.pitchbook.com/profile/59179-78/company/profile#, https://perma.cc/L4AB-2XKD (last accessed July 20, 2023).

132. Press Release, Centripetal Networks, Centripetal Networks Announces the Latest Release of RuleGate® Network Protection System (Apr. 20, 2015), http://www.prweb.com/releases/2015/04/prweb12664218.htm.

133. *See* Complaint at 9, Centripetal Networks, Inc. v. Cisco Sys., Inc., No. 2:18-cv-0094 (E.D. Va. Feb. 13, 2018).

partnered with ThreatGRID. ThreatGRID sold threat intelligence technology that Centripetal integrated with their own patented products. Cisco later acquired ThreatGRID in 2016. Centripetal believes that Cisco benefited from its acquisition of ThreatGRID through "increased exposure to Centripetal's patented technology as a result of the acquisition of ThreatGRID."[134]

After Centripetal and Cisco signed an NDA, in February 2016, Centripetal presented detailed, highly sensitive, confidential information about its patented technology and products to Cisco during a WebEx conference call. This presentation included details of its patented technology for the Asserted Patents. For example, Centripetal detailed how its "patented filter algorithms eliminate the speed and scalability problem," how its "patented system, live update, and correlation technologies 'automate workflow'" and how its "patented" "instant host correlation" conveys "real time analytics."[135]

After the WebEx meeting, a Cisco engineer, who attended the meeting, wrote an internal email, stating the team should "look at these algorithms" that Centripetal had and "study their [patent] claims."[136] The next day, on February 5, 2016, a Centripetal employee sent an e-mail to Cisco summarizing the WebEx meeting, noting that Cisco "seemed to hone in on our filter technology and algorithms. The algorithms are a significant networking technology with broad application that we've productized for security. There were also a few questions on our patents . . . ." [137]

There were a number of follow-up meetings with Cisco, including a request from Cisco's security architect, who was very interested in Centripetal's patented technology. He requested and received a demonstration of Centripetal's patented RuleGate product, which he described in an online blog that educates Cisco employees entitled "Cool Tool: Centripetal Networks RuleGate—Threat Intelligence Tool," and where he stated, "I found this tool to be a pretty cool new approach to leveraging threat data."[138]

Later in 2016, Cisco invited Centripetal to participate in Cisco Live, Cisco's annual trade show. Centripetal was asked to demonstrate its technology in Cisco's Security Partner Village booth. Centripetal attended the Cisco Live conference and demonstrated its patented RuleGate Threat Intelligence Gateway product, which included some of the asserted patents. At the time, Cisco

134. *Id.* at 23.

135. *See* Centripetal Networks, Inc. v. Cisco Sys., Inc., 492 F.Supp.3d 495, 598 (E.D. Va. 2020.

136. *Id.*

137. *Id.*

138. *Id.*

listed Centripetal on its website, as part of a partner ecosystem whose "[t]hreat intelligence platforms use Threat Grid."[139]

Near the end of 2016, Cisco had several meetings with the investment bank Oppenheimer & Co. about Centripetal. These meetings stemmed from Centripetal's engagement with Oppenheimer to evaluate companies who were interested in making a strategic investment in Centripetal. During the meetings Oppenheimer presented Cisco with additional information about Centripetal, "including a list of Centripetal's patents issued at the time, product offerings that practice the patents, and a highly sensitive, detailed technical disclosure which detailed the core RuleGate functionalities covered by the Asserted Patents."[140]

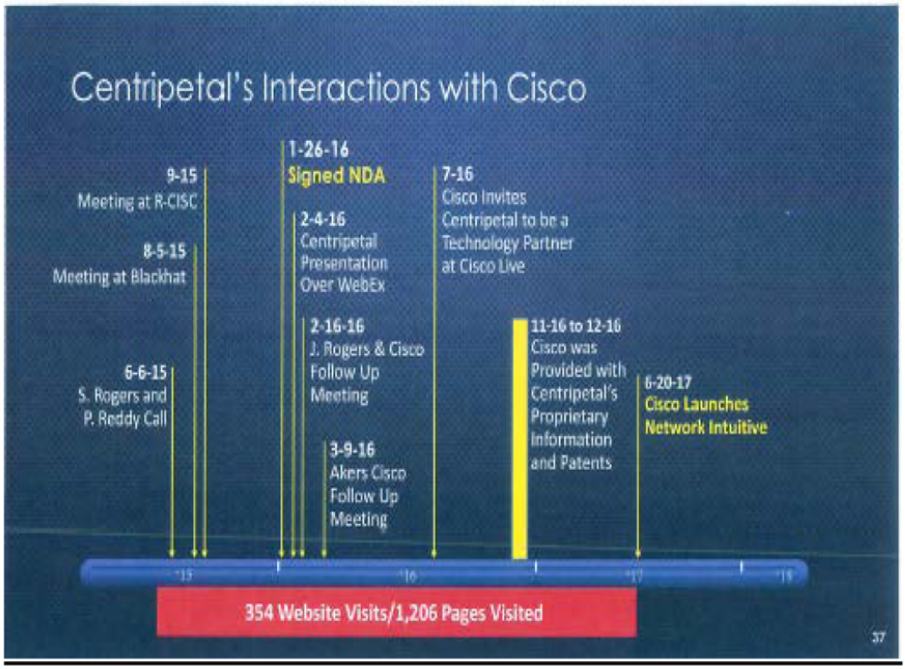
Below in Figure 4.4 is Slide 37, which Centripetal presented during its opening statements at trial. It summarizes in a timeline Centripetal and Cisco interactions leading up to Cisco's launch of "network of the future" products that incorporate Centripetal's patented technology.[141]

139. Amended Complaint at 24, Centripetal Networks, Inc. v. Cisco Sys., Inc., No. 2:18-cv-0094 (E.D. Va. Oct. 5, 2020).

140. *See* Opinion and Order at 150–51, Centripetal Networks, Inc. v. Cisco Sys., Inc., No. 2:18-cv-0094 (E.D. Va. Oct. 5, 2020).

141. *Id.* at 151–52.

**Figure 4.4: Timeline of interactions between Centripetal and Cisco.**




Then on February 13, 2018, Centripetal filed a complaint against Cisco for infringement of several of Centripetal's patents in the Eastern District of Virginia. Table 4.9 below provides an overview and status of the U.S. litigation activities in federal district court, the Court of Appeals for the Federal District (CAFC), and the Patent Trial and Appeal Board (PTAB) at the U.S. Patent and Trademark Office (USPTO).

To summarize, eleven patents were asserted against Cisco. Eight claims from four patents were found valid and infringed. Damages of about $756M were awarded and enhanced due to willful infringement by 2.5 times for a total damages award of about $1.9B. Pre-judgement interest of $14M and a running 10% royalty on apportioned sales for the next three years and 5% for the subsequent three years resulted in a total award of about $2.75B in favor of Centripetal.[142]

Of the nine patents that Cisco challenged through the PTAB's IPR program, two were denied institution, seven were instituted, and nearly all claims

142. *See* Opinion and Order at 166, Centripetal Networks, Inc. v. Cisco Sys., Inc., No. 2:18-cv-0094 (E.D. Va. Oct. 5, 2020).

were found unpatentable. In total there were 190 total claims challenged, and 185 claims found unpatentable.[143]

The case was appealed by Cisco to the CAFC in April 2021, and the CAFC published its decision in June 2022.[144] In the end, the three-judge panel from the CAFC reversed the Opinion & Order denying Cisco's Motion for Miscellaneous Relief, vacated the Opinion & Order regarding Infringement and Damages and the Opinion & Order Denying Post-Judgment Motions & Declaring the Case Final, and remanded for further proceedings before a newly appointed judge, who shall decide the case without regard for the vacated opinions and orders. The CAFC decision, which disqualified the District Judge Henry C. Morgan, stemmed from the finding that Judge Morgan's wife held 100 shares of Cisco stock while the case was pending before Judge Morgan. The total value of the stock held by Judge Morgan's wife for which the $2.75B decision was reversed was about $4,000.[145] As a percentage of Cisco's market cap, the impact of the decision would hypothetically result in a $60 investment loss to Judge Morgan's wife on a $4,000 stock holding.[146]

143. *Id.* at 2–3, 166.

144. *See* Defendant's Notice of Appeal, Centripetal Networks, Inc. v. Cisco Sys., Inc., No. 2:18-cv-0094 (E.D. Va. Apr. 14, 2021); Centripetal Networks Inc. v. Cisco Sys. Inc., 38 F.4th 1025 (Fed. Cir. 2022).

145. Centripetal Networks, Inc. v. Cisco Sys., Inc., 38 F.4th 1025, 1027 (Fed. Cir. 2022).

146. Calculation: Judge Morgan's wife's investmest loss = (patent damages/market cap) * (value of shares held).

**Table 4.9 Overview of U.S. litigation between Centripetal and Cisco.**

| Case | Date | Patents | Venue | Status |
|---|---|---|---|---|
| *Centripetal v. Cisco* | 02-13-2018 | 9,686,193<br>9,560,176<br>9,560,077<br>9,413,722<br>9,203,806<br>9,160,713<br>9,124,552<br>9,565,213<br>9,137,205<br>9,674,148<br>9,917,856 | EDVA | At trial, Centripetal asserted that Cisco infringes Claims 63 and 77 of '205, Claims 9 and 17 of '806, Claims 11 and 21 of '176, Claims 18 and 19 of '193, and Claims 24 and 25 of '856. Opinion issued October 5, 2020: '856, '176, '193, '806 valid and infringed. '205 not infringed. Damages of $755,808,545. Willful infringement enhanced damages 2.5x to $1,889,521,362.50. Pre-judgement interest of $13,717,925. Total of $1,903,239,287.50. Running 10% royalty on apportioned sales for three years, 5% royalty for following three years. |

| | | | | |
|---|---|---|---|---|
| Cisco IPRs | Filed between 3-31-2020 and 7-27-2020 | Denied:<br>9,686,193<br>9,560,176<br>Instituted:<br>9,160,713<br>9,124,552<br>9,565,213<br>9,674,148<br>9,560,077<br>9,413,722<br>9,137,205* | PTAB | For Instituted: All claims invalidated. Some appealed; all affirmed on appeal.<br>*'205 unasserted claims invalidated. |
| *Centripetal v. Cisco* | 4-19-2021 | Appeal | CAFC | Reverse Opinion & Order denying Cisco's motion for Miscellaneous Relief (Recusal of Judge due to wife holding 100 shares of Cisco stock), Vacate order regarding infringement and damages and the Opinion & Order Denying Post-Judgment Motions & Declaring the Case Final, and remand for further proceedings before a newly appointed judge, who shall decide the case without regard for the vacated opinions and orders. |

There was also at least one case filed by Centripetal in the German courts, according to Cisco's 10-K for the fiscal year ending July 30, 2022.[147] In total, Centripetal filed complaints asserting six patents against Cisco in the District Court of Düsseldorf, Germany.[148]

These cases are in various stages:

- Centripetal asserted three European patents, seeking both injunctive relief and damages against Cisco in April of 2020. Two of the three European patents are counterparts to two U.S. patents Centripetal asserted one of which has been invalidated by the PTAB.[149]
- In June of 2021, Centripetal amended one of its complaints to assert one additional European patent and one additional German Utility Model patent.
- Later in 2021 the German Court rejected Centripetal's complaints on two of the asserted patents; Centripetal appealed.[150]
- A hearing for a Cisco nullity action in the Federal Patent Court in Germany on one of those two patents occurred on August 1, 2022. At the time of writing, the Court's opinion has yet to be published.[151]
- On December 21, 2021, the German Court stayed its decision on infringement of the third patent pending a decision by the Federal Patent Court in a related nullity proceeding.[152]
- On May 17, 2022, Centripetal withdrew its complaint for infringement of the German Utility Model patent. The proceedings on Centripetal's European patent filed on June 22, 2021 remains pending.[153]
- On February 14, 2022, Centripetal filed an additional complaint asserting infringement of another patent issued by the European Patent Office. Centripetal seeks both injunctive relief and damages on these patents.[154]

147. *See* Cisco Systems, Inc., Annual Report (Form 10-K) (July 30, 2022), https://d18rn0p25nwr6d.cloudfront.net/CIK-0000858877/3ba9f4b0-a7e6-496e-8c94-78b0ae2c026c.pdf.

148. *Id.* at 91.

149. *Id.*

150. *Id.*

151. *Id.*

152. *Id.*

153. *Id.*

154. *Id.*

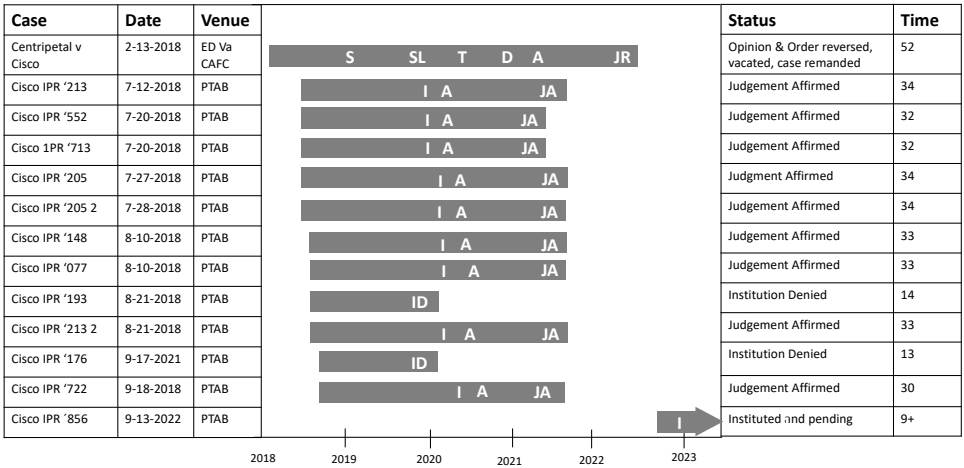
*3. Specific Litigation Behavior and Results*

This Section IV.B.3 provides a deeper look into the specific legal proceedings that define the overall litigation campaign between Centripetal and Cisco in the US. This includes specific information regarding the venue, patents-in-suit, key dates, key motions, and current status or final disposition that define the litigation behavior in the commercial context of a small, VC-funded operating company (Centripetal) versus a very large operating company (Cisco).

There has been one patent infringement lawsuit filed in the U.S. district court system—by Centripetal against Cisco. The lawsuit has asserted a specific set of patents. This Section IV.B.3 is organized around the asserted patent sets, including the associated proceedings at the PTAB and CAFC in order to better understand the litigation behavior at the patent level.

**Figure 4.5: Timelines of specific U.S. litigation activities between Centripetal and Cisco. Time = months.**

**(S=Stay, SL=Stay Lifted (for non IPR patents and claims), O=Opinion, A=Appeal, I=Instituted, M=Markman, T=Trial, D=Decision, ID=Institution Denied, JA=Judgement Affirmed, JR=Judgement Reversed)**




On February 13, 2018, Centripetal filed a patent infringement complaint in the Eastern District of Virginia against Cisco, followed by an amended complaint on March 29, 2018, asserting infringement of eleven U.S. patents shown in Table 4.10.[155] Both the '205 patent and the '856 patent were previously asserted in a case against Keysight Technologies, and the '176, '193, and '806

155. *See* Opinion and Order at 1-2, Centripetal Networks, Inc. v. Cisco Sys., Inc., No. 2:18-cv-0094 (E.D. Va. Oct. 5, 2020).

patents are in the same patent family and covered similar fields of technology as the patents that were asserted in the previous case.[156]

Between July 12, 2018 and September 18, 2018, Cisco filed numerous petitions for IPR before the PTAB against nine of the eleven Centripetal patents originally asserted against Cisco shown in Table 4.10.[157] Cisco also filed a motion to stay pending resolution of IPR proceedings,[158] which was granted by the court on February 25, 2019.[159] Upon the motion of Centripetal, on September 18, 2019, the Court issued an order lifting the stay in part with respect to patents and claims not currently subject to IPR proceedings and setting the case for trial in April 2020.[160] The parties later waived a jury trial following the jury trial limitations resulting from the COVID-19 pandemic.[161]

At the 22-day bench trial beginning April 2020, Centripetal asserted that Cisco infringed claims 63 and 77 of the '205 patent, claims 9 and 17 of the '806 patent, claims 11 and 21 of the '176 patent, claims 18 and 19 of the '193 patent, and claims 24 and 25 of the '856 patent.[162] Of the claims not at issue for trial, the PTAB granted institution of IPR on all of the claims of the '552, the '713, the '213, the '148, the '077, and the '722 patents and granted institution of IPR of claims of the '205 patent that were not the subject of the bench trial.[163]

The PTAB invalidated all of the claims of the '552, the '713, the '213, the '148, and the '077 patents and invalidated the unasserted claims of the '205 patent. Centripetal appealed the PTAB decisions regarding the '552, the '713, the '213, the '148, and the '077 patents as well as the unasserted claims of the '205 patent.[164] All PTAB decisions were affirmed by the CAFC between March 10, 2021 and May 12, 2021.[165]

For the '176 patent and the '193 patent, institution was denied by the PTAB. Finally, for the '722 patent, 20 claims were held unpatentable, while five claims were deemed not unpatentable by the PTAB. After an appeal, the PTAB decisions were affirmed by the CAFC.[166]

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156. *Id.* at 128; Centripetal Networks, Inc. v. Keysight Techs., Inc., 2018 BL 401352 (E.D. Va. Sept. 25, 2018).

157. Opinion and Order at 2, Centripetal Networks, Inc. v. Cisco Sys., Inc., No. 2:18-cv-0094 (E.D. Va. Oct. 5, 2020).

158. *Id.*

159. *Id.*

160. *Id.*

161. *Id.*

162. *Id.*

163. *Id.*

164. *Id.* at 3.

165. *See* Centripetal Networks, Inc. v. Cisco Sys., Inc., 847 Fed. Appx. 869 (Fed. Cir. 2021); Centripetal Networks, Inc. v. Cisco Sys., Inc., 847 Fed. Appx. 927 (Fed. Cir. 2021).

166. *Id.*

On October 5, 2020, Judge Morgan issued a 167-page Opinion and Order containing his findings of fact and conclusion. He wrote:

> For the reasons stated within, the Court FINDS the '856 Patent, the '176 Patent, the '193 Patent, and the '806 Patent claims valid and literally INFRINGED and the '205 Patent NOT INFRINGED. The Court FINDS the actual damages suffered by Centripetal as a result of infringement total $755,808,545; that the infringement was willful and egregious and shall be enhanced by a factor of 2.5x to equal $1,889,521,362.50. The Court awarded pre-judgment interest of $13,717,925 applied to the actual damages before enhancement plus its costs. This, accordingly, equals a total award of $1,903,239,287.50 payable in a lump sum due on the judgment date. The Court, additionally, imposes a running royalty of 10% on the apportioned sales of the accused products and their successors for a period of three years followed by a second three-year term with a running royalty of 5% on said sales upon the terms described supra. It DENIES any further relief to Centripetal at the termination of the second three-year term.[167]

**Table 4.10: *Centripetal v. Cisco* patents-in-suit (EDVA and PTAB).**

| U.S. Patent # | P/G | Description | Claims | Validity |
|---|---|---|---|---|
| 9,565,213 | 2012/ 2017 | Methods and systems for protecting a secured network | 16 | IPR—All challenged claims unpatentable. |
| 9,124,552 | 2013/ 2015 | Filtering network data transfers | 21 | IPR—All challenged claims unpatentable. |
| 9,160,713 | 2013/ 2015 | Filtering network data transfers | 20 | IPR—All challenged claims unpatentable. |

167. Opinion and Order at 166, Centripetal Networks, Inc. v. Cisco Systems, Inc., No. 2:18-cv-0094 (E.D. Va. Oct. 5, 2020).

| | | | | |
|---|---|---|---|---|
| 9,137,205 | 2012/ 2015 | Methods and systems for protecting a secured network | 97 | IPR—57 challenged claims Unpatentable; District court—claims 63 & 77 valid but not infringed. |
| 9,674,148 | 2013/ 2017 | Rule swapping in a packet network | 20 | IPR—All challenged claims unpatentable. |
| 9,560,077 | 2012/ 2017 | Methods and systems for protecting a secured network | 20 | IPR—All challenged claims unpatentable. |
| 9,413,722 | 2015/ 2016 | Rule-based network-threat detection | 25 | IPR—Claims 1–7, 10–12, 14–21, 24, 25 unpatentable; claims 8, 9, 13, 22, 23 not unpatentable. |
| 9,560,176 | 2015/ 2017 | Correlating packets in communications networks | 21 | IPR—Institution denied; District Court—Claims 11 & 21 valid and infringed. |
| 9,686,193 | 2015/ 2017 | Filtering network data transfers | 20 | IPR—Institution denied; District Court—Claims 18–19 valid and infringed. |
| 9,203,806 | 2013/ 2015 | Rule swapping in packet network | 24 | District Court—Claims 9 & 17 valid and infringed. |

| | | | | |
|---|---|---|---|---|
| 9,917,856 | 2015/ 2018 | Rule-based network-threat detection for encrypted communications | 25 | District Court—Claims 24 & 25 valid and infringed. |

On April 14, 2021, Cisco appealed the decision to the Federal Circuit from the Eastern District of Virginia, citing many of the fundamental decisions and rulings from the case.[168] Cisco also moved for amended findings and judgment under Federal Rule of Civil Procedure 52(b) with respect to direct infringement and damages and for a new trial under Rule 59(a)(2).[169] The court denied those motions on March 17, 2021.[170] However, on June 23, 2022, Cisco's appeal regarding the question of whether the district judge should have recused himself under 28 U.S.C. § 455(b) was decided by the CAFC, who vacated the district court's decision and remanded the case for further proceedings before a newly appointed judge, who shall decide the case without regard for the vacated opinions and orders.[171] One day later on June 24, 2022, Cisco filed an IPR on the '856 patent, which was instituted by the PTAB on January 4, 2023.[172] In the interim, on September 13, 2022, Centripetal filed a petition for writ of certiorari, which was denied on December 5, 2022.[173]

*4. Case Discussion*

Below is a short discussion of several key aspects of the *Centripetal v. Cisco* litigation from a patent holdout perspective.

a) Intrinsic Patent Holdout Challenges

*Centripetal v. Cisco* is another classic example of the intrinsic challenge in settling patent disputes through the U.S. court system in a timely and cost-effective manner. The litigation initiated at the Eastern District of Virginia took over 52 months through appeal, resulting in a vacated multibillion-dollar

168. *See* Defendant's Notice of Appeal, Centripetal Networks, Inc. v. Cisco Sys., Inc., No. 2:18-cv-0094 (E.D. Va. Apr. 14, 2021).

169. *See* Centripetal Networks, Inc. v. Cisco Sys., Inc., 526 F. Supp. 3d 137, 139–40 (E.D. Va. 2021).

170. *Id.*

171. Centripetal Networks, Inc. v. Cisco Sys., Inc., 38 F.4th 1025, 1040 (Fed. Cir. 2022).

172. Cisco Sys., Inc. v. Ahn, No. IPR 2022-01151 (P.T.A.B. May 23, 2023).

173. Centripetal Networks, Inc. v. Cisco Sys., Inc., 143 S. Ct. 487 (2022).

judgement over a $4,000 stock position by the judge's wife that, if anything, would be negatively affected by the court's decision. Given the court's infringement date of June 2017, the dispute is now ongoing for over five years without a settlement. Additionally, the total cost of litigation across all venues is likely tens of millions of dollars. The case also further highlighted the fundamental difficulty in finding agreement even on common language in a contentious proceeding. Appendix A provides an example of testimony by experts over the meaning of the terms "immediately" and "also." In addition, the fundamental difficulty in overcoming validity and infringement challenges was exemplified when the court cited "Cisco's lockstep strategy of denying any infringement of any of the elements of the four claims where infringement is found, and backstopping this position by contending that if the Court found infringement the patents were ipso facto invalid, led to a number of factual conflicts in its presentation of its evidence."[174] While Centripetal is orders of magnitude smaller than Cisco, it appears to have been able to use its VC funding to manage the extensive costs and timeframe necessary to participate effectively in U.S. patent enforcement.

b) Extrinsic Patent Holdout Challenges

The extrinsic challenges impacting the patent system over the past two decades are visible in the litigation behavior in this dispute, including the following:

- The difficulty to obtain injunctive relief in federal court after *eBay*.
- The use of the PTAB to challenge patent validity through an IPR at the USPTO instead of federal court, which applies a higher burden of proof.[175] In this case, Cisco requested an IPR on nine of the eleven patents in suit, succeeding to institute and invalidate seven patents. The court added that the "many requests for inter partes review, by necessity, delayed the trial."[176]
- The convergence of cybersecurity technology into network infrastructure was clear driver of value to Cisco given the increase of approximately $5.575 billion in Cisco's revenue over three years by adding the infringing functionality to their non-

174. Centripetal Networks, Inc. v. Cisco Sys., Inc., 492 F. Supp. 3d 495, 519 (E.D. Va. 2020).

175. *See* Novartis AG v. Noven Pharm. Inc., 853 F.3d 1289, 1294 (Fed. Cir. 2017).

176. Centripetal Networks, Inc. v. Cisco Sys., Inc., 492 F. Supp. 3d 495, 518 (E.D. Va. 2020).

infringing product lines.[177] Cisco has a long history of acquiring small startup firms with valuable technology, which explains the initial collaboration and vetting.

c) Patent Holdout Behavior

In *Centripetal v. Cisco*, the court took on the issue of bad-faith behavior directly in its determination of willful infringement and enhanced damages. Specifically, the court applied the following nine *Read* factors to the evidence in the case:[178]

1. **Deliberate copying**—Cisco's release of products with Centripetal's functionality within a year of meetings where Centripetal provided demonstrations and confidential information as "beyond mere coincidence."[179]
2. **Defendant's investigation and good-faith belief of invalidity or non-infringement**—Cisco presented no evidence of any such investigation and its own technical and marketing documents suggest it would have been difficult to form such a belief."[180]
3. **Litigation behavior**— "Cisco had to shield the engineers who authored its current technical documents and the executives who praised its new security functionality for 'solving problems previously thought unsolvable' from answering to their own writings and statements."[181] Furthermore, the court added that "[m]ost of Cisco's challenges amounted to no more than conclusory statements by its experts without evidentiary support."[182]
4. **Defendant's size and financial condition**—"Cisco's immense size and commercial success with the infringing products."[183]
5. **Closeness of the case**—"the rulings on the four patents that were found infringed and valid were clear and not a close call."[184]

177. Centripetal Networks, Inc. v. Cisco Sys., Inc., 492 F. Supp. 3d 495, 603 (E.D. Va. 2020).
178. Read Corp. v. Portec, Inc., 970 F.2d 816, 826-27 (Fed. Cir. 1992).
179. Centripetal Networks, Inc. v. Cisco Sys., Inc., 492 F. Supp. 3d 495, 602 (E.D. Va. 2020).
180. *Id.*
181. *Id.*
182. *Id.* at 523.
183. *Id.* at 603.
184. *Id.*

6. **Duration of the misconduct**—the "infringing conduct has been continuous and unabated without any form of remedial action from June 20, 2017, to the present time."[185]
7. **Remedial action by the defendant**—the court noted no remedial action by Cisco even after the suit was filed.[186]
8. **Defendant's motivation for harm**—not cited by the court.
9. **Attempted concealment of the misconduct**— "Cisco, through its course of conduct, continually gathered information from Centripetal as if it intended to buy the technology from Centripetal. Cisco, then, appropriated the information gained in these meetings to learn about Centripetal's patented functionality and embedded it into its own products."[187] The court further noted the use of new technical and marketing that differed from their own official technical and marketing documentation that was admitted into evidence by Centripetal.

d) Patent Holdout Impact

As noted in Table 3.1, no STF in the past ten years is yet to receive a payment after a very large damage award on the district court level. This case falls into the pattern as well. However, for the sake of argument, one important question that this case highlights is whether a patent holder can truly be made whole through court-determined compensation (i.e., a liability rules based system). While the court found that Cisco ticked most of the *Read* boxes to justify a finding of bad-faith patent holdout behavior (see above), one could make an argument that the 2.5x enhanced damages is a sufficient remedy, thus resulting in no patent holdout impact in this particular case. Instead, the vacated and remanded ruling adds another data point in support of the hypothesis of systematic patent holdout as inherent in the current patent system.

## V. TOWARD A THEORY OF PATENT HOLDOUT IN THE SMALL(ER) TECHNOLOGY FIRM (STF) CONTEXT

While the development of patent holdout theory has primarily grown out of the context of standards and SEPs, it is argued that the general principles can be applied to any IP right enforcement situation involving opportunistic behavior.[188] Similarly, Lemley and Shapiro argued primarily for the case of

185. *Id.* at 603–4
186. *Id.*
187. *Id.* at 604.
188. Epstein & Noroozi, *supra* note 36, at 1384.

patent holdup in the context of PAEs. Thus, building symmetrically on Lemley and Shapiro's definition of patent holdup: if weak patents in a system of strong injunctive relief can hypothetically create increased bargaining power for patent holders (i.e., patent holdup), then strong patents in a system of weak injunctive relief can hypothetically create increased bargaining power for potential infringers (i.e., patent holdout) and lead an infringing firm to negotiate royalties far below the patent holder's true economic contribution. Concomitantly, if Farrell and Shapiro can ask "how strong are weak patents?" in 2008, then we must also be able to ask "how weak are strong patents?" in 2023. Below are a number of key theoretical propositions to better define patent holdout in the STF context.

### A. TYPOLOGY OF PATENT HOLDOUT FOR STFS

To understand the nature and impact of patent holdout for STFs, a holistic typology is required to identify the different STF contexts and behaviors resulting from patent holdout. Below is a list of specific types and behaviors that define STFs faced with a patent holdout situation:

#### *1. Types of STFs that Can Experience Patent Holdout*

- **Hybrid Operating Companies (OPCOs)**: Smaller operating companies that deploy a hybrid business model to extract value from their patented technology that covers multiple application areas and geographies where they may not be best suited to compete directly on the product/service market.
- **Non-Practicing Entities (NPEs)**[189]: Companies who seek solely to license their own patented technology instead of vertically integrate onto the product/service market by choice or due to the lack of complementary assets.
- **Patent Assertion Entities (PAEs) by proxy**: Companies that collaborate with or have acquired patents from hybrid OPCOs or NPEs discussed above. This may be a necessity for STFs that don't have the financial strength to litigate themselves—see below.

#### *2. Types of STF Behavior in Response to Patent Holdout*

- **Forced to litigate**: The most obvious outcome is that STFs will be forced to litigate using their own financial resources or financial backing. As many STFs won't have the financial resources to cover the high litigation costs over the extended timeframe of U.S. litigation, many

189. The term of art "non-practicing" is used descriptively, not pejoratively, to denote firms that do not commercialize their technology through the sale of products and services.

will need to turn to either litigation financiers or collaborate with PAEs for support. As both actors will take a large cut of any award or settlement from litigation, one could argue that the STF, even under the best circumstances, will likely receive less value than the true contribution of their patent technology. Subsequently, licensees could discount any pre-litigation offer by the amount of the cost of litigation and/or equity lost through the need to engage third-party litigation support, which could facilitate a systemic hold-out effect for the subcategory of STFs with less financial resources.

- **Unable to litigate or settle**: Many STFs may be unable to or choose not to litigate for the financial reasons discussed above or for other commercial reasons (e.g., the alleged infringer is an important actor in the value chain). The high transaction costs associated with litigation can serve as an indemnification for infringement. When the value of successful litigation is adjusted for risk (and shared equity), this indemnification can be quite high from the STF perspective (e.g., potentially ranging from $10-100M depending on the number of patents and different venues). This should produce an observable empirical impact unless STFs are able to mitigate the loss of patent enforcement with other sources of competitive advantage.
- **Forced to settle**: Similar to reasons above, STFs that are unable to litigate may be forced financially to settle for an amount lower than the true value of their patented technology. This information is difficult to observe due to the lack of transparency of settlement deals and the challenge in calculating "true" value as reference.
- **Firm failure:** The STF fails for lack of investment based on the critical need for patent protection and the perception of uncertain patentability and ineffectual patent enforcement by venture financiers.

### B. HOLDOUT BEHAVIOR BY ALLEGED INFRINGERS – BAD-FAITH VS. SYSTEMATIC INCENTIVES

Both patent holdup and holdout behaviors are often described in pejorative terms that imply bad faith. For example, firms accused of patent holdup are "trolls" and firms accused of patent holdout are "predatory infringers." When these terms are applied broadly to all circumstances of patent licensing that are contentious, the fundamental challenges facing markets for technology are lost in the rhetoric. Below is a description of specific characteristics that define patent holdout by alleged infringers from good-faith to bad-faith to systemic:

*1. Good-Faith Behavior (i.e., Not Patent Holdout)*

The intrinsic challenges of the patent system require a certain amount of cost, time, and uncertainty to be regarded as within the bounds of good-faith behavior by potential licensees. For example, validity and infringement will likely never be fully agreed even when there is an ongoing negotiation, as doing so would open the licensor to willful infringement should there be litigation. Furthermore, actors can have target prices differing by orders of magnitude based on legitimate perceptions of the apportionment of value of the patented technology in relation to the overall value of a new, complex infringing product or service. This can become even more difficult to determine if the infringing product or service is on the subsidized side of a multi-sided market business model. Below are specific yet subjective circumstances that could be considered a good-faith behavior by a licensee:

- A reasonable time spent conducting due diligence on asserted patents (e.g., actors can legitimately disagree regarding validity and infringement).
- A reasonable time spent negotiating over price and terms.
- Refusal to accept an unreasonable offer or settlement.[190]
- Petitioning a court or employing other ADR methods to resolve legitimate legal and factual uncertainties.

*2. Bad-Faith Behavior*

The line between good-faith and bad-faith behavior can be difficult to ascertain completely without formal discovery unless the licensee's behavior is particularly obvious. Below are several examples of bad-faith behavior that are subjective but possible to ascertain either informally or formally through judicial proceedings:

- Willful infringement.
- Refusal to negotiate.
- Refusal to accept a reasonable offer based on well-accepted market norms.[191]
- Conducting sham litigation for the sole purpose to delay and increase the litigation costs for the patent holder.

190. This is, of course highly subjective. Even when courts award damages, one or both of the parties is often unsatisfied.

191. This requires knowledge of the range of the settlements offered by both sides. If the range of offers was well above or below the buyers and sellers target price, litigation or other dispute resolution methods are appropriate behaviors.

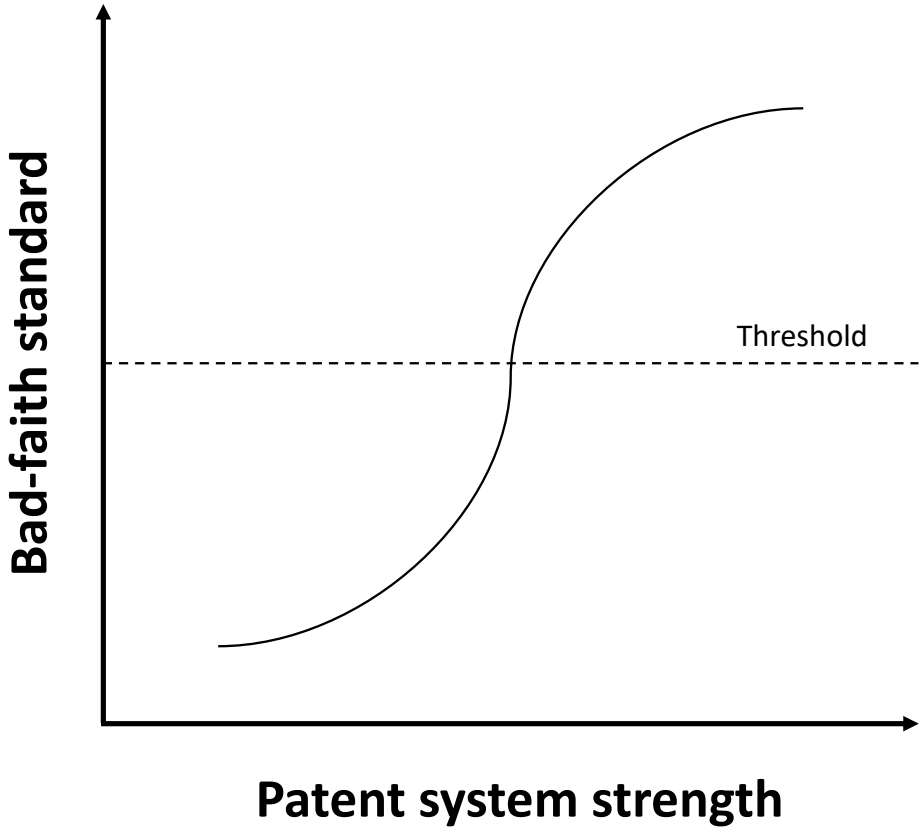
A key question is where the line is between patent due diligence and opportunism (i.e., between a willing licensee conducting reasonable due diligence and an unwilling licensee or willing infringer deploying a patent holdout strategy).

*3. Rational Behavior Incentivized by the Patent System*

While acknowledging the possibility for change, it is difficult not to put forward the proposition that patent holdout is inherent in the U.S. patent system based on the intrinsic challenges of high costs, long timeframes, and probabilistic patent validity. The theoretical probability for systematic patent holdout is further enhanced when injunctions are reduced, granted patents are easier to invalidate, and damages are more difficult to uphold.

Figure 5.1 below shows the relationship between bad-faith behavior and the weakening of the patent system. At some point, it is difficult to separate bad-faith behavior from rational behavior incentivized by the system, which is depicted by the "threshold" in the figure. For example, if there was no enforcement possibility, would it be bad faith for an infringer not to pay?

**Figure 5.1: The relationship between bad-faith behavior and patent system strength.**




*4. Rational Behavior Incentivized by Market Forces*

In addition to patent system incentives, market forces also create powerful incentives that impact patent holdout behavior, including:

- **Collective action problems**
  1. **Refusal to license**—when paying a royalty would put a potential licensee at a pricing disadvantage with an unlicensed competitor, it will refuse to take a license until all its competitors are also licensed, creating a collective holdout effect.
  2. **Disperse political power**—while society could benefit as a whole from increased patent enforcement opportunities for STFs, the organization of these small firms to collectively impact the political process is limited against bigger actors.
- **Adverse signaling**—potential licensees are disincentivized to take a license and settle without a fight if this would signal weakness and

attract a greater group of firms seeking a license. It would both incentivize actors asserting patents as well as generating evidence of comparable licenses.

- **Positive externalities**—the use of IPRs and other invalidity proceedings generates a positive externality as an invalid patent benefits all potential licensees. This can lead to direct or indirect collusion by potential licensees, especially when a patent holder is asserting its patents against multiple actors.

C. PATENT HOLDOUT IMPACT

Even if patent holdout behavior is present, it is still necessary to measure the economic impact of that behavior to understand the effect on social welfare. Below is a model describing the different levels of patent holdout impact and the theoretical propositions informed by this Article's study.

a. **Circumstantial effect**—there is preliminary empirical evidence of circumstantial patent holdout based on the small sample of STF litigation in this study. If the primary impact is circumstantial, further research should produce an even distribution of cases where STFs asserting patents experience appropriate settlements or damage awards in relation to those STFs that are compelled to accept compensation lower than the actual value of their patented technology.

b. **Systematic effect**—there are theoretical prerequisites of a systematic effect based on the logical incentives produced by a patent system with both intrinsic and extrinsic challenges, but confirmation requires further quantitative empirical evidence. Below are several indicators that support the potential existence of systematic patent holdout:

   - The weakening of the patent system with respect to reduced injunctive relief and increased opportunities for patent invalidity.
   - Collective action problems that incentivize potential licensees to holdout and limit that political power of STFs.
   - The difficulty for STF patent holders who have won damage awards to actually receive compensation.

The fact that only one of the cases in Table 3.1 has received an actual payment even after years of litigation and damage awards does not incentivize decision-makers of alleged infringing firms to settle. Of course, further empirical investigation of STF settlement data is needed to draw any clear conclusions. Below are further theoretical

propositions that would be helpful to test the systematic nature of patent holdout:

- How has the invalidity rate of asserted patents changed for STFs during the past 20 years?
- How does the reduction of injunctive relief alter the bargaining power of STFs in litigation against much larger actors with deep pockets? For example, the litigation with Sonos is not significant enough to be mentioned in Google's 10-K report.
- Given the lack of very large damage awards that have not been overturned, what is the highest settlement amount that a large actor has paid pre-litigation?

c. **Systemic effect** – theoretical preconditions exist for a systemic effect for industries where patent protection is critical for investment and leverage to enter markets with large incumbent firms, but confirmation requires further quantitative empirical evidence. Below are several criteria that are important in investigating the potential existence of systemic patent holdout:

- Holdout must include a compulsion to accept a settlement below the real economic value of the patent (e.g., below the reservation price) that has an impact on dynamic efficiency. For example:
  1. The rate of innovation of STFs in an industry is reduced (ex post holdout).
  2. The rate of investment in STFs in an industry is reduced (ex ante holdout).
- Holdout mitigating factors that lower the systemic impact by balancing bargaining power and incentivizing settlements, including:
  1. The leverage of injunctive relief in foreign countries to generate increased patent owner bargaining power (e.g., Germany, UK, China, and the upcoming EU Unified Patent Court).
  2. The increased use of enhanced damages by district courts that directly and adequately compensate patent holders and indirectly facilitate earlier settlements.

## VI. CONCLUSIONS

There are no patent police. This means that patent owners must pay to surveil the market for potential infringers and pay to enforce their patents if

negotiations fail. In a patent system with low transaction costs and speedy, reliable results, this would not be a problem, but, unfortunately, the U.S. patent system is very expensive, lengthy, and uncertain. While large firms can carry this burden, STFs cannot. In addition, the main attribute of any property right system—injunctive relief—has been weakened significantly in the US, thus removing the main instrument STFs have to balance the power in negotiations with larger actors and incentivizing patent holdout behavior as a rational strategy. Below are several key insights resulting from this Article's study:

- The high cost and long timeframes of U.S. litigation combined with the subjective nature of patentability and infringement create an intrinsic patent holdout bias in the U.S. patent system, especially for small(er) technology firms (STFs), as the burden of enforcement falls on the patent holder.
- This intrinsic bias is exacerbated by recent extrinsic judicial and legislative changes that reduce access to injunctive relief and increase opportunities for invalidity, creating a systematic incentive for patent holdout beyond circumstantial bad-faith behavior by individual actors.
- Preliminary statistical results show that:
    - Both OPCOs and NPEs litigate as a means to settle licensing-based infringement disputes.
    - Very few small firms in the past ten years have received court-awarded damages and fewer have ever received an actual payment.
    - The time in litigation ranged from 30-98 months, with most still ongoing.
    - Several $100M+ cases were vacated after years of litigation over legal technicalities that could have been known at the outset, including the $2.75B *Centripetal* ruling based on the judge's wife ownership of $4,000 of Cisco stock. The more ways a patent holder can potentially lose, the more incentive exists for patent holdout.
- Preliminary case study results show that:
    - Both *Sonos* and *Centripetal* show evidence of systematic patent holdout that incentives litigation over settlement. The court in the *Centripetal* cases also cited bad-faith behavior leading to enhanced damages for willful infringement.
    - Both STFs and large companies are willing to use the PTAB in litigation (e.g., Sonos as well as Google and Cisco filed IPRs)

- The result of the appeal of Sonos's preliminary win at the ITC will provide evidence on whether extra-judicial orders can facilitate settlements in place of traditional court injunctions.
- The enhanced damages award in the Centripetal case raises the question as to whether the use of willful infringement can provide adequate remedies in equity for a patent holder and disincentivize patent holdout.

Further empirical research is required to better measure the systematic scale and systemic economic impact of patent holdout for STFs, especially given that much of the evidence of systemic patent holdout will manifest in STFs unable to litigate, accepting forced settlements, or failing to receive VC investment.

## APPENDIX A: EXCERPTS OF EXPERT TESTIMONY FROM *CENTRIPETAL V. CISCO*

The following pages include some of the expert testimony from Cisco's expert, Dr. Douglas Schmidt, an independent expert witness in networking and network security who opined regarding non-infringement, invalidity, and damages of the '856 Patent. The goal of the Appendix is to illustrate the intrinsic challenge of the patent system regarding the subjective nature of patentability and infringement built on the foundation of language.

The following snippet of the transcript from the trial starts on page 47 where Dr. Schmidt is being questioned by Centripetal's counsel[192]:

> Q. So we go to 1287. This is a document describing the Catalyst 9000 switch. "Foundation for a New Era of Intent-based Networking." Do you see that, Dr. Schmidt?
>
> A. I do.
>
> Q. Okay. You know Dr. Cole relied on this document in his direct testimony of infringement, correct?
>
> A. I believe so.
>
> Q. Okay. Now if we turn to Page 28 of that document ending in Bates Number 028, there's a graphic at the top here and it talks about the Catalyst 9000 Advanced Security Capabilities. Do you see that?
>
> A. I do.
>
> Q. And you recall Dr. Cole relying on this document, correct?
>
> A. Not particularly, no.
>
> Q. Okay. Well, if you look at the very bottom it says, "Detect and stop threats, exclamation point." Do you see that?
>
> A. I do.
>
> Q. And Dr. Cole used it to show that the Catalyst switches and the routers that have the same operating systems can detect and stop threats prospectively right? Or proactively, correct?
>
> A. I don't believe that that's what it says, no.
>
> Q. So you don't think this says it's going to detect and stop threats proactively?

192. Centripetal Networks, Inc. v. Cisco Sys., Inc., 492 F. Supp. 3d 495, 535–38 (E.D. Va. 2020).

A. I don't know what this slide says in this context. I know that Dr. Cole had an analysis that read the claims in a way that was essentially a non-sequitur, a series of non-sequiturs, and accused things as being part of—the read on the claims, the patent claims that had nothing to do with the way in which the products operate.

Q. I'm asking about your opinion now. When it says, "Detect and stop threats," does that mean it's detecting and stopping the threat before they get to the host?

A. It's not clear what it means in this context. I see the words "detect and stop threat." I don't see how it applies to the patent that we're talking about here.

Q. So you don't know what "detect and stop threat" means is what you're telling the Court?

A. No. I'm just saying I don't know whether it means what you're saying it means.

THE COURT: Well, what do you think it means over on the right where it says "Before, During and After"?

THE WITNESS: It looks like it's saying that—so it looks like it's talking about the fact it's possible to quarantine something, but I don't know how that refers to the—I don't know how that refers to the way in which it reads on the claims and whether what Dr. Cole was alleging has anything to do with what the claims are asserting.

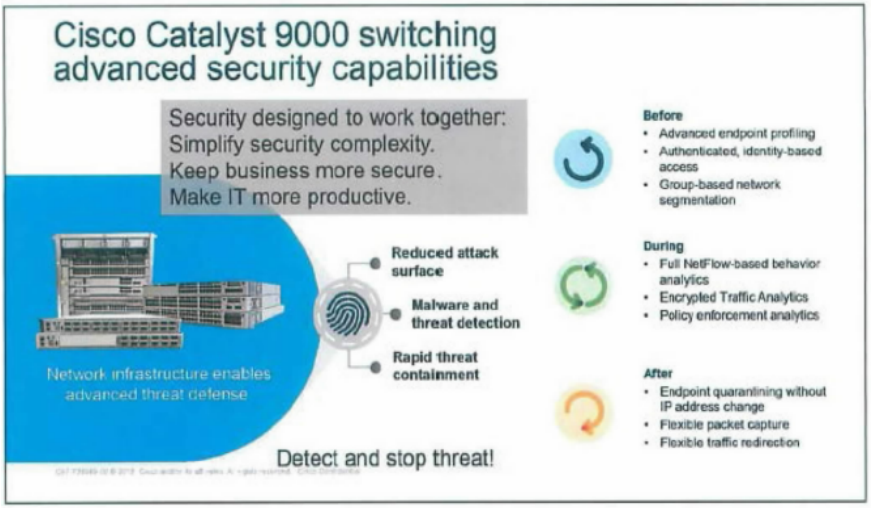
BY MR. ANDRE:

Q. So when it says "During", during the packets coming in, Full Net-Flow-based behavior analytics, Encrypted Traffic Analytics, Policy Enforcement Analytics. You don't have an understanding of what that's referring to?

A. Again, this particular slide is coming out of thin air here, so I would have to spend a little bit of time looking at it to understand the way it's being used in this particular context.

Tr. 1925:16-1927:21; see PTX-1287 at 028 (depicted below).

**PTX-1287**
**Cisco Catalyst 9000 Switching Technical Presentation from 2018**




It's difficult to comprehend why Dr. Schmidt would state, in his rebuttal of Dr. Cole, that he cannot understand a Cisco post 2017 document because it is "coming out of thin air." In his preparation for his expert testimony, the Court is unaware how or why he overlooked this crucial Cisco document. Dr. Schmidt, when questioned again about this point, stated:

> Q. When we talk about Stealthwatch, if we go to the next page, you keep talking about this after-the-fact stuff. On that table on the left there it says, "Real-time detection of attacks by immediately detecting malicious connections from the local environment to the Internet." Do you see that?
>
> A. I do.
>
> Q. So does that make you rethink your opinion that the real-time doesn't mean immediately?
>
> A. No, it does not.
>
> Q. So the word "immediately" doesn't mean immediately in that sentence?
>
> A. Again, immediately is always relative to something. We already know that the packets are always delivered to the destination by the time the work goes up, by the time the NetFlow goes up to Stealthwatch and Cognitive Threat Analytics. And so it will detect it as quickly as it can, but it doesn't say, it doesn't say before the packets are delivered to the destination, does it? It says real-time detection of attacks by immediately detecting malicious connections. But

> there's nothing there about it blocking the traffic, it just says it's detecting it.

Tr. 2113:17-2114:12. Dr. Schmidt's testimony is directly refuted by Cisco's own technical documents. For example, Cisco's Catalyst 9000 at-a-glance guide highlights that this line of switches can "detect **and stop** threats, even with encrypted traffic." PTX-199 at 224 (emphasis added). Cisco portrays the benefits of Stealthwatch as "[r]eal time detection of attacks by immediately detecting malicious connections from the local environment to the Internet." PTX-383 at 356. The Stealthwatch Data Sheet confirms that Stealthwatch uses "advanced security analytics to detect **and respond** to threats in **real time**." PTX-482 at 664 (emphasis added). These documents confirm that the accused products are not solely used for detecting, but also for stopping those threats. Furthermore, the Stealthwatch Data Sheet notes that "Stealthwatch can recognize these early signs [of attacks] to **prevent** high impact . . . [o]nce a threat is identified, you can **also** conduct forensic investigations to pinpoint the source of the threat . . ." PTX-482 at 665 (emphasis added). The Court asked Dr. Schmidt about the word "also" in PTX-482:

> THE COURT: Why do you think it says "also" there?
>
> THE WITNESS: I think what it's talking about there, Your Honor, if you take a look, it says "You can determine where else it may have propagated." If you look at the —
>
> THE COURT: Do you think maybe it means you can do the things in the first two sentences and also do the thing in the third sentence? Do you think that's what "also" means?
>
> THE WITNESS: I think it's trying to say, sir, that if you look—the forensic investigations they are specifically calling out here are pinpointing where the problem was, so identifying who the bad guy is, and then determining what else might be infected. So that's the problem with network threats; they often spread rapidly like viruses. That's why they're called viruses. So this is saying you can do additional analysis to not just say one person has a problem, but all the other things in the network that that person's connected to somehow, that computer has been connecting to, may also be a problem too. I think that's what "also" means here.
>
> THE COURT: I think "also" means "also" . . .

Tr. 1974:13-1975:6. Notably when Mr. Schmidt previously read the same sentence from PTX-482, he omitted the word "also": "Once a threat is identified, you can ____ conduct forensic investigations." Tr. 1936:16-17. From his own testimony, it is clear to the Court that Dr. Schmidt is solely limiting his

testimony to the forensic after the fact analysis feature in the old pre-2017 Stealthwatch. The Court accepts that Stealthwatch has the features to conduct forensic investigations after the fact. However, Dr. Schmidt, throughout his testimony ignores the presence of the word "also" and "detect and stop" in the technical documents, which denotes that the after the fact investigation is a feature that operates in addition to the ability to stop threats in real time. See Tr. 1974:3-1975:8."