

EVIDENCE OF SYSTEMATIC “PATENT HOLDOUT”

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ABSTRACT

“Patent holdup” and “patent holdout”—concepts borrowed from the general theory of incomplete contracts and applied to the patent world—are topics that have been long debated in the patent policy arena, particularly in the context of standard-essential patents (SEPs). Although for many years, the policy debate focused exclusively on “patent holdup,” that is, opportunism on the side of patent holders, there is now a broad consensus that “patent holdout,” which refers to opportunism on the side of implementers, may also occur. Yet, whereas commentary on “patent holdup” abounds, both in terms of theory and evidence (or the lack of it), “patent holdout” is not yet well explored in the literature. This article aims to fill this gap, by providing comprehensive examinations of the incentive structure and empirical evidence of “patent holdout.” After analyzing a rich set of court data, we find that concerns about implementers’ opportunism have ample empirical support in court decisions, in alignment with the incentive structure enabled by the patent enforcement regime today. We also find that although courts have made some progress in mitigating opportunistic practices, they have been generally unable to sufficiently address the problem of “patent holdout.” Indeed, empirical evidence shows that in licensing negotiations involving SEPs, “patent holdout” continues to be a real-world issue. Our analysis suggests that to enhance the efficiency of licensing negotiation for SEPs, it is critical to evaluate and ultimately implement at least some measures that address “patent holdout.”

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I. INTRODUCTION

“Patent holdup” and “patent holdout”—concepts borrowed from the general theory of incomplete contracts and applied to the patent world—are topics that have been long debated in the patent policy arena. “Patent holdup” refers to the opportunistic behavior of a patent holder using the threat of exclusion (that is, injunction) from the market to coerce a potential licensee to accept “unreasonable” royalties or other such licensing terms. Symmetrically, “patent holdout” refers to the opportunistic behavior of an implementer of a patented technology that uses delaying tactics and legal maneuvering to prolong infringement and thereby coerce the patent holder to accept zero or “unreasonable” royalties or other such licensing terms. Although for many years, the policy debate focused exclusively on “patent holdup,” there is now a broad consensus that opportunism may arise both on the side of patent holders and on the side of implementers—a point of bargaining where incomplete contracts break.¹

1. *See, e.g.,* Optis Cellular Tech. LLC v. Apple Retail U.K [2022] EWCA Civ 1411, 7; EUR. COMM’N, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAM

Whereas commentary on “patent holdup” abounds, both in terms of theory and evidence (or the lack of it), “patent holdout” is not yet well explored in the literature. This Article is one of the first comprehensive examinations of the incentive structure and empirical evidence of “patent holdout,” utilizing a rich set of court data, to determine whether “patent holdout” is observed in practice.² Although we acknowledge that “patent holdout” is not specific to any particular industry, we focus our analysis on technology standards and the so-called standard-essential patents (“SEPs”) that are subject to the holder’s commitment to offer a license on fair, reasonable, and non-discriminatory (“FRAND”) terms. This focus lends itself to a practical approach to gathering empirical data and is a sensible focus because “patent holdup” and “patent holdout” have most often been discussed in the context of SEPs.

We start our analysis with the framework for understanding the incentives that companies may have to engage in “patent holdout” due to the current patent enforcement and institutional structure. We then examine court decisions that have scrutinized the behavior of parties negotiating a license for

THE COUNCIL AND THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE, SETTING OUT THE EU APPROACH TO STANDARD ESSENTIAL PATENTS 2 (2017) (recognizing that opportunistic behavior might arise both on the side of SEP holders and on the side of implementers), <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017DC0712&from=en>; POLICY DEPARTMENT FOR CITIZENS’ RIGHTS AND CONSTITUTIONAL AFFAIRS, EUROPEAN PARLIAMENT, STANDARD ESSENTIAL PATENTS AND THE INTERNET OF THINGS 25 (2019); Makan Delrahim, Assistant Attorney General, U.S. Dep’t Just., Remarks delivered at the USC Gould School of Law, Los Angeles, California, Take It to the Limit: Respecting Innovation Incentives in the Application of Antitrust Law 3 (Nov. 10, 2017), <https://www.justice.gov/opa/speech/file/1010746/download> (“Too often lost in the debate over the hold-up problem is recognition of a more serious risk: the hold-out problem.”); Andrei Iancu, Under Secretary of Commerce for Intellectual Property and Director of the USPTO, Remarks delivered at the Standard-Essential Patents Strategy Conference (Sept. 10, 2019), <https://www.uspto.gov/about-us/news-updates/remarks-director-iancu-standard-essential-patents-strategy-conference> (“[W]hen it comes to FRAND-encumbered standard essential patents (SEPs), any policy statement should incentivize good faith negotiations and disincentivize threats of either patent hold-up or patent hold-out.”).

2. During the course of our work on this topic, we came across the research paper by Brian Love and Christian Helmers titled “An Empirical Test of Patent Hold-Out Theory: Evidence from Litigation of Standard Essential Patents,” that addresses a similar, although slightly different question related to empirical evidence of patent holdout. Specifically, the authors examine whether “testable predictions from the literature supporting hold-out theory” find support in empirical data. Our understanding is that although in the initial version of the paper found limited supporting evidence for the hold-out theory, the revised version of the paper published in November 2022 found some evidence of patent hold out, thus corroborating, to some extent, the findings of our Article. See Brian J. Love & Christian Helmers, *Patent Hold-Out and Licensing Frictions: Evidence from Litigation of Standard Essential Patents*, INT’L J. OF INDUS. ORG. (forthcoming), <https://ssrn.com/abstract=3950060>.

FRAND-encumbered SEPs. Although our analysis is not exhaustive, we find that concerns about “patent holdout” have ample empirical support in court decisions, in alignment with the incentive structure enabled by the patent enforcement regime today. We also find that although courts have made some progress, they have been generally unable to address the problem of “patent holdout.” Indeed, empirical evidence shows that in the context of SEPs, “patent holdout” continues to be a real-world issue.

Our findings have important implications for current policy discussions. Starting in 2021, government agencies across multiple jurisdictions have announced initiatives to evaluate the introduction of policy measures aimed at improving the efficiency of licensing negotiations for SEPs.³ By 2023, some agencies have even presented concrete regulatory proposals aiming at enhancing the efficiency of licensing negotiations over SEPs.⁴ Although virtually all agencies recognize the need for a balanced approach that mitigates the risk of opportunism by both patent holders and implementers, little attention has yet been given to measures that could be adopted to address the “patent holdout” problem. Our analysis suggests that to enhance the efficiency of licensing negotiation for SEPs, it is critical to evaluate and ultimately implement at least some measures that address “patent holdout.”

II. PATENT HOLDOUT: AN ECONOMIC ANALYSIS

The concepts of “patent holdup” and “patent holdout” are based on the idea of “holdup” developed by the Nobel laureate economist Oliver

3. *See, e.g.*, EUR. COMM’N, INTELLECTUAL PROPERTY – NEW FRAMEWORK FOR STANDARD-ESSENTIAL PATENTS (2022), https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13109-Intellectual-property-new-framework-for-standard-essential-patents_en [hereinafter EUR. COMM’N, SEP FRAMEWORK]; *Public Comments Welcome on Draft Policy Statement on Licensing Negotiations and Remedies for Standards-Essential Patents Subject to F/RAND Commitments*, U.S. DEP’T JUST. OFF. PUB. AFFS. (Dec. 6, 2021), <https://www.justice.gov/opa/pr/public-comments-welcome-draft-policy-statement-licensing-negotiations-and-remedies-standards>; *Consultation Outcome: Standard Essential Patents and Innovation: Executive Summary and Next Steps*, GOV.UK (July 5, 2023), <https://www.gov.uk/government/consultations/standard-essential-patents-and-innovation-call-for-views/outcome/standard-essential-patents-and-innovation-executive-summary-and-next-steps>; JAPAN PATENT OFFICE, GUIDE TO LICENSING NEGOTIATIONS INVOLVING STANDARD ESSENTIAL PATENTS (2022), <https://www.jpo.go.jp/e/system/laws/rule/guideline/patent/document/rev-seps-tebiki/guide-seps-en.pdf>.

4. *See, e.g.*, EUR. COMM’N, COM(2023)232 - PROPOSAL FOR A REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON STANDARD ESSENTIAL PATENTS AND AMENDING REGULATION (EU) 2017/1001 (2023), <https://single-market-economy.ec.europa.eu/publications/com2023232-proposal-regulation-standard-essential-patents>

Williamson in the theory of incomplete contracts.⁵ In very broad terms, “holdup” refers to the opportunistic appropriation of another firm’s quasi-rents that, for the sake of simplicity, can be described as a firm’s income. Such appropriation can occur if the parties negotiate the terms of a transaction after one of the parties has made a sunk investment, that is, an investment that cannot be recovered if the parties walk away from the transaction.⁶

In the context of patents, one party is the owner of a patented invention (“innovator”) and the other is the manufacturer of a product, service, or process that uses the invention (“implementer”). For example, after an implementer has sunk costs in integrating the patented technology into its products, the innovator can raise the royalty, thus “holding up” the implementer and extracting some of the implementer’s profit from the use of that invention.⁷ Symmetrically, after an innovator has sunk costs in research and development (R&D), created a new invention, and patented it, an implementer can refuse to pay, or significantly reduce the royalties paid, for a license to the patented technology, thus “holding out” on the innovator.⁸ The concern is that when anticipating “holdup” or “holdout,” the prospective inventor or implementor would invest less than a socially optimal amount in their respective innovative activities.⁹

5. See STEVEN TADELIS & OLIVER E. WILLIAMSON, TRANSACTION COST ECONOMICS, IN THE HANDBOOK OF ORGANIZATIONAL ECONOMICS 159 (Robert Gibbons & John Roberts eds., 2012).

6. The economic rationale is simple. A firm will enter a given business only if it expects that doing so will be profitable – that is, if a firm expects to earn a positive economic rent. In economic terms, this can be described as $ER < R - c - i$, where ER is expected economic rent, R is the expected revenue, C is the operating cost (c), and i is the firm’s investment. However, as Williamson explains, there is a “fundamental transformation” in the firm’s incentives after it has made a sunk investment (*id.* at 16). At that point, a firm that has made a sunk investment will choose to remain in the market as long as its quasi rents (QR) are positive—that is $QR < R - c$. Therefore, if the parties negotiate the terms of a transaction after one of them has made a sunk investment, the other firm might act opportunistically an appropriate part, or all, of the other firm’s quasi rent.

7. See Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1993 (2007).

8. See Richard Epstein & Noroozi Kayvan, *Why Incentives for Patent Holdout Threaten to Dismantle FRAND, and Why It Matters*, 32 BERKELEY TECH. L.J. 1381, 1384 (2017); Gregor Langus, Lipatov Vilen & Neven Damien, *Standard-Essential Patents: Who Is Really Holding Up (and When)?*, 9 J. COMPETITION L. & ECON. 253, 255-56 (2013); ANNE LAYNE-FARRAR, WHY PATENT HOLDOUT IS NOT JUST A FANCY NAME FOR PLAIN OLD PATENT INFRINGEMENT 1-4 (2016).

9. See Joseph Farrell, John Hayes, Carl Shapiro & Theresa Sullivan, *Standard Setting, Patents and Hold-up*, 74 ANTITRUST L.J. 603, 647 (2007) (stating “[a]nticipation of hold-up encourages a range of inefficient forms of self protection, such as postponing or minimizing investment, or ensuring that standards use only antique technology”); Carl Shapiro, *Patent Holdup*, 100 CALIF. L. REV. 1731, 1733 (2012).

Whereas the “patent holdup” theory has been widely discussed in the economic literature, both on theoretical and empirical grounds, “patent holdout” has received less attention. That is why we focus our analysis on the phenomenon of “patent holdout.” Indeed, inefficiencies from “patent holdout” may be equally or more detrimental than inefficiencies from “patent holdup,” so it is appropriate to determine whether “patent holdout” is a real-world phenomenon.

As a first step, we examine the incentives of a rational implementer in negotiating a license for SEPs with a patent holder. When deciding whether to execute a license, a rational implementer will do a cost/benefit analysis of: (1) entering into a license agreement; or (2) infringing the SEPs, delaying or refusing to execute a license, and potentially entering a legal dispute with the patent holder. In simple terms, the implementer will compare (1) its expected cost under a license with (2) the expected cost of infringement and potential litigation, and opt for the scenario that minimizes its cost.¹⁰

Whereas the expected cost under a license is defined (or definable) by the terms specified in the license offer, the expected costs of infringement will depend on the legal consequences. If an implementer infringes a patent, refuses the execution of a license, and therefore risks an injunction that removes its product from the marketplace temporarily, then the expected cost of infringement can be high. In the worst-case scenario, the implementer will have to pay ex post a FRAND royalty that it would have had to pay in the first place if the license was executed, and the only cost from infringement would be the cost of litigation. Indeed, in the best-case scenario, an infringer that refuses to execute a license may end up paying zero royalties and incur no cost of litigation if the patent holder does not challenge the infringer in court.

Thus, in a world where injunctions are unlikely to be granted or are avoided by agreeing ex post to the payment of a FRAND royalty, a rational implementer is more likely to be strictly better off by infringing and delaying royalty payments—and thus holding out—as long as their cost of litigation is lower than the royalty payments. In other words, “patent holdout” becomes a rational business decision for implementers.

Aligning Reward and Contribution, in 8 INNOVATION POLICY AND THE ECONOMY 111 (Adam Jaffe, Josh Lerner & Scott Stern eds., 2008).

10. The implementer will compare the expected profit in case of a license with the expected profit in the case of infringement. For ease of exposition, we focus exclusively on the costs (i.e., expected payments) due by the implementer.

III. EMPIRICAL EVIDENCE OF “PATENT HOLDOUT”

In the next step of our analysis, we examine whether our theoretical framework on “patent holdout” has empirical support. Although our analysis is not exhaustive, we find multiple cases in which courts around the world have found that implementers engage in “patent holdout” when negotiating a license for SEPs, which thus provides support to our theoretical predictions.

A. METHODOLOGY

We perform our empirical analysis by examining the main SEPs court decisions around the globe.¹¹ We focus our analysis on cases involving FRAND-committed SEPs across five jurisdictions: (1) the United States, (2) Germany, (3) the Netherlands, (4) the United Kingdom, and (5) India. We have chosen these jurisdictions because of the prominent role they have played, and continue to play, in SEP-related litigation. Due to concerns related to selection bias in published court decisions, we exclude China from our analysis, despite that being an important jurisdiction for SEP enforcement.¹²

We examine court decisions¹³ issued over an entire decade, from 2012 to 2022. We identify all cases involving allegations of SEP infringement in the five jurisdictions where a court decision was issued between January 2012 to August 2022. Among those decisions, we identify through review of the court documents those in which the court issued a decision on the merits of the case and explicitly determined that the implementer (1) engaged in “patent holdout”, (2) was an unwilling licensee, or (3) negotiated in bad faith. We also considered by reviewing the court findings the cases in which the court found that the implementer (4) delayed the negotiation, (5) made unsubstantiated arguments that the SEP holder’s offered license terms were not FRAND, or (6) refused to execute a license on terms that the court found to be FRAND. Finally, for the United States, we also include cases in which courts found that the implementer (7) engaged in willful infringement, as captured by the court documents.¹⁴ To make sure our analysis is reliable, we only consider cases where the original document was available.

11. We use the Darts-IP—a searchable global database on IP litigation—complemented with the database made available by the 4iP Council that summarizes the main SEP court decisions in Europe.

12. We note that it might be desirable to include China in future updates of our Article, provided that the analysis incorporates a mechanism to account for the possible selection bias.

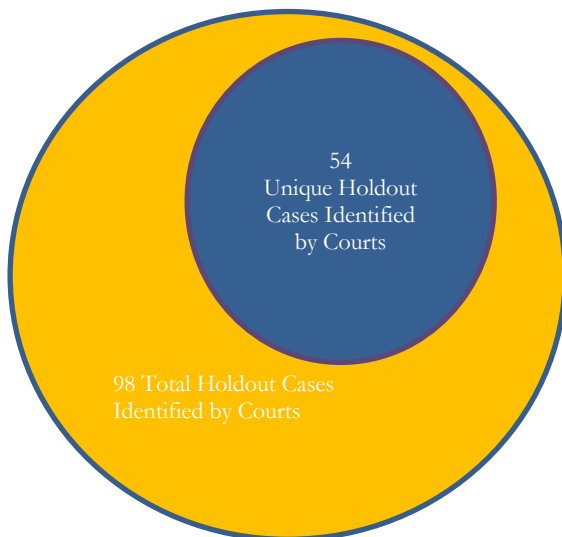
13. For the United States, we also consider decisions adopted by the International Trade Commission.

14. Although for the purpose of this Article we have limited our analysis to the above-identified categories, we acknowledge that there are other conducts that might be considered examples of “patent holdout.”

B. FINDINGS

Based on our analysis, we find that “patent holdout” is far from a rare phenomenon in SEP disputes. We find that there have been at least fifty-four cases over the past decade in which courts found that the implementer engaged in “patent holdout” when negotiating a license for SEPs. This number does not include parallel cases—litigation between the same parties in front of courts in different jurisdictions, or litigation between the same parties within the same jurisdiction but at different appellate levels, or at the same level but involving different patents. In other words, we have identified fifty-eight unique cases of “patent holdout,” but the number of cases in which courts have found that the implementer engaged in “patent holdout” is actually higher, as Figure 1 shows.

Figure 1: Unique Holdout v. Total Holdout Cases Identified by Courts¹⁵



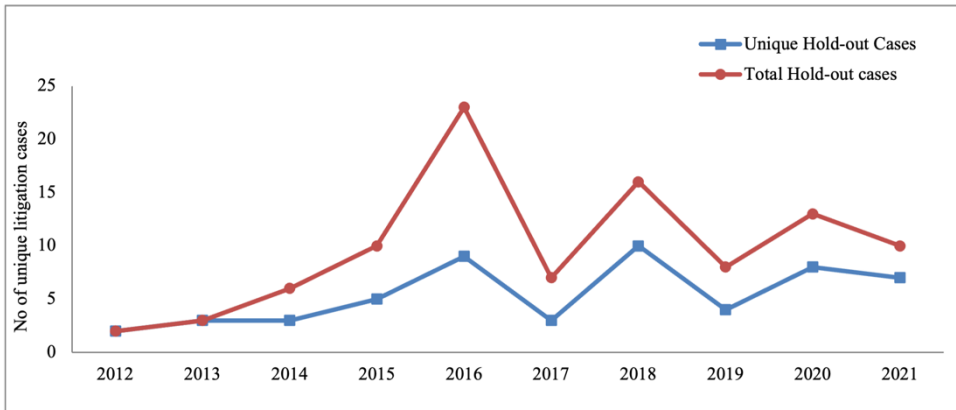
Of course, the identified cases of “patent holdout” do not represent the total volume of “patent holdout” that occurs in the real world. We limit our analysis to adjudicated cases—litigation where a court issued a decision on the merits of the case. It is, however, possible that some implementers engaged in “patent holdout” when negotiating a license for SEPs but the parties settled

15. Sources: analysis of the following databases Darts-IP; 4IP Council (last visited Oct. 30, 2022).

their dispute before the court issued a final decision in the case. Those cases of “patent holdout” are unaccounted for in our analysis, as settled cases are not captured in the litigation databases.

We examined how the courts’ findings of “patent holdout” change over time and found that “patent holdout” continues to be a real-world phenomenon. We have examined historical data and found there have been several spikes in terms of both unique and total “patent holdout” findings by courts, including in 2016, 2018, and 2020, as shown in Figure 2.¹⁶

Figure 2: Courts’ Holdout Findings from 2012 to 2021¹⁷



Although some progress has been made, considering that the number of annual “patent holdout” findings has gradually decreased, several unique “patent holdout” findings are fairly recent. More specifically, over thirty percent of the identified court decisions have been issued from 2020 onwards, thus showing that “patent holdout” continues to occur in practice.

In analyzing the identified cases, we also found that almost half of the “patent holdout” findings involve repeat behavior—cases where a given implementer has been found to have engaged in “patent holdout” toward multiple SEP holders. At the top of the list of companies that have been repeatedly found to have engaged in “patent holdout” include Huawei (with seven unique cases in which courts found that the company engaged in “patent holdout”), followed by TCL (with five unique “holdout” findings). Other implementers

16. We have excluded from the figure data for 2022, given that at the time when we completed our research, data for that year were still incomplete, including only decisions up to August 2022.

¹⁷ Sources: Darts-IP; 4IP Council.

that have been found to have engaged in “patent holdout” on multiple occasions include HTC, ZTE, , Daimler, Mas Electronics, and Apple as shown in Table 1.

Table 1: Companies that Have Been Repeatedly Found to Have Engaged in “Patent Holdout”¹⁸

Company	Number of Unique Holdout Findings
Huawei	7
TCL	5
ZTE	4
HTC	3
Daimler	3
Mas Electronik	3
Apple	2

In sum, the data obtained from the analysis of courts’ decisions across five jurisdictions comports with our theoretical assessment, which predicts that refusing a FRAND license offer and engaging in “holdout” might be a rational business strategy for an implementer.

C. “PATENT HOLDOUT” STRATEGIES

In reviewing the identified cases, we observed that implementers used a variety of strategies to engage in “patent holdout,” such as: (1) refusing to initiate license negotiations by not responding to a notification of infringement; (2) failing to constructively negotiate licensing terms, for example, by using delaying tactics such as repeated requests for information that the patent holder has already provided; (3) refusing to execute a license unless patents are found valid and infringed, thus challenging the validity and infringement of a large bundle of patents and creating years of delay in the licensing negotiation; (4) arguing that the offered terms are not FRAND; and (5) refusing to accept a license on terms that the court determined to be FRAND. To provide a better understanding of how “patent holdout” takes place in practice, we briefly describe the most notable examples below.

1. *Refusal to Initiate License Negotiations*

One type of “patent holdout” is when the implementer refuses to start a negotiation with the SEP holder. We have found several examples that fall into this category. In *Philips v. Wiko*, the Hague Court of Appeal found that Wiko,

¹⁸ Sources: Darts-IP; 4IP Council.(last visited October 2022).

a wholly-owned subsidiary of the Chinese mobile phone manufacturer Tinno Mobil, did not respond to the patent holder’s notification about infringement for almost two years and replied to the patent holder only once sued in court.¹⁹ In *Sisvel v. Haier*, the German Federal Court of Justice found that Haier, a Chinese multinational home appliances and consumer electronics company, did not reply to the SEP holder’s notification about infringement for over a year.²⁰ As the German Federal Court of Justice observed, the implementer’s failure to reply to the infringement notification within a few months typically indicates that the implementer is not interested in executing a license and is instead engaging in “patent holdout.”²¹

In other cases, we found that the implementer replied to the notification about infringement but embraced strategies that prevented the parties from initiating a negotiation. For example, when the Indian electronic company Intex refused to sign a non-disclosure agreement (NDA) with Ericsson, a Swedish telecommunications company, this effectively precluded the parties from initiating a negotiation over the license terms for several years.²² Intex signed the NDA five years after the first notification about infringement, and even then, the parties did not reach an agreement on the license terms. Ericsson sued the company for patent infringement in court. The court ultimately found that Intex negotiated in bad faith and was an unwilling licensee.²³

2. *Failure to Constructively Negotiate the License Terms*

We found several cases in which the implementer entered into a negotiation with the SEP holder but then engaged in practices that unreasonably delayed the process and hence the execution of a license. In *Koninklijke Philips N.V. v. Asustek Computers Inc.*, the Hague Court of Appeal found that during the negotiation, Asus, a Taiwanese multinational electronics company and implementer of a standard, was not represented by technical experts that were essential for negotiating the license terms, continued to evade substantive discussions of the terms, and refrained from making any counteroffer.²⁴ Asus also never responded to the SEP holder’s proposed licensing terms or commented

19. *Koninklijke Philips N.V. v. Wiko SAS*, Court of Appeal in the Hague, July 2, 2019, 200.219.487/01, ¶¶ 2.1–2.4 (Neth.); *see also* *Koninklijke Philips N.V. v. Wiko SAS*, Karlsruhe [KA] Oct. 30, 2019, 6 U 183/16, ¶ 32 (Ger.).

20. Bundesgerichtshof [BGH] [Federal Court of Justice] May 5, 2020, KZR 36/17, ¶ 92 (Ger.) [hereinafter *Sisvel v. Haier*, KZR 36/17].

21. *Id.*

22. *Telefonaktiebolaget LM Ericsson v. Intex Technologies (India) Ltd.*, CS(OS) No. 1045 / 2014, High Ct. of Delhi (Mar. 13, 2015), ¶ 13.3.

23. *Id.* at ¶¶ 136, 148.

24. *Koninklijke Philips N.V. v. Asustek Computers Inc.*, Court of Appeal of the Hague, May 7, 2019, No. 200.221.250/01, ¶¶ 4.172–4.179 (Neth.).

on its negotiating position.²⁵ The court found that Asus’s licensing behavior showed that the company had not been willing to execute a license agreement with the SEP holder and was instead engaging in “patent holdout.”²⁶

In *Philips v. TCL*, the Düsseldorf regional court found that TCT Mobile, a company that is part of the Chinese electronics company TCL Technology, did not respond to the SEP holder’s license for over three years and responded only once sued in court, stating that it was willing to execute a license, but did not engage in any constructive discussion.²⁷ TCL eventually made a counteroffer to Philips, but the court found that that offer was clearly not FRAND because, among other things, TCL failed to cover infringing tablets and feature phones, and did not provide any compensation for past infringement but merely for prospective sales.²⁸ The court found that these deficiencies showed not only that the counteroffer was a non-starter for a negotiation but also confirmed that TCL was an unwilling licensee.²⁹

Similarly, in *HEVC (Dolby) v. MAS Elektronik*, the Regional Court in Düsseldorf found that MAS, a German consumer electronics company, was using strategic tactics to delay the negotiation of a license agreement for the use of SEPs.³⁰ Specifically, the court found that the e-mail correspondence between the parties showed that MAS refrained from making any constructive comments and repeatedly raised questions already answered by the SEP holder.³¹

3. *Refusal to Execute a License Unless the Patents Are Found Valid and Infringed*

There are also several cases in which the implementer refused to execute a license unless the SEPs at issue were found to be valid and infringed—a negotiating position that several courts have found to be indicative of unwillingness to execute a license. In *Conversant Wireless Licensing v. Huawei*, the Düsseldorf district court found inappropriate the implementer’s refusal to execute a license until infringement proceedings against two other mobile phone manufacturers in the United States would be decided in favor of Conversant.³² The court reasoned that although an implementer has clearly a right to challenge

25. *Id.*

26. *Id.* ¶ 4.174.

27. *Philips v. TCL*, Düsseldorf [DUS] [Higher Regional Court] May 12, 2022, I-2 U 13/21, ¶¶ 301–03 (Ger.).

28. *Id.* at 342–44.

29. *Id.* at 348.

30. *HEVC (Dolby) v. MAS Elektronik*, LG Düsseldorf [DUS] [Landgericht Regional Court] May 7, 2020, 4c O 44/18 (Ger.).

31. *Id.* at 774–77.

32. *Conversant Wireless v. Huawei Technologies*, LG Düsseldorf [DUS] [Landgericht Regional Court] Aug. 27, 2020, 4b O 30/18, ¶¶ 239–41 (Ger.).

the validity and infringement of SEPs in court, it would be inappropriate to make this a condition for the execution of a license, particularly considering that a license agreement could include an “adjustment mechanism” that takes into account the outcome of legal disputes that challenge the validity of individual SEPs.³³

Similarly, in *Sisvel v. Haier*, the implementer said it was willing to execute a FRAND license only for the patents that a court would determine to be valid and infringed.³⁴ In *St. Lawrence v. Vodafone*, HTC, a manufacturer of infringing devices that intervened in support of the Defendant, said that it would be willing to execute a license but only after a court made a finding about infringement.³⁵ On both occasions, the court found the implementer’s position to be unreasonable.³⁶

4. *Unsupported Assertions that the SEP Holder’s Offer is Not FRAND*

A special type of delay tactic includes cases where the implementer negotiates a license but makes unsupported assertions that the offered license terms are not FRAND. Although there might be a genuine disagreement between the two parties as to whether the offered terms are FRAND, evidence that the implementer is making baseless allegations about the violation of the FRAND commitment or raising arguments that have been previously rejected by courts typically suggests that the implementer has no intention of executing a license agreement and is instead engaging in “patent holdout.”

There are several cases in which courts have found that the implementer could not offer any support for its allegation that the SEP holder’s offer was not FRAND. In *Tagivan (MPEG-LA) v. Huawei*, the parties negotiated a license for over six years but never reached an agreement as Huawei, the implementer, kept arguing that the offered terms were not FRAND.³⁷ The District Court of Düsseldorf ultimately rejected Huawei’s argument, reasoning that the approximately 2,000 standard licensing agreements concluded by the MPEG-LA pool provided a “strong indication” that the underlying licensing terms are fair and reasonable, and Huawei did not present any persuasive facts that would support the opposite conclusion.³⁸

³³. *Id.* ¶ 241.

³⁴. *Sisvel v. Haier*, KZR 36/17, ¶ 96.

³⁵. *Saint Lawrence v. Vodafone*, LG Düsseldorf [DUS] [Landgericht Regional Court] Mar. 31, 2016, 4a O 73/14, ¶ 398 (Ger.).

³⁶. *Id.*; *Sisvel v. Haier*, KZR 36/17, ¶ 96.

³⁷. *Tagivan (MPEG-LA) v. Huawei*, LG Düsseldorf [DUS] [Landgericht Regional Court], Nov. 9, 2018, 4a O 17/17 (Ger.).

³⁸. *Id.* ¶ 501; *see also id.* ¶¶ 503–6.

There are other similar cases. For example, although courts have repeatedly confirmed that a FRAND offer may be global in scope,³⁹ we found that implementers continue arguing an offer for a worldwide license violates a FRAND commitment. In *Optis Wireless v. Apple*, the parties negotiated the license terms but failed to reach an agreement because Apple kept arguing that the offered terms were not FRAND.⁴⁰ The court ultimately rejected Apple's argument, emphasizing that a SEP holder does not need to make individual license offers for SEPs in each country to comply with its FRAND obligation,⁴¹ and the jury subsequently found that Apple's infringement of the SEPs in the suit was willful.⁴²

In *Philips v. Wiko*, Wiko alleged that Philips' offer was not FRAND, but the court found that the implementer could not provide any support for its assertion.⁴³ Likewise, in the investigation 337-TA-613 in front of the U.S. International Trade Commission (ITC), the administrative law judge (ALJ) Theodore Essex criticized the implementers for providing no support for the allegation that the SEP holder's offer was not FRAND.⁴⁴

5. Refusal to Accept Court-Determined FRAND License Terms

Finally, in some cases, implementers engage in "patent holdout" by refusing to execute a license agreement on terms that a court or an arbitration body found to be FRAND.

The U.K. Supreme Court first confirmed this principle in *Unwired Planet v. Huawei*.⁴⁵ The Court found Huawei was infringing Unwired Planet's SEPs and unwilling to enter into a license on terms that the Court found to be FRAND. Huawei argued that despite its refusal to accept a FRAND license, the Court should not issue an injunction and should instead award damages for the

39. *Unwired Planet Int'l v. Huawei Technologies Ltd.*, [2020] UKSC 37, ¶ 15; *Sisvel v. Haier*, KZR 36/17, ¶ 78.

40. *Optis Wireless Tech., LLC v. Apple Inc.*, No. 2:19-CV-00066-JRG, 2020 WL 999463, at *3 (E.D. Tex., Mar. 2, 2020).

41. *Id.* at *12.

42. The jury awarded PanOptis \$ 506 million in damages. The court subsequently granted a new trial on the damages award, but not on the issue of willfulness. *See Optis Wireless Tech., LLC v. Apple Inc.*, No. 2:19-CV-00066-JRG, 2021 WL 2349343, at *9 (E.D. Tex. Apr. 14, 2021).

43. *Philips v. Wiko*, Court of Appeal of the Hague, July 2, 2019, C/09/511922/HA ZA 16-623, ¶¶ 4.25–41 (Neth.).

44. ITC Inv. No 337-TA-613, *In the Matter of Certain 3G Mobile Handsets and Components thereof – Initial Determination on Remand*, 53 (Apr. 27, 2015).

45. *Unwired Planet International Ltd v. Huawei Technologies Co. Ltd.*, [2020] UKSC 37, ¶ 159.

infringement of Unwired Planet’s U.K. SEPs.⁴⁶ In rejecting that argument, the Court emphasized that doing so would encourage “patent holdout”:

[I]f the patent-holder were confined to a monetary remedy, implementers who were infringing the patents would have an incentive to continue infringing until, patent by patent, and country by country, they were compelled to pay royalties. It would not make economic sense for them to enter voluntarily into FRAND licences.⁴⁷

The principle that an implementer unwilling to accept a court-determined FRAND rate is engaging in patent holdout was reaffirmed in several subsequent decisions. In 2019, in *TQ Delta v. ZyXEL Communications*, the U.K. High Court of Justice found that the implementer’s refusal to accept court-determined FRAND license terms was evidence of a “patent holdout.”⁴⁸ In 2013, the SEP holder notified ZyXEL, a Taiwanese manufacturer of networking devices, about the infringement. The parties failed to reach an agreement and TQ Delta then initiated proceedings both in the United States and in the United Kingdom.⁴⁹ By the time the U.K. court issued its judgment in 2019—six years after the notification about infringement—ZyXEL did not pay anything for the use of TQ Delta’s SEPs, nor for the use of any other SEPs, although it continued to infringe them.⁵⁰ ZyXEL repeatedly changed its position as to whether it would accept the FRAND license terms determined by the U.K. court.⁵¹ In 2017, when asked whether it would take a license on whatever terms the court determined to be FRAND, ZyXEL’s solicitor said that the company “will need to consider whether to enter that license” and added that “[t]hat decision will depend upon the terms that the Court has decided are RAND.”⁵² The U.K. court concluded that ZyXEL’s negotiating behavior and its unwillingness to accept court-determined FRAND license terms clearly showed that the implementer was engaging in a “holdout.”⁵³

Similarly, in the 2022 decision in *Optis Cellular v. Apple*, Apple contended that an implementer should be able to avoid an injunction, even if it fails to commit to take a license upon terms determined to be FRAND by the court.⁵⁴ The England and Wales Court of Appeal rejected Apple’s argument, reasoning

46. *Id.*

47. *Id.* ¶ 167.

48. *TQ Delta v. Zyxel Communications*, [2019] EWHC 745 (Pat), ¶ 12.

49. *Id.*

50. *Id.* ¶ 12.

51. *Id.* ¶ 8.

52. *Id.* ¶ 10.

53. *Id.* ¶ 12.

54. *Optis Cellular Tech. LLC v. Apple Retail U.K.*, [2022] EWCA Civ 1411 (England and Wales Court of Appeal), at 65.

that it “would tend to promote holdout by implementers.”⁵⁵ More specifically, the court said that “[i]f the implementer wants to avoid the normal consequences of having been found to infringe, it can commit to taking a Court-Determined Licence. If the implementer does not want to commit to taking a Court-Determined Licence, then it should be restrained from infringing. . . . Otherwise . . . hold out by implementers would be promoted.”⁵⁶ The court ultimately concluded that “Apple’s behaviour in declining to commit to take a Court-Determined Licence once they had been found to infringe EP744, and their pursuit of their appeal, could well be argued to constitute a form of hold out.”⁵⁷

By now, there is a general agreement that a willing licensee is a licensee that is willing to accept court-determined FRAND terms whatever those terms are. Conversely, an implementer that is not willing to accept court-determined FRAND terms is an unwilling licensee.

IV. POLICY IMPLICATIONS OF THE EMPIRICAL FINDINGS

Our empirical findings about “patent holdout” have important implications for the current policy debate. First, our analysis debunks the suggestion made by some implementers that the risk of “patent holdout” is minimal and should be ignored by policymakers.⁵⁸ Our analysis shows that “patent holdout” is not merely a theoretical concern but a problem that patent holders face in practice when negotiating a license for their SEPs, as confirmed by courts’ findings across many major jurisdictions.

Second, our findings are relevant to the agencies’ effort to “promote an efficient and sustainable SEP licensing ecosystem, where the interests of both SEP holders and implementers are considered.”⁵⁹ Empirical evidence suggests that at least some inefficiencies in the licensing of SEPs are attributable to “holdout” strategies that some implementers continue to adopt and that courts are unable to address. This indicates a need for measures that discourage implementers’ opportunism and, as a result, promote more efficient licensing

55. *Id.* at ¶ 67.

56. *Id.* at ¶ 76.

57. *Id.* at ¶ 115.

58. *See, e.g.*, APPLE INC., RESPONSE TO EUROPEAN COMMISSION CALL FOR EVIDENCE ON INTELLECTUAL PROPERTY – NEW FRAMEWORK FOR STANDARD-ESSENTIAL PATENTS 9 (2022) (“[T]here are very few examples of conduct that consistently indicate unwillingness or dilatory conduct.”); Brief of Amicus Curiae Apple, Inc. in Support of Appellant at 24, *Continental Automotive Systems, Inc. v. Avanci, LLC, et al.*, No. 20-11032 (5th Cir. Feb. 16, 2021).

59. EUR. COMM’N, SEP FRAMEWORK, *supra* note 3, at 4.

negotiations. Yet, among the many policy actions currently on the table, none of the proposals seek to address either directly or indirectly the problem of “holdout.” Rather, there is a concern that at least some of the discussed measures, if not designed carefully, could encourage further opportunism by implementers and therefore decrease, rather than increase, efficiencies in SEP licensing. We thus encourage policymakers to consider how to mitigate the risk of “holdout” or at the very least ensure that any newly adopted policy does not encourage further holdout behavior.

Indeed, patent holdout has detrimental effects on innovation, the economy, and consumers.⁶⁰ By hindering a patent holder’s ability to be compensated for the use of its technologies in a timely manner, patent holdout undermines the inventor’s ability and incentives to continue making risky investments in R&D.⁶¹ Although patent holdout negatively affects all patent holders, it is particularly harmful to small and medium-sized enterprises (SMEs) that generally lack the financial resources to protect their patented technologies in parallel litigation across multiple jurisdictions, facing widespread infringement.⁶² In other words, when patent infringement is common, participation in innovative markets is limited to large integrated companies that

60. Damien Geradin, *Reverse Hold-Up: The (Often Ignored) Risks Faced by Innovators in Standardized Areas* 7–8 (Paper prepared for the Swedish Competition Authority on the Pros and Cons of Standard-Setting, 2010); Epstein & Noroozi, *supra* note 8, at 1384; Makan Delrahim, Assistant Att’y Gen., Antitrust Div., U.S. Dep’t Just., Keynote Address at University of Pennsylvania Law School, The “New Madison” Approach to Antitrust and Intellectual Property Law 8 (Mar. 16, 2018), <https://www.justice.gov/opa/speech/file/1044316/download>; Andrei Iancu, *Patent ‘Holdouts’ Are Sapping U.S. Innovation*, NEWSWEEK (Oct. 18, 2021), <https://www.newsweek.com/patent-holdouts-are-sapping-us-innovation-opinion-1639417>.

61. YANN MÉNIÈRE, FAIR, REASONABLE AND NON-DISCRIMINATORY (FRAND) LICENSING TERMS – RESEARCH ANALYSIS OF A CONTROVERSIAL CONCEPT 15 (2015) (“[P]atent “hold out” can induce royalty losses for SEP holders, and significantly reduce their incentives to invest in the development of standards.”); David J. Kappos, *The Antitrust Assault on Intellectual Property*, 31 HARV. J.L. & TECH. 665, 681 (2018) (“[C]ompanies that have substantially invested in research, development and innovation are deprived of a fair return on that investment, which makes future investment less likely or makes innovator companies reluctant to contribute cutting-edge technology to standards.”).

62. *See, e.g.*, *Unwired Planet Int’l Ltd v. Huawei Techs. Co.* [2017] EWHC (Pat) 2988 [1] (Eng.), ¶ 404 (finding that because of “the difficulties Unwired Planet had encountered in trying to license the portfolio and the cost of litigation,” the company was “on the verge of insolvency”); Fractus Comments on the Proposed Draft Policy Statement on Licensing Negotiations and Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments 2 (Feb. 4, 2022) (describing the challenges that the company faced when “an increasing number of clients opportunistically used Fractus’ patents on their smartphone models without paying royalties”).

can monetize their investment in R&D through means other than patent protection.⁶³

Finally, evidence of “holdout” is also relevant for the broader geopolitical discussion on technology standards. By hindering a patent holder’s ability to be compensated for the use of its technologies in a timely manner, “patent holdout” undermines the inventor’s ability and incentives to continue making risky investments in R&D and bring new inventions to the market. This seems to be particularly relevant now as most major nations have recognized the strategic importance of technology standards and have adopted, or are in the process of adopting, national strategies that seek to strengthen the country’s role in developing global technological standards.⁶⁴ Encouraging investment in risky R&D is critical for any country that aims to be a strong player in the development of global technological standards, and “holdout” undermines the “most critical tool”⁶⁵ that governments in market-based economies have to encourage these types of investments.

V. CONCLUSION

The policy debate on SEPs has gradually recognized that “patent holdup” and “patent holdout” are symmetrical problems and that both the patent holder and the implementer might act opportunistically when negotiating a license for SEPs. Yet, the academic discussion has primarily focused on “patent holdup” leaving the “patent holdout” phenomenon largely unexplored. This Article fills this gap by providing one of the first comprehensive empirical analysis of “patent holdout” behavior as identified in the courts’ documents. We examined an expansive data set that spans across five jurisdictions and covers an entire decade of SEPs litigation to determine whether concerns of “holdout” find support in the real world. We find that they do, which is unsurprising given the current incentive system where rejecting a FRAND offer and engaging in “holdout” is often a rational business decision. These results are particularly relevant for the current policy discussion as some government

63. *See generally* JONATHAN BARNETT, *INNOVATORS, FIRMS, AND MARKETS* (2021) (explaining that large and more integrated firms have the ability to earn returns on innovation without recourse to IP, whereas other type of firms, in particular younger, smaller, and less integrated firms do not).

64. *See, e.g.*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *An EU Strategy on Standardisation Setting Global Standards in Support of a Resilient, Green and Digital EU Single Market 1* (Feb. 2, 2022); The Central Committee of the Communist Party of China and the State Council Issued the “National Standardization Development Outline” (Oct. 10, 2021), http://www.gov.cn/zhengce/2021-10/10/content_5641727.htm.

65. EUR. COMM’N, *SEP FRAMEWORK*, *supra* note 3, at 1.

agencies seek to adopt policies that would “promote an efficient and sustainable SEP licensing ecosystem” but have so far devoted little attention to developing measures that could address the problem of “patent holdout.”

APPENDIX I: TOTAL AND UNIQUE HOLDOUT CASES

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
1	15 U 39/ 21	Via Licensing	TCT Mobile Europe TCT Mobile Europe	2021	OLG Düsseldorf
2	2:15-cv-00073	Audio MPEG, Inc	Hewlett-Packard Company Dell	2015	Virginia Eastern District Court
3	21 O 11384/19	Conversant Wireless Licensing	Daimler	2020	LG München
3	4b O 48/18	Conversant Wireless Licensing	Huawei Technologies Huawei Technologies Deutschland Huawei Technologies Duesseldorf	2020	LG Düsseldorf
4	4b O 30/18	Conversant Wireless Licensing	Huawei Technologies Anonymous	2020	LG Düsseldorf
5	[2020] UKSC 37-2	Conversant Wireless Licensing	Huawei Technologies Huawei Technologies (UK) ZTE ZTE (UK)	2020	Eng & Wales Court of Appeal Appeal
5	HP-2017-000048	Conversant Wireless Licensing	Huawei Technologies Huawei Technologies (UK) ZTE ZTE (UK)	2018	Patents Court
6	2:14-cv-00912	Core Wireless Licensing	LG Electronics Mobilecomm USA LG Electronics LG Electronics USA	2015	Texas Eastern District Court

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
7	4c O 44/18	Dolby International	MAS Elektronik	2020	LG Düsseldorf
8	4b O 23/20	Dolby International	TCT Mobile Germany TCT Mobile Europe	2021	LG Düsseldorf
9	CS(OS) 2501/2015	Ericsson	Best It World India	2015	Delhi High Court
10	CS(OS) 442/2013	Ericsson	Intex Technologies India Micromax Informatics Mercury Electronics Yu Televentures	2015	Delhi High Court
11	4c O 56/18	GE Video Compression	Mas Elektronik	2020	LG Düsseldorf
12	7 O 14276/20	InterDigital	Xiaomi	2021	Munich
13	6 U 104	IP Bridge	HTC Germany	2020	Karlsruhe
14	4b O 5/17	IP Bridge	ZTE Deutschland	2018	LG Düsseldorf
14	7 O 13016/21	IP Bridge 1	ZTE	2022	LG München First instance
15	6 U 149/20	IP Bridge	Tct Mobile Germany	2022	Karlsruhe
16	4b O 4/17	IP Bridge 1	Huawei Technologies Deutschland	2018	LG Düsseldorf

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
16	7 O 36/21	IP Bridge I	Anonymous Huawei Technologies	2021	LG München
16	4c O 3/17	IP Bridge 1	Huawei Technologies Deutschland	2018	LG Düsseldorf
17	1:17-cv-00090	Koninklijke KPN	Sierra Wireless Sierra Wireless America	2019	Delaware District Court
18	200.221.250/01	Koninklijke Philips N.V.	ASUSTeK Computer Asus Europe Asus Holland	2019	Gerechtshof 's Gravenhage - Appeal Court of the Hague
19	4c O 69/18	Koninklijke Philips	Mas Elektronik	2021	LG Düsseldorf
20	7 O 23/14	Koninklijke Philips Electronics	Acer Computer	2014	Mannheim
20	6 U 57/16	Koninklijke Philips N.V.	Acer Computer	2016	OLG Karlsruhe
21	HA ZA 16-139	Koninklijke Philips Electronics	Archos	2017	Rechtbank Den Haag - Court of the Hague
22	2 U 13/21	Koninklijke Philips Electronics	TCT	2022	OLG Düsseldorf
23	HA ZA 16-623	Koninklijke Philips Electronics	Wiko	2017	Rechtbank Den Haag - Court of the Hague
23	200.219.487/01	Koninklijke Philips Electronics	Wiko	2019	Gerechtshof 's Gravenhage - Appeal Court of the Hague

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
23	7 O 44/16	Koninklijke Philips Electronics	Wiko Germany	2016	Mannheim
23	7 O 18/17	Koninklijke Philips Electronics	Wiko Germany	2018	Mannheim
23	19/04503	Koninklijke Philips N.V.	Wiko	2022	Hoge Raad Der Nederlanden
23	6 U 183/16	Koninklijke Philips N.V.	Wiko Germany	2019	OLG Karlsruhe
23	7 O 43/16	Koninklijke Philips Electronics	Wiko Germany	2016	Mannheim
24	4b O 84/19	LG Electronics	TCL Communication Technology Holdings TCT Mobile Europe Tct Mobile Germany TCL Communication	2021	LG Düsseldorf
24	2 O 131/19	LG Electronics	TCL	2021	Mannheim
25	CS(OS) 764/2015	LM Ericsson	Lava International	2016	Delhi High Court
26	4c O 12/17	Mitsubishi Electric Lighting	Huawei Technologies Deutschland	2019	LG Düsseldorf
27	6 U 130/20	Nokia	Daimler Continental Huawei Technologies Deutschland Robert Bosch	2021	OLG Karlsruhe

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
			Tomtom Valeo Peiker Bury		
27	21 O 3891/19	Nokia Technologies	Daimler	2020	LG München
27	2 O 34/19	Nokia	Daimler Continental Huawei Technologies Deutschland Robert Bosch Tomtom Valeo Peiker Bury	2020	Mannheim
28	21 O 13026/19	Nokia Technologies	Lenovo	2020	LG München
29	7 O 99/15	NTT Docomo	HTC Germany	2016	Mannheim
29	7 O 100/15	NTT Docomo	HTC Germany	2016	Mannheim
29	7 O 66/15	NTT DoCoMo	HTC Germany	2016	Mannheim
30	2:19-cv-00066	Optis Cellular Technology Panoptis Patent Management Unwired Planet Optis Wireless Technology Unwired Planet International	Apple	2020	Texas Eastern District Court

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
31	2:17-cv-00123	Optis Wireless Technology Panoptis Patent Management Optis Cellular Technology	Huawei Technologies Huawei Device USA Huawei Device Huawei Device (shenzhen)	2018	Texas Eastern District Court
32	4b O 15/17	Panasonic Intellectual Property Corporation of America	Huawei Technologies Deutschland	2018	LG Düsseldorf
33	4b O 16/17	Panasonic Intellectual Property Corporation of America	ZTE Deutschland	2018	LG Düsseldorf
34	7 O 96/14	Pioneer	Acer Computer	2016	Mannheim
34	6 U 55/16	Pioneer	Acer Computer	2016	OLG Karlsruhe
35	6 U 44/15	Saint Lawrence Communications	Telekom Deutschland	2015	OLG Karlsruhe
35	2 O 106/14	Saint Lawrence Communications	Telekom Deutschland	2015	Mannheim
35	2 O 103/14	Saint Lawrence Communications	Telekom Deutschland	2015	Mannheim
36	4a O 126/14	Saint Lawrence Communications	Vodafone HTC - High Tech Computer	2016	LG Düsseldorf
36	15 U 35/16	Saint Lawrence Communications	Vodafone HTC - High Tech Computer	2016	OLG Düsseldorf

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
36	15 U 36/16	Saint Lawrence Communications	Vodafone HTC - High Tech Computer	2016	OLG Düsseldorf
36	4a O 73/14	Saint Lawrence Communications	Vodafone HTC - High Tech Computer	2016	LG Düsseldorf
37	2:15-cv-00349	Saint Lawrence Communications	ZTE (TX) ZTE USA Motorola Mobility ZTE	2016	Texas Eastern District Court
37	2:15-cv-00351	Saint Lawrence Communications	ZTE (TX) ZTE USA Motorola Mobility ZTE	2016	Texas Eastern District Court
38	6:12-cv-00855	Science Applications International Virnetx Leidos	Cisco Systems Aastra Usa Aastra Technologies NEC Corporation of America NEC Apple	2014	Texas Eastern District Court
38	2013-01489	Science Applications International Virnetx Leidos	Cisco Systems Aastra Usa Aastra Technologies NEC Corporation of America NEC Apple	2014	U.S. Court of Appeals, Federal Circuit
38	2019-01050	Science Applications International Virnetx Leidos	Cisco Systems Aastra Usa Aastra Technologies NEC Corporation of America NEC Apple	2019	U.S. Court of Appeals, Federal Circuit

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
38	6:10-cv-00417	Science Applications International Virnetx Leidos	Cisco Systems Aastra Usa Aastra Technologies NEC Corporation of America NEC Apple	2013	Texas Eastern District Court
39	7 O 8818/19	Sharp	Daimler	2020	LG München
40	15 U 65/15	Sisvel International S.A.	Haier	2016	OLG Düsseldorf
40	4a O 144/14	Sisvel International S.A.	Haier Europe Trading Haier Deutschland	2015	LG Düsseldorf
40	15 U 66/15	Sisvel International S.A.	Haier Europe Trading Haier Deutschland	2016	OLG Düsseldorf
40	K ZR 35/17	Sisvel International S.A.	Haier Europe Trading Haier Deutschland	2018	Bundesgerichtshof
40	K ZR 36/17	Sisvel International S.A.	Haier Europe Trading Haier Deutschland	2020	Bundesgerichtshof
40	4a O 93/14	Sisvel International S.A.	Haier Europe Trading Haier Deutschland	2015	LG Düsseldorf
41	6 U 103/19	Sisvel International S.A.	Wiko Germany Anonymous	2020	OLG Karlsruhe
41	7 O 115/16	Sisvel International S.A.	Wiko Germany Anonymous	2019	Mannheim

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
42	1:19-cv-01140	Sisvel International 3g Licensing	Anydata	2021	Delaware District Court
43	2:12-cv-02319	Smart Modular Technologies	Netlist	2012	California Eastern District Court
44	7 O 24/14	Sony	Acer Computer	2014	Mannheim
45	7 O 26/14	Sony	Asus Computer	2016	Mannheim
46	4a O 63/17	Tagivan II	Huawei Technologies Deutschland	2018	LG Düsseldorf
46	4a O 17/17	Tagivan II	Huawei Technologies Deutschland	2018	LG Düsseldorf
47	HP-2017-000045	TQ Delta LLC	Zyxel Communications UK Zyxel Communication	2017	Patents Court
48	A3/2017/1784, [2018] EWCA Civ 2344	Unwired Planet	Huawei	2018	UK Court of Appeal
48	4b O 49/14	Unwired Planet International Ericsson	Huawei Technologies Deutschland Huawei Technologies	2016	LG Düsseldorf
48	4b O 51/14	Unwired Planet International Ericsson	Huawei Technologies Duesseldorf Huawei Technologies Deutschland Huawei Technologies	2016	LG Düsseldorf

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
48	4b O 52/14	Unwired Planet International Ericsson	Huawei Technologies Duesseldorf Huawei Technologies Deutschland Huawei Technologies	2016	LG Düsseldorf
49	4b O 122/14	Unwired Planet International Ericsson	Samsung Electronics Samsung Electronics	2016	LG Düsseldorf
50	HP-2014-000005	Unwired Planet International Unwired Planet	Google Ireland Google Commerce Samsung Electronics UK Google Huawei Technologies Samsung Electronics Huawei Technologies (UK) LM Ericsson	2014	Patents Court
51	7 O 14091/19	VoiceAge EVS	HMD Global	2022	LG München
51	7 O 15350/19	VoiceAge EVS	HMD Global	2021	LG München
52	6 U 162/13	Vringo Germany	ZTE Deutschland ZTE	2014	OLG Karlsruhe
52	2 O 41/13	Vringo Germany	ZTE Deutschland ZTE	2013	Mannheim
53	21 O 8879/21	Nokia	Oppo	2022	LG München First instance

S.No of Unique case	Case Number	Plaintiff	Defendant	Year	Court
53	[2022] EWCA Civ 947	Nokia	Oppo	2022	UK Court of Appeal
53	21 O 11522/21	Nokia Technologies	Oneplus Technology	2022	LG München
53	21 O 8890/21	Nokia Technologies Nokia Solutions and Networks	Reflection Investment	2022	LG München First instance
54	2:22-cv-00078	G Communications	Samsung Electronics America Samsung Electronics	2022	Texas Eastern District Court First instance

APPENDIX II: REPEATED HOLDOUT

Case Number	Plaintiff	Defendant	Year	Court
4b O 48/18	Conversant Wireless Licensing	Huawei Technologies Huawei Technologies Deutschland Huawei Technologies Duesseldorf	2020	LG Düsseldorf
4c O 3/17	IP Bridge 1	Huawei Technologies Deutschland	2018	LG Düsseldorf
4c O 12/17	Mitsubishi Electric Lighting	Huawei Technologies Deutschland	2019	LG Düsseldorf
2:17-cv-00123	Optis Wireless Technology Panoptis Patent Management Optis Cellular Technology	Huawei Technologies Huawei Device USA Huawei Device Huawei Device (shenzhen)	2019	Texas Eastern District Court
4b O 15/17	Panasonic Intellectual Property Corporation of America	Huawei Technologies Deutschland	2018	LG Düsseldorf
4a O 17/17	Tagivan II	Huawei Technologies Deutschland	2018	LG Düsseldorf
A3/2017/1784, [2018] EWCA Civ 2344	Unwired Planet	Huawei	2018	UK Court of Appeal
HP-2017-000048	Conversant Wireless Licensing	Huawei ZTE	2018	UK Patents Court
4b O 16/17	Panasonic Intellectual Property Corporation of America	ZTE Deutschland	2018	LG Düsseldorf
6 U 162/13	Vringo Germany	ZTE Deutschland	2014	OLG Karlsruhe
4b O 5/17	IP Bridge	ZTE Deutschland	2018	LG Düsseldorf
15 U 39/21	Via Licensing	TCT Mobile Europe	2021	OLG Düsseldorf
4b O 23/20	Dolby International	TCT Mobile Germany	2021	LG Düsseldorf

Case Number	Plaintiff	Defendant	Year	Court
		TCT Mobile Europe		
6 U 149/20	IP Bridge	TCT Mobile Germany	2022	Karlsruhe
2 U 13/21	Koninklijke Philips Electronics	TCT	2022	OLG Düsseldorf
2 O 131/19	LG Electronics	TCL	2021	Mannheim
6 U 104/18	IP Bridge	HTC Germany	2020	Karlsruhe
7 O 66/15	NTT DoCoMo	HTC Germany	2016	Mannheim
4a O 73/14	Saint Lawrence Communications	Vodafone HTC - High Tech Computer	2016	LG Düsseldorf
2:19-cv-00066	Optis Cellular Technology Panoptis Patent Management Unwired Planet Optis Wireless Technology Unwired Planet International	Apple	2020	Texas Eastern District Court
6:10-cv-00417	Science Applications International Virnetx Leidos	Cisco Systems Aastra Usa Aastra Technologies NEC Corporation of America NEC Apple	2013	Texas Eastern District Court
21 O 11384/19	Conversant Wireless Licensing	Daimler	2020	LG München
2 O 34/19	Nokia	Daimler Continental Huawei Technologies Deutschland Robert Bosch Tomtom Valeo Peiker Bury	2020	Mannheim
7 O 8818/19	Sharp	Daimler	2020	LG München

Case Number	Plaintiff	Defendant	Year	Court
4c O 44/18	Dolby International	MAS Elektronik	2020	LG Düsseldorf
4c O 56/18	GE Video Compression	Mas Elektronik	2020	LG Düsseldorf
4c O 69/18	Koninklijke Philips	Mas Elektronik	2021	LG Düsseldorf

