



Is Patent Holdup a Hoax?

*J. Gregory Sidak**

Many economists—and perhaps even a fair number of judges and lawyers—would agree that a sound economic theory can usefully inform the legal analysis of a complex commercial dispute. But how likely is it that knowledge accrues in the opposite direction? Can the expediency of legal advocacy serendipitously inspire a breakthrough in economic understanding? Can a client’s desired outcome in a consequential legal dispute plausibly motivate a novel economic theory that genuinely advances science? Perhaps so, if one embraces a new interpretation of Oscar Wilde’s notion of “the triumph of hope over experience.”¹ But only perhaps.

In 2007, two law review articles debuted the patent-holdup conjecture, which has since become *de rigueur* for any implementer of an industry standard to allege against a holder of standard-essential patents (SEPs) when the parties dispute whether the SEP holder has offered to license those patents on legitimately fair, reasonable, and nondiscriminatory (FRAND) terms. The patent-holdup conjecture quickly became a big business. The first article² was written by Mark Lemley, a distinguished law professor at Stanford and (at the time) of counsel to the San Francisco litigation boutique Keker & Van Nest, and by Carl Shapiro, an equally distinguished economics professor at Berkeley and a senior consultant to Charles River Associates (a publicly

* Chairman, Criterion Economics, Washington, D.C. Email: jgsidak@criterioneconomics.com. I thank Joseph Linfield, Douglas Maggs, Urška Petrovčič, Marc Richardson, Melinda Ledden Sidak, Jeremy Skog, Blount Stewart, Han Tran, and Andrew Vassallo for helpful research and comments. I have served as a consulting or testifying economic expert in disputes or negotiations concerning the licensing of SEPs on FRAND or RAND terms. Portions of this article reiterate themes that I have expressed in nonconfidential passages of expert reports and testimony in those matters; however, I do not rely on any confidential business information (CBI) from any proceeding. No client or third party has commissioned or funded or exercised editorial control over this article. The views expressed here are solely my own. Copyright 2018 by J. Gregory Sidak. All rights reserved.

¹ Wilde might have been riffing on Samuel Johnson. See, e.g., Ken Coughlin, Letter to the Editor, *Oscar Wilde’s Debt to Samuel Johnson*, N.Y. TIMES, Oct. 29, 2006.

² Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1991 n.* (2007).

traded company formally named CRA International).³ The second article was written by Shapiro, along with economists Joseph Farrell of Berkeley and (at the time) CRA, and John Hayes and Theresa Sullivan, both of CRA.⁴

From its inception, the patent-holdup conjecture, though ostensibly economic in character and predominantly articulated by economists, was not a theory to be debated by academic economists, as confirmed by the fact that the authors chose to place these two seminal articles in law reviews rather than economics journals. Instead, its creators seemed to cultivate the patent-holdup conjecture for consumption by lawyers, judges, and antitrust

³ Both Lemley and Shapiro started their own firms. Lemley subsequently co-founded the Durie Tangri law firm in San Francisco. Shapiro, after the first of two stints as Deputy Assistant Attorney General for Economic Analysis (chief economist) in the Antitrust Division of the U.S. Department of Justice, co-founded the Tilden Group with Michael Katz, another Berkeley economics professor, which they sold two years later, in 1998, to CRA for \$9.6 million in cash and common stock. Charles River Associates Inc., Annual Report for the Fiscal Year Ended November 28, 1998 (SEC Form 10-K), at 4 (filed Feb. 23, 1999). As a consultant with CRA, Shapiro has worked on many notable antitrust matters. He played a highly publicized role as Intel's expert economic witness in the Federal Trade Commission's 1999 monopolization case against the company. See, e.g., Reuters Security, *Taking the Stand at Antitrust II*, WIRED, Feb. 22, 1999, <https://www.wired.com/1999/02/taking-the-stand-at-antitrust-ii/>. Shapiro subsequently wrote about the experience in Carl Shapiro, *Technology Cross-Licensing Practices: FTC v. Intel (1999)*, in *THE ANTITRUST REVOLUTION: ECONOMICS, COMPETITION, AND POLICY* 350 (John E. Kwoka, Jr. & Lawrence J. White eds., Oxford Univ. Press 4th ed. 2004).

Founded in 1965, CRA traces its roots to MIT economist Franklin Fisher and is widely regarded as one of the two preeminent big-litigation consulting firms in the United States, if not the world. See, e.g., CRA International, Inc., Annual Report for the Fiscal Year Ended December 30, 2017 (SEC Form 10-K), at 4 (filed Mar. 12, 2018); *Franklin M. Fisher Biography*, U.S. DEP'T OF JUSTICE, ANTITRUST DIV., <https://www.justice.gov/atr/franklin-m-fisher-biography> (updated June 25, 2015).

⁴ Joseph Farrell, John Hayes, Carl Shapiro & Theresa Sullivan, *Standard Setting, Patents, and Hold-Up: A Troublesome Mix*, 74 ANTITRUST L.J. 603 (2007). Farrell, Hayes, Shapiro, and Sullivan specifically discuss the patent-holdup conjecture in the context of standards setting, whereas Lemley and Shapiro, *supra* note 2, discuss the conjecture more generally and mention standards setting as merely one application of their theory.

Unlike Shapiro, Farrell appears not to have published subsequent articles concerning the patent-holdup conjecture since 2007. In three subsequent works, he has briefly mentioned the patent-holdup conjecture while discussing intellectual property and standards. See Joseph Farrell & Carl Shapiro, *How Strong Are Weak Patents?*, 98 AM. ECON. REV. 1347, 1362 (2008) (arguing that weak patents "can create a danger of patent hold-up"); Joseph Farrell, *Intellectual Property as a Bargaining Environment*, in 9 INNOVATION POLICY AND THE ECONOMY 39, 40–41, 46–47 (Josh Lerner & Scott Stern eds., Univ. of Chicago Press 2009) (arguing that patent holdup acts as a barrier to efficient license negotiation and recommending policy responses); Joseph Farrell & Timothy Simcoe, *Four Paths to Compatibility*, in OXFORD HANDBOOK OF THE DIGITAL ECONOMY 34, 44 (Martin Peitz & Joel Waldfogel eds., Oxford Univ. Press 2012) (arguing that SSOs require patent holders to disclose essential patents and license them on RAND terms for the purpose of mitigating the risk of patent holdup). In the winter of 2013, Samsung publicly disclosed Farrell as its expert witness in two patent-infringement investigations before the U.S. International Trade Commission (ITC) that concerned FRAND issues. See Respondents' Initial Expert Disclosure at 12, Certain Electronic Devices, Including Certain Wireless Communication Devices, Tablet Computers, Media Players, and Televisions, and Components Thereof, Inv. No. 337-TA-862 (USITC Feb. 11, 2013); Complainants Samsung Electronics Co., Ltd. and Samsung Telecommunications America, LLC's Identification of Expert Witnesses at 10, Certain Wireless Communication Equipment and Articles Therein, Inv. No. 337-TA-866 (USITC Mar. 26, 2013). By January 2013, Farrell had moved to Bates White, where he is a partner. See Press Release, Bates White Economic Consulting, Joseph Farrell, Professor of Economics at University of California, Berkeley, and Former Director of the Bureau of Economics at the Federal Trade Commission, Joins Bates White Economic Consulting (Jan. 3, 2013), <https://www.bateswhite.com/news-32.html>; see also Joseph Farrell, *DPhil—Partner*, BATES WHITE ECON. CONSULTING, <https://www.bateswhite.com/professionals-Joseph-Farrell.html>. For the record, Ericsson—the party adverse to Samsung in those two ITC investigations—disclosed me as one of its expert economics witnesses in both the 862 and 866 investigations.

enforcers. The two seminal articles were co-authored by eminent scholars at Berkeley and Stanford whose professional reputations and experience, as legal counsel or as consulting or testifying economic experts, had enabled them over time to speak with authority on consequential legal disputes concerning intellectual property.

It is therefore not surprising that four west-coast technology titans—Apple, Cisco, Intel, and Microsoft—considered it meritorious to fund the article by Lemley and Shapiro.⁵ Since 2007, those four firms have publicly advocated policies and interpretations of legal doctrines that would lower FRAND royalties for SEPs.⁶ Similarly, since 2007, CRA and its affiliated academics have continued to champion the patent-holdup conjecture, both in the United States and abroad.⁷

By itself, the fact that the article by Lemley and Shapiro elicited the interest and financial support of Apple, Cisco, Intel, and Microsoft surely does not invalidate the patent-holdup conjecture. If anything, one should construe that corporate support as a market signal of quality and of the real-world relevance of the topic that Lemley and Shapiro committed to address. The corporate sponsorship indicates that leading technology

⁵ Lemley & Shapiro, *Patent Holdup and Royalty Stacking*, *supra* note 2, at 1991 n.*. The authors acknowledged two additional funders: Micron Technology and SAP. *Id.* These two companies have been less vocal about the patent-holdup conjecture since 2007 than the four other companies.

The 2007 article by Farrell, Hayes, Shapiro, and Sullivan, *supra* note 4, does not contain an analogous disclosure of corporate sponsorship. I therefore proceed on the assumption that neither the authors nor Charles River Associates received funding from any CRA client to support the writing of that article.

⁶ See, e.g., Letter from Ira Blumberg, Vice President of Intellectual Prop., Lenovo Grp. Ltd., et al. to Howard E. Michel, President & CEO, IEEE, and Bruce Kraemer, President, IEEE-SA & Dir., IEEE (Jan. 30, 2015) (signed by representatives of Lenovo Group Ltd., Cisco Systems, Inc., Sceptre Inc., PacTech Law, P.C., Intel Corp., Samsung Electronics Co. Ltd., Kingston Technology Company, Inc., Juniper Networks, Inc., Hewlett-Packard Española S.L., Dell Inc., Microsoft Corp., D-Link Systems, Inc., Apple Inc., Sierra Wireless, Inc., and Verizon Communications Inc.), <http://comparativepatentremedies.blogspot.com/2015/02/letter-in-support-of-proposed-ieee-sa.html>. In 2015, these firms urged the Institute of Electrical and Electronics Engineers (IEEE) to amend its bylaws to set parameters on RAND royalties for SEPs that favored implementers and disfavored SEP holders. See Roy E. Hoffinger, *The 2015 DOJ IEEE Business Review Letter: The Triumph of Industrial Policy Preferences Over Law and Evidence*, COMPETITION POL'Y INT'L ANTITRUST CHRON., Mar. 2015, at 1, 7 (“[T]he outcome of the [IEEE patent policy revisions in 2015] was thoroughly in line with the public and litigation positions of the major licensees [of patents essential to IEEE’s standards.]”); Ron D. Katznelson, *Perilous Deviations from FRAND Harmony—Operational Pitfalls of the 2015 IEEE Patent Policy*, 2015 IEEE 9TH INTERNATIONAL CONFERENCE ON STANDARDIZATION AND INNOVATION IN INFORMATION TECHNOLOGY (SIIT) 1 (2015); J. Gregory Sidak, *Testing for Bias to Suppress Royalties for Standard-Essential Patents*, 1 CRITERION J. ON INNOVATION 301, 314–16, 319–22 (2016); J. Gregory Sidak, *The Antitrust Division’s Devaluation of Standard-Essential Patents*, 104 GEO. L.J. ONLINE 48 (2015).

⁷ See, e.g., PIERRE RÉGIBEAU, RAPHAËL DE CONINCK & HANS ZENGER, TRANSPARENCY, PREDICTABILITY, AND EFFICIENCY OF SSO-BASED STANDARDIZATION AND SEP LICENSING: A REPORT FOR THE EUROPEAN COMMISSION (Charles River Associates 2016); *International Trade Commission (ITC) Patent Litigation: Hearing Before the Subcomm. on Courts, Intellectual Prop., & the Internet of the H. Comm. on the Judiciary*, 114th Cong. (2016) (written testimony of Fiona M. Scott Morton, Professor, Yale University School of Management) [hereinafter Scott Morton Testimony], <https://judiciary.house.gov/wp-content/uploads/2016/04/04.14.16-Scott-Morton-Testimony.pdf>. Scott Morton, a professor at Yale, is a senior consultant to CRA and a testifying economic expert for Apple. See, e.g., Respondent Apple Inc.’s Identification of Expert Witnesses at 8, Certain Mobile Electronic Devices and Radio Frequency and Processing Components Thereof, Inv. No. 337-TA-1093 (USITC Mar. 2, 2018).

companies perceived these two professors not to be stuck in an ivory tower, preoccupied with theories that would never be noticed by, much less influence, the real world below.⁸

At the same time, even if this corporate approbation comes from the most influential, the most profitable, and the most powerful of tech companies, that fact surely does not establish the epistemological merit of the patent-holdup conjecture. That corporations subvent research elucidating an economic conjecture on patent holdup is not evidence that the conjecture is true and advances the frontiers of objective knowledge. An economic conjecture on patent holdup can be useful for the corporations funding and applauding it even if it turns out to be false, as long as the conjecture successfully persuades its target audience—whether it consists of judges, jurors, arbitrators, legislators, antitrust enforcers, equity analysts, or journalists.⁹ In contrast, to be validated in a scientific sense, the patent-holdup conjecture must survive attempts at falsification, just as the scientific method demands of any theory. This process of conjecture and refutation is, Karl Popper explained, how we recognize a genuine contribution to objective knowledge.¹⁰ It is not some pedantic proposition to debate over drinks at the faculty club; it is the Supreme Court’s stated epistemological foundation for deciding whether ostensibly “expert testimony” is admissible evidence under Federal Rule of Evidence 702.¹¹

⁸ By comparison, the most significant piece of scholarship ever published on antitrust law originated as a consulting report prepared by William Landes and Richard Posner through their consulting firm at the time, Lexecon (now called Compass Lexecon, a subsidiary of the publicly traded company FTI Consulting, Inc.), on behalf of AT&T during the government’s monopolization case to break up the Bell System. See William M. Landes & Richard A. Posner, *Market Power in Antitrust Cases*, 94 HARV. L. REV. 937, 937 n.* (1981). The published article identified Lexecon—though not its client, AT&T—perhaps because Posner’s role as an adviser to AT&T in the divestiture case was already common knowledge by the time William F. Baxter gave me the article to read when it first circulated as a University of Chicago Law School working paper in 1980. See WILLIAM DOMNARSKI, RICHARD POSNER 76 & 265 n.87, 90–93 (Oxford Univ. Press 2016).

⁹ By analogy, a regulation recognized to rest on an implausible factual premise might nonetheless endure because it is effective in advancing an unstated (and perhaps illegitimate) objective bearing no relationship to its ostensible purpose. See, e.g., J. Gregory Sidak, *An Economic Theory of Censorship*, 11 SUP. CT. ECON. REV. 81, 117 (2003) (“If, after multiple attempts over the span of more than a quarter century, the FCC cannot cogently say what good the rule serves in a market that is already highly diverse and highly competitive, then a reviewing court should ask what *bad* the rule might serve.” (emphasis in original)).

¹⁰ See KARL R. POPPER, CONJECTURES AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE (Routledge 5th ed. 1989); KARL R. POPPER, OBJECTIVE KNOWLEDGE: AN EVOLUTIONARY APPROACH (Oxford Univ. Press rev. ed. 1979).

¹¹ See *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 591–93 (1993) (construing FED. R. EVID. 702). The Court has emphasized that, to be helpful to the finder of fact, and thus to be admissible as evidence in a federal court proceeding, an expert’s testimony must rely on the scientific method, *id.* at 591, which the Court clearly understood to be the process of conjecture and attempts at empirical refutation that Sir Karl Popper outlined in his famous writings on objective knowledge. *Id.* at 593 (“[T]he criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.” (alteration in original) (emphasis omitted) (quoting POPPER, CONJECTURES AND REFUTATIONS, *supra* note 10, at 37)); see also J. Gregory Sidak, *Court-Appointed Neutral Economic Experts*, 9 J. COMPETITION L. & ECON. 359, 384–86 (2013) (analyzing the epistemological foundation of *Daubert* and its progeny).

Given the symbiotic relationships between large technology companies, celebrity scholars at prestigious research universities in or near Silicon Valley, the respected economic consulting firms and law firms that advise these major tech companies on strategic and contentious matters, and the antitrust enforcers who address the technology sector, it not difficult to understand why, soon after Lemley, Shapiro, and Farrell unveiled their patent-holdup conjecture in 2007, the conjecture commanded such immediate and widespread attention and controversy. Nor does it require much imagination to understand why the patent-holdup conjecture soon grew to become a standard tool of legal and political advocacy for tech companies and antitrust enforcement agencies around the world.

I focus in this article on how the patent-holdup narrative has evolved since 2007, given the inroads made by skeptics who have sought to refute the conjecture. The tenor of the patent-holdup debate fundamentally changed in 2015, when one of the conjecture's creators seemed to demand that his theory simply be excused from scientific scrutiny and its skeptics be discredited because they were "patent-holdup deniers."¹² As I will show, this kind of resort to a rhetorical crutch is repeatedly observed in the patent-holdup narrative, and each time it is should be recognized as a red flag that the proponent of the patent-holdup conjecture in question lacks substantive, scientific arguments with which to answer those who doubt the conjecture.

Of course, if the proponents of the patent-holdup conjecture themselves indeed lack any persuasive scientific evidence with which to establish the verisimilitude of their narrative, it would be more intellectually honest for them simply to drop the pretense of rationality and call for patent-holdup crusaders to wage holy war on patent-holdup infidels. It is therefore delicious irony that in 2015 Lemley—verily the John the Baptist of patent holdup—decried what he called "faith-based intellectual property," which, he said, "is at its base a religion and not a science because it does not admit the prospect of being proven wrong."¹³

¹² Carl Shapiro, Patent Holdup: Myth or Reality? 19 (Oct. 6, 2015) (unpublished manuscript), <https://www.scribd.com/document/319856394/Shapiro-Patent-Holdup-Myth-or-Reality-DRAFT-2015-10-06>.

¹³ Mark A. Lemley, *Faith-Based Intellectual Property*, 62 UCLA L. REV. 1328, 1346 (2015). Perhaps, in the tradition of legendary movie director Billy Wilder, Lemley's wordplay about faith successfully "[m]ake[s] the subtleties obvious." See MAURICE ZOLOTOW, BILLY WILDER IN HOLLYWOOD 181 (Proscenium Publishers 3d ed. 1996). But for those who have forgotten or never spotted Lemley's rhetorical allusion, President George W. Bush's first executive order created in the White House an "Office of Faith-Based and Community Initiatives." Exec. Order No. 13,199, 3 C.F.R. 752 (2002), *reprinted in* 3 U.S.C. ch. 2 (Supp. V. 2005); see also GEORGE W. BUSH, RALLYING THE ARMIES OF COMPASSION (2001). Some intellectuals argued that the executive order violated the separation of church and state. See, e.g., Susan Jacoby, *Keeping the Faith, Ignoring the History*, N.Y. TIMES, Feb. 28, 2009. Perhaps others ridiculed the executive order because they considered it lumpish for an American president to discuss faith as the basis for any government policy; Lemley could expect this insinuation to resonate with some if not many readers of his essay on faith, reason, and intellectual property. There are, of course, serious intellectual examinations of the relationship between faith and reason, none of which gets its due in Lemley's cartoonish trope of "faith-based

The patent-holdup conjecture posits that, when an unlicensed implementer has made a sunk investment in the implementation of a patented technology and thereby supposedly becomes “locked in” to using that technology, a patent holder could demand a higher royalty from the infringer than the patent holder could have demanded before the infringer had made its sunk investment.¹⁴ Proponents of the conjecture believe that patent holdup is acute in the face of a collectively established industry standard, whereby an entire industry makes investments specific to implementing the standard. Yet, despite the fact that patent holders and implementers have demonstrated the perspicacity to achieve consensus on a particular standard, ill-defined “coordination problems” unexpectedly arise that supposedly “make it especially hard” for these very same implementers “to shift away from an agreed-upon standard in response to excessive royalty demands” by SEP holders.¹⁵ Proponents of the patent-holdup conjecture argue that an SEP holder exacerbates the risk of patent holdup by its use of an injunction from a federal district court or an exclusion order from the U.S. International Trade Commission (ITC)—or even by the SEP holder’s mere *threat* to seek an injunction or exclusion order.¹⁶ On the basis of those contentions, the leading proponents of the patent-holdup conjecture predict that patent holdup will increase prices for consumers, reduce firms’ incentives to participate in standard-setting activities, and impede innovation.¹⁷

intellectual property.” For example, when Lemley pontificates on faith and reason, he might find it useful to consider the views expressed on the matter by Karol Wojtyła, a real Pontiff. See ENCYCLICAL LETTER FIDES ET RATIO OF THE SUPREME PONTIFF JOHN PAUL II TO THE BISHOPS OF THE CATHOLIC CHURCH ON THE RELATIONSHIP BETWEEN FAITH AND REASON (Sept. 14, 1998). Or by a Templeton Prize winner who is both a mathematical physicist at the University of Cambridge and an Anglican priest. See JOHN POLKINGHORNE, BELIEF IN GOD IN AN AGE OF SCIENCE (Yale Univ. Press 1998). But, of course, that depth of intellectual curiosity—and serious examination of the possibility that faith and reason might be complements rather than substitutes, a relationship that my late colleague Michael Novak, himself a recipient of the Templeton Prize, described to me with the metaphor that reason can provide the trellis upon which climbs the living rose, faith—does not serve the caricature of faith-as-the-enemy-of-reason that Lemley’s rhetorical device is calculated to depict.

¹⁴ See, e.g., Farrell, Hayes, Shapiro & Sullivan, *supra* note 4, at 612–13; A. Douglas Melamed & Carl Shapiro, *How Antitrust Law Can Make FRAND Commitments More Effective*, 127 YALE L.J. 2110, 2111 (2018); see also HAL R. VARIAN, JOSEPH FARRELL & CARL SHAPIRO, THE ECONOMICS OF INFORMATION TECHNOLOGY: AN INTRODUCTION 81 (Cambridge Univ. Press 2004).

¹⁵ Farrell, Hayes, Shapiro & Sullivan, *supra* note 4, at 616; see also Lemley & Shapiro, *Patent Holdup and Royalty Stacking*, *supra* note 2, at 2016; Melamed & Shapiro, *supra* note 14, at 2113.

¹⁶ Scott Morton Testimony, *supra* note 7, at 2; see also Melamed & Shapiro, *supra* note 14, at 2115 (“Implementers that are forced to bear the risk of an injunction are thus induced to agree to royalties greater than those that would be appropriate if only the value of the patented technology were at stake.”); Lemley & Shapiro, *Patent Holdup and Royalty Stacking*, *supra* note 2, at 1993 (“Injunction threats often involve a strong element of *holdup*. . . . [T]he threat of an injunction can enable a patent holder to negotiate royalties far in excess of the patent holder’s true economic contribution.” (emphasis in original)); Farrell, Hayes, Shapiro & Sullivan, *supra* note 4, at 638 (arguing that the use of an injunction would permit the SEP holder to “withdraw more surplus than its technology contributed”).

¹⁷ Lemley & Shapiro, *Patent Holdup and Royalty Stacking*, *supra* note 2, at 1993, 2010, 2035; Farrell, Hayes, Shapiro & Sullivan, *supra* note 4, at 608; see also Kai-Uwe Kühn, Fiona Scott Morton & Howard Shelanski, *Standard Setting Organizations Can Help Solve the Standard Essential Patents Licensing Problem*, COMPETITION POL’Y INT’L: ANTITRUST CHRON., Mar. 2013, at 1, 3; William F. Lee & A. Douglas Melamed, *Breaking the*

Proponents of the patent-holdup conjecture claim that it rests on the holdup theory that Nobel laureate Oliver Williamson of Berkeley and other economists advanced in the literature on transaction-cost economics.¹⁸ For example, Shapiro and Douglas Melamed write in an article on FRAND royalties in the *Yale Law Journal* in 2018: “These implications of lock-in and ex post dealings are well understood: they represent an example of the general concept of lock-in and opportunism developed by Oliver Williamson. Williamson was awarded the Nobel Prize for this work.”¹⁹ Even before one sits down to dissect the logic of the patent-holdup conjecture step by step alongside the logic of Williamson’s theory of holdup, the extravagance of this claim by Melamed and Shapiro is called into question by the fact that the Nobel Prize committee’s report on the work by Williamson, which explains in detail and at length why he merited sharing the Prize in 2009 with Elinor Ostrom, conspicuously omits any mention of patents or the patent-holdup conjecture.²⁰

Moreover, this account by Melamed and Shapiro in 2018 ignores that, by 2015 at the latest, economists and legal scholars had already debunked this specious representation of the provenance of the patent-holdup conjecture. The many definitions of “patent holdup” that proponents had introduced since 2007 in fact did *not* track the economic reasoning of Williamson’s canonical definition of holdup. Economists and legal scholars have also shown that the key assumptions of Williamson’s holdup theory are missing from the licensing negotiations for SEPs.²¹ Put differently, one

Vicious Cycle of Patent Damages, 101 CORNELL L. REV. 385, 388 (2016) (“Flaws in current doctrine create a reinforcing cycle that perpetuates inflated patent damages and imposes a wasteful drag on commercial development and innovation, and an inefficient tax (in the form of higher prices) on the public.”).

¹⁸ See, e.g., Farrell, Hayes, Shapiro & Sullivan, *supra* note 4, at 604, 607.

¹⁹ Melamed & Shapiro, *supra* note 14, at 2115 & n.14 (citing Steven Tadelis & Oliver E. Williamson, *Transaction Cost Economics*, in THE HANDBOOK OF ORGANIZATIONAL ECONOMICS 159 (Robert Gibbons & John Roberts eds., Princeton Univ. Press 2012)). Melamed is today a law professor at Stanford. He was previously senior vice president and general counsel of Intel and, before that, a partner at WilmerHale and Acting Assistant Attorney General at the Antitrust Division of the U.S. Department of Justice. While at Intel, Melamed publicly endorsed, on the company’s behalf, the patent-holdup conjecture in congressional testimony and advocated specific policy recommendations based upon it. See *Standard Essential Patent Disputes and Antitrust Law: Hearing Before the Subcomm. on Antitrust, Competition Policy & Consumer Rights of the S. Comm. on the Judiciary*, 113th Cong. 51 (2013) (statement of A. Douglas Melamed, Senior Vice President and Gen. Counsel, Intel Corp.), <https://www.intel.com/content/dam/www/public/us/en/documents/corporate-information/melamed-testimony-july-30-2013-statement.pdf>.

²⁰ See ECONOMIC SCIENCES PRIZE COMMITTEE OF THE ROYAL SWEDISH ACADEMY OF SCIENCES, SCIENTIFIC BACKGROUND ON THE SVERIGES RIKSBANK PRIZE IN ECONOMIC SCIENCES IN MEMORY OF ALFRED NOBEL 2009: ECONOMIC GOVERNANCE (Oct. 12, 2009), <https://www.nobelprize.org/uploads/2018/06/advanced-economicsciences2009.pdf>.

²¹ See, e.g., Alexander Galetovic & Stephen Haber, *The Fallacies of Patent-Holdup Theory*, 13 J. COMPETITION L. & ECON. 1, 23–26 (2017); Alexander Galetovic & Stephen Haber, *Innovation Under Threat? An Assessment of the Evidence for Patent Holdup and Royalty Stacking in SEP-Intensive, IT Industries*, COMPETITION POL’Y INT’L ANTITRUST CHRON., Sept. 2016, at 1, 2; Pierre Larouche & Florian Schuett, *Repeated Interaction in Standard Setting* 1, 2–4 (Tilburg Law School Research Paper No. 16/2016, 2016); J. Gregory Sidak, *The Meaning of FRAND, Part I: Royalties*, 9 J. COMPETITION L. & ECON. 931, 1029 (2013); Damien Geradin & Miguel Rato, *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, 126 (2007).

cannot infer the patent-holdup conjecture from Williamson's holdup theory. Consequently, the proponents of the patent-holdup conjecture have never been truly describing Williamsonian holdup all these years; instead, they have been describing a *sui generis* theory in which excessive royalties for SEPs are deemed to exist because those royalties supposedly exceed a legitimately FRAND level.²² For example, in a moment of remarkable candor captured on camera and preserved for posterity on the Internet, Fiona Scott Morton of Yale and CRA said, in an interview at a conference on SEPs organized by Jean Tirole and held at the Toulouse School of Economics in May 2013, that FRAND "basically means a very low price."²³

In a 2018 law review article, Jorge Contreras of the University of Utah explains that the proponents of the patent-holdup conjecture have begun to drop the mask. He recognizes the inconsistency between Williamson's definition of holdup and the definition implicitly used in the patent-holdup conjecture, and he finds that the "early theorists of patent hold-up may have made an unfortunate terminological choice when describing the phenomenon."²⁴ Contreras expiates this "unfortunate" choice of words as being merely harmless error: "the term used to describe the phenomenon is not fatal to its existence," and "[a]ttempts to discount theories about patent hold-up solely on the basis that they are inconsistent with similarly-named transaction cost economics theories of hold-up" would provide little practical value.²⁵

To his considerable credit as a scholar, Contreras sincerely engages the arguments that critics of the patent-holdup conjecture have advanced. Still, he asks us to excuse too much. His explanation reminds us of the adage commonly attributed to Groucho Marx: "These are my principles. If you don't like them I have others."²⁶ Of course, while Groucho was hoping for a laugh, Contreras is deadly serious, and his heroic efforts to rehabilitate the patent-holdup conjecture, once stripped of its false provenance, simply underscores a deeper truth: words matter, as George Orwell famously observed²⁷

²² See, e.g., Jorge L. Contreras, *Much Ado About Hold-Up*, 2018 U. ILL. L. REV. (forthcoming 2018) (manuscript at 10) ("Courts adjudicating disputes between patent holders and manufacturers have subsequently adopted streamlined definitions of hold-up such as: '[t]he ability of a holder of [a] SEP to demand more than the value of its patented technology,' and 'when the holder of a SEP demands excessive royalties after companies are locked into using a standard.'" (alterations in original) (first quoting *Microsoft Corp. v. Motorola, Inc.*, No. C10-1823JLR, 2013 WL 2111217, at *10 (W.D. Wash. Apr. 25, 2013) (Robart, J.); then quoting *Ericsson Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1209 (Fed. Cir. 2014))).

²³ Standard-Essential Patents: A Conference at the Toulouse School of Economics (2013), <https://ut-capitole.ubicast.tv/permalink/v12513c68a6d372rcc00/iframe/>, at approximately 2:06 (video interview of Fiona Scott Morton).

²⁴ Contreras, *Much Ado About Hold-Up*, *supra* note 22, at 12.

²⁵ *Id.*

²⁶ This adage has been attributed to many different politicians and comedians, including—most notably—Groucho Marx. THE YALE BOOK OF QUOTATIONS 498 (Fred R. Shapiro ed., Yale Univ. Press 2006). But an early reference appears in a 19th century New Zealand periodical. *Weekly Epitome*, N.Z. TABLET, Oct. 18, 1873, at 8.

²⁷ GEORGE ORWELL, *Politics and the English Language*, 13 HORIZON 252, 252–53 (1946), reprinted in THE ORWELL READER: FICTION, ESSAYS, AND REPORTAGE 355, 355 (Harcourt 1956).

and as any scholar cunning enough to demean his critics as “patent-holdup deniers” already well understands. The “unfortunate terminological choice” excuse that Contreras offers requires us to believe, implausibly, that the seminal proponents of the patent-holdup conjecture cited the most important writings of their Berkeley colleague yet never correctly understood why Williamson’s oeuvre merited a Nobel Prize. Even that farfetched excuse is difficult to square with the fact that, as noted above, Shapiro as recently as 2018 still invokes the concept of Williamsonian holdup to claim an undeserved pedigree in economic theory for the patent-holdup conjecture,²⁸ even though Contreras, who I understand to be far more sympathetic to the patent-holdup conjecture than I am, has disavowed, in an article published the same year, the claimed linkage between the conjecture and Williamson’s general theory of holdup. The authors of the patent-holdup conjecture evidently have gotten several years behind in their reading.

The claim that the patent-holdup conjecture descends from Williamson’s legitimate theory of holdup is false advertising in at least three respects. First, it invokes the name and reputation of Oliver Williamson. Second, it invokes the Nobel Prize in economics as a signal of quality—namely, as an indicator of the intellectual significance, reliability, and respectability of a scientific theory. Third, as I will explain in the following pages, it implies that a larger corpus of economic scholarship supports the conjecture than is remotely the case.

In law, of course, the passing off of mislabeled goods is considered to be illegitimate, as the existence of the protection of trademarks under the Lanham Act attests²⁹ and as the common law tort of unfair competition attested even earlier.³⁰ From an economic perspective, the rationale for such legal prohibitions is that passing off appropriates and dilutes the value of private investments in brand names, which can aid consumers by reducing their search costs through the seller’s creation of a market signal of his product’s quality.³¹ The seller’s sunk investment in a brand name can credibly signal the future delivery of quality because, if the seller prematurely exits the market, he cannot continue to earn the quasi rents necessary to recoup that sunk investment and thus will forfeit the unrecouped portion of his nonsalvageable investment. The seller’s sunk investment in a brand is, in the

²⁸ See Melamed & Shapiro, *supra* note 14, at 2115.

²⁹ Ch. 540, 60 Stat. 427 (1946) (codified as amended in scattered sections of 15 U.S.C.).

³⁰ See RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 1 cmt. G, § 9 cmts. b–d (AM. LAW INST. 1995).

³¹ See Benjamin Klein, *Brand Names*, in 1 THE CONCISE ENCYCLOPEDIA OF ECONOMICS 42 (David R. Henderson ed., Library of Economics & Liberty 2007) (“Consumers always have incomplete information about product availability, quality, and alternative prices. Such ‘imperfect information’ leads them to rely on brand names, which lessen the costs of acquiring product information.”); DAVID BESANKO, DAVID DRANOVE, MARK SHANLEY & SCOTT SCHAEFER, *ECONOMICS OF STRATEGY* 339 (Wiley 6th ed. 2013) (“[B]randing can also serve as an alternative to disclosure by signaling the quality of vertically differentiated products.”).

language of transaction-cost economics, a “hostage” offered to consumers to guarantee quality.³² This economic literature on the value of branding is vast and predated the debut of the patent-holdup conjecture.³³

It is not a satisfactory answer for Contreras to say in effect, “Yes, the proponents of the patent-holdup conjecture engaged in false advertising, but their ersatz conjecture of high prices for SEPs nonetheless hangs together as promised, so call it a banana if you prefer.” For reasons that I will explain in the following pages, the patent-holdup conjecture does *not* hang together, with or without the false claim that it has some connection to Oliver Williamson, to the Nobel Prize in economics, and to a preexisting literature on authentically Williamsonian holdup. It is supremely ironic that Shapiro would make these claims about his patent-holdup conjecture, because his celebrated dissertation in economics at MIT, *Consumer Information, Product Quality, and Seller Reputation*, concerned “the performance of markets in which buyers are unable to observe the quality of products they buy prior to purchase” “[s]ince a seller can always cheat on his customers (cut quality) without detection, at least for a little while.”³⁴ In this instance, Shapiro is the seller, the patent-holdup conjecture is the product, and the customers who have difficulty discerning the quality of that product being sold to them are judges, antitrust officials, and policy makers.

For more than a decade now the proponents of the patent-holdup conjecture have had a run that Andrew Lloyd Webber would envy. Their conjecture has delivered a crowd-pleasing story arc to an audience of judges, antitrust enforcers, and policy makers around the world. The culmination of that intellectual advocacy is scheduled to occur in January 2019 in the Federal Trade Commission’s monopolization trial against Qualcomm, undertaken

³² See Oliver E. Williamson, *Credible Commitments: Using Hostages to Support Exchange*, 73 AM. ECON. REV. 519 (1983); see also Benjamin Klein & Keith Leffler, *The Role of Market Forces in Assuring Contractual Performance*, 89 J. POL. ECON. 615, 616 (1981) (“But economists also have long considered ‘reputations’ and brand names to be private devices which provide incentives that assure contract performance in the absence of any third-party enforcer.” (citing Friedrich A. Hayek, *The Meaning of Competition*, in INDIVIDUALISM AND ECONOMIC ORDER 97 (Univ. Chicago Press 1948); 4 ALFRED MARSHALL, PRINCIPLES OF ECONOMICS: AN INTRODUCTORY VOLUME, at xi (Macmillan 8th ed. 1949) (1890))).

³³ See, e.g., Martin W. Cripps, *Reputation*, in THE NEW PALGRAVE DICTIONARY OF ECONOMICS 105–06 (Steven N. Durlauf & Lawrence E. Blume eds., Palgrave Macmillan 2d ed. 2008) (“The literature on reputation has two main themes. The first is that introducing a small amount of incomplete information in a dynamic game can dramatically change the set of equilibrium payoffs: introducing something to signal can have big implications in a dynamic model. . . . The second theme of the literature on reputations is that introducing incomplete information in a dynamic game may introduce new and important signalling dynamics in the players’ strategies. Thus reputation effects tell us something about behaviour. This theme is particularly important in applications to macroeconomics and to industrial organization, for example.”).

³⁴ Carl Shapiro, *Consumer Information, Product Quality and Seller Reputation* (Oct. 10, 1980) (unpublished Ph.D. dissertation, MIT) (on file with MIT Libraries Document Services, MIT), at 2 [hereinafter Shapiro Dissertation]. Shapiro’s dissertation factors heavily in several of his early journal articles. See Carl Shapiro, *Consumer Information, Product Quality, and Seller Reputation*, 13 BELL J. ECON. 20 (1982); Carl Shapiro, *Optimal Pricing of Experience Goods*, 14 BELL J. ECON. 497 (1983); Carl Shapiro, *Premiums for High Quality Products as Returns to Reputation*, 98 Q.J. ECON. 659 (1983).

with Intel's approbation³⁵ and starring Shapiro as the government's expert economic witness, in a performance that can be expected to deliver a medley of patent holdup's greatest hits.³⁶

However, a closer inspection confirms that the showmanship that is the patent-holdup narrative was never rooted in sound economic analysis. Given the potential for the patent-holdup conjecture to be an expedient hoax, a reckoning is due. The patent-holdup conjecture has been invoked to legitimate a line of advocacy for well-capitalized firms that seek to pay less to use someone else's patented technology and for U.S. government officials who seek to justify coercion that is not predicated on the violation of any existing American law. Choosing at this late date the correct nomenclature to describe what the patent-holdup proponents have been advocating for the past decade would at least be a step toward intellectual candor and analytical clarity. Speaking plainly about economic analysis can only help to identify the most efficient remedies where a genuine violation of existing law has occurred.³⁷

In Part I of this article, I review the theory of Williamsonian holdup. In Part II, I ask whether the assumptions underlying Williamsonian holdup are present in the licensing of SEPs. In Part III, I ask whether empirical evidence supports the patent-holdup conjecture. In Part IV, I examine a remarkably

³⁵ See Letter from ACT/The App Association, et al. to Donald J. Trump, President of the United States of America 2 (Apr. 20, 2017), <http://src.bna.com/oad> ("In short, the impartial and substantive determination of an FTC action in a U.S. court is critical to supporting a successful U.S. market and U.S. business environment. Such a process is, in the end, good for the U.S. economy and job market. We encourage the administration to support this robust agency and court process."). Intel is listed as a signatory on the letter and as a "Sponsor Member" of The App Association. *Id.* at 2 & n.2.

³⁶ See Federal Trade Commission's Complaint for Equitable Relief, *FTC v. Qualcomm Inc.*, No. 5:17-cv-00220, 2017 WL 242848 (N.D. Cal. Jan. 17, 2017) [hereinafter *FTC Complaint for Equitable Relief*]; Joint Case Management Statement at 9, *FTC v. Qualcomm Inc.*, No. 5:17-cv-00220 (N.D. Cal. Sept. 14, 2018), ECF No. 853 ("Also on May 24, [2018,] the FTC served the report of its proffered expert economist, Dr. Carl Shapiro, in which he opined that Qualcomm 'sacrificed profits' on chipsets supplied for incorporation into the five iPad models in order to exclude its competitors from chipset sales for those devices."); Brief of *Amicus Curiae* Intel Corporation in Support of Plaintiff's Opposition to Defendant's Motion to Dismiss at 2, *FTC v. Qualcomm Inc.*, No. 5:17-cv-00220 (N.D. Cal. May 12, 2017), Exhibit 1 to ECF No. 92 ("This Court is well aware of the role standards setting organizations ('SSOs') play in the cellular communications industry, as well as the benefits and dangers that result from the adoption of industry-wide standards and the granting of standard-essential patents ('SEPs').").

³⁷ Lest one scoff at the possibility that the patent-holdup conjecture is a hoax, it should be sobering to recall the WorldCom fraud and bankruptcy, which could not have occurred but for the creation and propagation of a narrative that traffic over the Internet was doubling every 100 days, such that the equity research department of Salomon Smith Barney (which also happened to be WorldCom's investment bankers) could continue raising its share-price targets for WorldCom stock to astronomical levels. The 100-day factoid of exponential growth in Internet traffic was credulously repeated by many people and institutions that occupied positions of trust and should have known better, including the business press, other equity research firms, the chairman of the Federal Communications Commission, and even the Vice President of the United States. The narrative was false, and when the music stopped once WorldCom's related accounting fraud could no longer be concealed, roughly \$90 billion of shareholder wealth was wiped out and Worldcom declared bankruptcy. See J. Gregory Sidak, *The Failure of Good Intentions: The WorldCom Fraud and the Collapse of American Telecommunications After Deregulation*, 20 YALE J. ON REG. 207, 228-30 (2003). To my knowledge, no public official has yet accepted responsibility for the extent to which the government lent credibility to the hoax upon which WorldCom's fraud was predicated.

ignored question in this debate: how does the market for corporate control provide implementers a mechanism for deterring patent holdup? In Part V, I ask whether patent holdup differs from the exercise of market power. In Part VI, I explain why the false nomenclature of the patent-holdup conjecture matters.

I. THE ECONOMIC DEFINITION OF HOLDUP

DEVELOPED BY NOBEL LAUREATE

OLIVER WILLIAMSON

The term “holdup” has a precise meaning in economics. It is the opportunistic appropriation of another firm’s quasi rents.³⁸ Transaction-cost economics explains that a firm will enter a market if it expects to earn a positive economic rent, which is defined as the firm’s expected revenues (R) net of its operating cost (c) and its investment cost (k)—that is, $R - c - k$.³⁹ Thus, a firm will enter the market if $R - c - k > 0$. In Williamson’s terminology, a “fundamental transformation” in the firm’s incentives to remain in the market occurs after the firm has entered and made an investment k that is specific to a transaction with a particular firm.⁴⁰ After k is sunk, only the firm’s quasi rents—that is, expected revenues net of operating costs ($R - c$)—affect the firm’s decision to continue operating.⁴¹ As long as $(R - c) \geq 0$, firm A will choose, in the short run, to remain in the market.⁴² Hence, if firm A and firm B negotiate the terms of a transaction *after* firm A has made a relationship-specific (sunk) investment, firm B might opportunistically appropriate part, or all, of firm A ’s quasi rent.

³⁸ See Oliver E. Williamson, *Transaction-Cost Economics: The Governance of Contractual Relations*, 22 J.L. & ECON. 233, 234 (1979); Benjamin Klein, Robert G. Crawford & Armen A. Alchian, *Vertical Integration, Appropriable Rents, and the Competitive Contracting Process*, 21 J.L. & ECON. 297, 297–98 (1978); Klein & Leffler, *The Role of Market Forces in Assuring Contractual Performance*, *supra* note 32, at 617–18.

³⁹ See, e.g., Sidak, *The Meaning of FRAND, Part I: Royalties*, *supra* note 21, at 977.

⁴⁰ OLIVER E. WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM* 52–56, 61 (Free Press 1985).

⁴¹ See, e.g., Sidak, *The Meaning of FRAND, Part I: Royalties*, *supra* note 21, at 977. This difference is often called a firm’s “operating profit.” When a firm’s expected operating profit is negative, the firm minimizes its losses by shutting down production in the short run (and exiting the industry in the long run). See, e.g., N. GREGORY MANKIW, *PRINCIPLES OF ECONOMICS* 274 (Cengage Learning 8th ed. 2018); DENNIS W. CARLTON & JEFFREY M. PERLOFF, *MODERN INDUSTRIAL ORGANIZATION* 59 (Pearson 4th ed. 2005) (defining quasi rents as “[t]he revenues earned in excess of avoidable cost . . . which are the payments above the minimum amount necessary to keep a firm operating in the short run”). Accountants give quasi rent a different name: contribution margin. See, e.g., CHARLES T. HORNGREN, SRIKANT M. DATAR & MADHAV V. RAJAN, *COST ACCOUNTING: A MANAGERIAL EMPHASIS* 68–70 (Pearson 15th ed. 2014).

⁴² The appropriable quasi rent cannot exceed the costs of switching to the next-best alternative. See Klein, Crawford & Alchian, *supra* note 38, at 298 (“The quasi-rent value of the asset is the excess of its value over its salvage value, that is, its value in its next best *use* to another renter. The potentially appropriable specialized portion of the quasi rent is that portion, if any, in excess of its value to the second highest-valuing *user*.” (emphasis in original)).

Consider the following example of Williamsonian holdup involving a landlord and a coffee bar owner.⁴³ Suppose that the coffee bar owner's expected revenue is \$2000 per month (R). Suppose further for ease of exposition that the coffee bar owner has no operating costs other than rent and that the coffee bar owner and the landlord have an incomplete rent contract for \$1000 per month (c). Suppose further that the coffee bar owner has invested \$500 (k) to install an expensive commercial-grade espresso machine and decorate the coffee bar.⁴⁴ In economic terms, the cost of \$500 to install the espresso machine and decorate the coffee bar are sunk costs,⁴⁵ for those costs are specific to the location of the coffee bar that the owner has chosen to use. When facing a rent of \$1000, the coffee bar owner will likely enter the market because the expected economic rent from doing so is positive—that is, $R - c - k$ is \$500.

Suppose that, after two months—and after the coffee bar owner has invested in the installation of the commercial-grade espresso machine and the décor of the coffee bar—the landlord increases the rent to \$1800 per month.⁴⁶ After the rent increase, the coffee bar owner will remain in the market in the short run because quasi rents—her revenue (R) net of her rent (c)—are still positive. After the rent increase, her quasi rents from the business fall from \$500 to \$200. The landlord has thus appropriated part of the coffee bar owner's quasi rents. Indeed, had the landlord charged the coffee bar owner \$1800 for rent at the outset, before she had made the sunk investments, the coffee bar owner would not have entered the market, because her expected rent ($R - c - k$) would have been negative.

The example of the coffee bar owner and the landlord demonstrates that, for holdup to occur, three necessary conditions must be satisfied.⁴⁷ First, it is necessary that there be a relationship-specific investment. That is, the coffee bar owner must not be able to reinstall the espresso machine inexpensively elsewhere, because “if the coffee bar owner can easily shift her equipment to another use (for example, by moving it down the street), she can reject the demand for a higher rent.”⁴⁸

Second, it is also necessary that the rent contract be incomplete, because if the coffee bar owner and the landlord had contractually foreclosed the

⁴³ I borrow this example from Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 14–20.

⁴⁴ *Id.* at 17 (“Believing that they had secure, long-term leases, they decorated their properties and purchased expensive commercial-grade espresso machines, much of whose cost was for installation: a water line needed to be run to the espresso machine and a drain needed to be run from the espresso machine to the waste pipe.”). To be clear, the sunk cost is not the purchase price of the espresso machine itself (which is salvageable), but rather the cost of the machine's installation and the cost of decorating the coffee bar.

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM*, *supra* note 40, at 56–57.

⁴⁸ Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 20.

option of increasing the rent during the lease, the landlord could not increase the price.⁴⁹ Williamson calls this element the requirement of “uncertainty.”⁵⁰ If the coffee bar owner had anticipated that the landlord would act opportunistically, she (1) would have taken precautions to avoid the effects of such a rent increase (for example, by contractually precluding the landlord’s option to increase the price)⁵¹ or (2) would not have entered the market in the first place.

Third, it is necessary that the landlord act opportunistically. Williamson describes opportunism as “self-interest seeking with guile.”⁵² Of course, there will be no holdup if the coffee bar owner makes a sunk investment and, though the contract is incomplete, the landlord nonetheless continues to charge the same rent. In that case, the landlord would be forbearing from opportunism.

II. ARE THE ASSUMPTIONS OF WILLIAMSON’S HOLDUP PRESENT IN THE LICENSING OF SEPs?

The proponents of the patent-holdup conjecture contend that their theory applies the principles of holdup theory, as it is understood in Williamsonian transaction-cost economics, to the context of licensing patents essential to practice industry standards.⁵³ That contention is an appeal to authority—an appeal to what Diedre McCloskey calls “an ethos worthy of belief.”⁵⁴ Since the proponents of the patent-holdup conjecture hope to sway a legal audience, their claim that the conjecture lineally descends from Williamson is presumably calculated to persuade judges, who might welcome an appeal to authority when scrutinizing an unfamiliar economic proposition.

But that assertion of a prestigious bloodline is specious. Skeptical economists and legal scholars have emphasized that one or more of the three

⁴⁹ *Id.* (“[I]f every contingency could be contractually anticipated, then there would be no room for renegotiation; any excuse for a rent increase conceived of by the landlord would already be in the contract.”).

⁵⁰ WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM*, *supra* note 40, at 79–80.

⁵¹ Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 20 (“The coffee bar owner did not install her espresso machine so that the landlord could appropriate her quasi rents, leaving her with a business that is losing money in the long run.”).

⁵² *Id.* at 23 (quoting WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM*, *supra* note 40, at 47); *see also* WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM*, *supra* note 40, at 47 (“[O]pportunism refers to the incomplete or distorted disclosure of information, especially to calculated efforts to mislead, distort, disguise, obfuscate, or otherwise confuse.”).

⁵³ *See, e.g.*, Farrell, Hayes, Shapiro & Sullivan, *supra* note 4, at 604, 607; Melamed & Shapiro, *supra* note 14, at 2115.

⁵⁴ DIEDRE N. MCCLOSKEY, *THE RHETORIC OF ECONOMICS II* (Univ. of Wisconsin Press 2d ed. 1998). The proponents of the patent-holdup conjecture have appealed to the work of other prominent economists as well. *See, e.g.*, Shapiro, *Patent Holdup: Myth or Reality?*, *supra* note 12, at 4 n.9 (citing Klein, Crawford & Alchian, *supra* note 38). One sometimes hears proponents of the patent-holdup conjecture invoke the research of Paul Joskow, who has also studied the effects of relationship-specific investments on contracts. *See* Paul L. Joskow, *Contract Duration and Relationship-Specific Investments: Empirical Evidence from Coal Markets*, 77 *AM. ECON. REV.* 168 (1987).

critical assumptions underlying Williamson's holdup model in transaction-cost economics—relationship-specific investment, uncertainty, and opportunism—are typically absent from standards setting.⁵⁵ Therefore, Williamson's holdup theory from transaction-cost economics provides no basis to conclude that SEP holders will systematically engage in holdup of implementers of the SSO's standard.

A. The Assumption of a Relationship-Specific Investment

The patent-holdup conjecture assumes that implementers of industry standards will systematically make relationship-specific investments before negotiating license terms with a given SEP holder. However, skeptical scholars have explained that it is unreasonable to expect that an SEP holder and an implementer always negotiate license terms for SEPs after the implementer has already made its relationship-specific investment.⁵⁶

In a paper entitled, *Patent Holdup: Myth or Reality?*, presented as a keynote luncheon speech to the IEEE's 9th International Conference on Standardization and Innovation in Information Technology (IEEE-SIIT) in Mountain View, California on October 6, 2015, Shapiro conceded that the significance of patent-specific investments is an empirical question that one must scrutinize on a case-by-case basis.⁵⁷ He said that a party that argues that it is subject to *ex post* patent holdup should be required to prove that it has made significant investments that are specific to the patent or patent portfolio in question.⁵⁸ (Shapiro withdrew this paper from the public domain after the IEEE-SIIT conference.⁵⁹)

By 2016, however, Shapiro's colleagues at Charles River Associates diverged from his 2015 opinion that the implementer needs to prove that it has made significant relationship-specific investments before it can claim to be a victim of patent holdup. In 2016, CRA explicitly advised the European Commission in a commissioned report that patent holdup "does not require that implementers have undertaken standard-specific investment before the

⁵⁵ See sources cited in *supra* note 21.

⁵⁶ See, e.g., Richard A. Epstein, F. Scott Kieff & Daniel F. Spulber, *The FTC, IP, and SSOs: Government Hold-Up Replacing Private Coordination*, 8 J. COMPETITION L. & ECON. 1, 18 (2012).

⁵⁷ Shapiro, *Patent Holdup: Myth or Reality?*, *supra* note 12, at 12.

⁵⁸ *Id.*

⁵⁹ Shapiro asks readers not to quote his paper. *Id.* at 1. Therefore, as a professional courtesy, I do not quote his paper here. The full text of his paper may be read at the link provided in *supra* note 12. Shapiro did not prohibit his readers from citing or paraphrasing his paper. Nor, obviously, did his speech prohibit his audience from hearing, digesting, recollecting, and repeating his words. The IEEE-SIIT did not impose Chatham House rules. To the contrary, it made a video recording of the event, although, based on my unsuccessful attempts to secure a copy, I have concluded that the IEEE-SIIT decided not to make the video of Shapiro's speech available to the public. In any event, I attended Shapiro's speech, along with at least 100 others; consequently, as factual matter, I can comment about what I heard and saw.

completion of the standard and the licensing of the corresponding SEPs.”⁶⁰ Similarly, Scott Morton’s idiosyncratic definition of patent holdup also does not require the implementer to have made any prior relationship-specific investment. Under her theory of patent holdup, a patent holder supposedly has the power to use the mere threat of an exclusion order to demand a royalty exceeding the *ex ante* value of the patented technology before the implementer has begun to use it. However, as I explained in Part I, the conjecture that patent holdup can occur in the absence of relationship-specific investment finds no support in Williamson’s concept of holdup.

In their 2018 article, Melamed and Shapiro introduce a new argument. They argue that, in licensing SEPs for a given standard, “it is impractical for implementers to enter into negotiations for patent licenses with all SEP owners prior to the establishment of a standard and to their implementation of it,”⁶¹ such that “[i]mplementers are therefore usually locked in to the allegedly infringing technologies well before the issue of patent royalties is addressed.”⁶² This argument is a straw man.

Granted, it might be “impractical” for an implementer to negotiate “with *all* SEP owners” before the SSO adopts the standard. But many of these negotiations occur between repeat players, who consequently have a shared history of negotiations, bargaining strategies, and preexisting bilateral contracts. Nothing prevents an implementer from negotiating in a timely manner with the holders of, say, the ten largest portfolios of relevant SEPs. It strains credulity to suggest that, had an implementer successfully negotiated FRAND licenses with the ten largest SEP holders for a given standard, a court would seriously entertain a request to enjoin the implementer’s manufacture or sale of an infringing product because of its impasse in a FRAND dispute with the *eleventh* largest SEP holder—let alone the five-hundredth largest SEP holder for the standard. The actual experience of litigated FRAND (or RAND) cases gives a lawyer no basis for advising his SEP holder client that it may reasonably expect to receive a permanent injunction upon prevailing on the merits of its infringement case. Permanent injunctions for infringement of SEPs are figments that inhabit the minds of patent-holdup proponents, but not the orders of federal district court judges.

Furthermore, Melamed and Shapiro do not explain why anyone should accept the implicit assumption that negotiations to license SEPs can occur only *after* the SSO has adopted a standard and implementers have made significant sunk investment to make products compliant with that standard. Such an assumption requires first positing, unrealistically, that the senior

⁶⁰ RÉGIBEAU, DE CONINCK & ZENGER, *supra* note 7, at 11. Instead, the CRA authors argued, “[t]he damage from this form of ‘hold-up’ comes [from] excessive royalties relative to the ex-ante benchmark.” *Id.*

⁶¹ Melamed & Shapiro, *supra* note 14, at 2113.

⁶² *Id.* at 2116.

management of the typical implementer is oblivious and careless. Rather, given the sustained attention that the patent-holdup conjecture has received for more than a decade from antitrust enforcers, regulators, industry participants, the business media, and academics, it is more reasonable to expect that a prudent implementer that faces a high risk of holdup will make investments specific to a standard only after it has negotiated satisfactory terms for the use of the required SEPs.

B. The Assumption of Uncertainty

The critical assumption of “uncertainty” in Williamson’s holdup model typically does not hold for SEPs for at least three reasons.⁶³

1. SSOs Typically Require Participants to Disclose to the Public Patents Potentially Essential to Practice an Industry Standard

First, SSOs typically require each participant to disclose any patent potentially essential to practice a standard and to indicate whether the participant is willing to license that patent on FRAND (or RAND) terms.⁶⁴ An SSO typically makes the list of declared-essential patents available to its participants and thereby enables implementers to identify the potential SEP holders before the implementers make relationship-specific investments.⁶⁵ The firm disclosing the SEP typically submits a public letter of assurance (LOA) memorializing its disclosure, and the SSO then typically publishes the LOA.⁶⁶ In other words, implementers of industry standards typically can identify the relevant SEP holders (and their respective SEPs) *before* making relationship-specific investments.

⁶³ See, e.g., Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 25; Epstein, Kieff & Spulber, *supra* note 56, at 18.

⁶⁴ See, e.g., European Telecommunication Standards Institute [ETSI], Rules of Procedure, Annex 6: ETSI Intellectual Property Rights Policy § 4.1 (Apr. 18, 2018), <http://www.etsi.org/images/files/IPR/etsi-ipr-policy.pdf>; JEDEC, JEDEC Manual of Organization and Procedure § 8.2.3 (July 2015), <http://www.jedec.org/sites/default/files/JM21R.pdf> (“All Committee Members must Disclose Potentially Essential Patents, known to their Representative(s) to be Potentially Essential Patents that are owned or controlled by that Committee Member to the personal knowledge of the Representatives.”).

⁶⁵ See, e.g., ETSI, ETSI Guide on Intellectual Property Rights (IPRs) § 3.1.1–3.1.2 (Sept. 19, 2013), <http://www.etsi.org/images/files/IPR/etsi-guide-on-ipr.pdf> (“The ETSI Special report SR 000 314 is an ETSI Deliverable entirely dedicated to information on IPRs which have been notified to ETSI as being Essential, or potentially Essential, to ETSI standards. This SR is generated twice a year and offers a summary of the information contained in the ETSI IPR Online database as of the time it is generated. . . . The ETSI IPR Online Database is an application that has been developed by the Secretariat to allow electronic online access to Information Statements and Licensing Declarations received by ETSI. Like the SR 000 314, the ETSI IPR Online Database contains IPRs, particularly patents and patent applications, which have been notified to ETSI as being essential, or potentially essential, to ETSI standards.”).

⁶⁶ See, e.g., Institute of Electrical Electronics Engineers, IEEE-SA Standards Board Bylaws § 6.2, at 16–19 (Dec. 2017) [hereinafter IEEE Standards Board Bylaws], https://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf.

2. *Major SEP Holders Publicly Announce Royalty Rates for Their SEPs Before Implementers Make Significant Relationship-Specific Investments in Implementing the Standard*

Second, some SEP holders announce in advance the royalties that they intend to charge for their portfolios of SEPs. Consider SEPs that read on the 5G standard. The 3rd Generation Partnership Project (3GPP) is a consortium of seven telecommunications standard-setting organizations (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC), known as “Organizational Partners,” that enables its members to produce the reports and specifications that define 3GPP technologies.⁶⁷ The first major iteration of the 5G New Radio (NR) standard (Release 15) was approved by 3GPP in June 2018.⁶⁸

Ericsson and Qualcomm are obviously two of the most significant holders of SEPs for mobile communications. In June 2018, Ericsson projected that the first 5G handsets will not become available to consumers until early 2019.⁶⁹ However, in November 2017, the trade press reported that, “[w]hile 5G standards are still being set by the 3GPP,” Ericsson and Qualcomm “have now announced planned license rates for their intellectual property (IP).”⁷⁰ By March 2017, Ericsson had already announced that it is prepared to license its portfolio of 5G SEPs for a \$5 per-unit royalty (for multimode handsets).⁷¹ Ericsson further announced that, “to encourage the adoption of the standardized technology also in market segments that will have low average sales prices for handsets,” it is prepared to offer a lower rate in exceptional circumstances, although not lower than a \$2.50 per-unit royalty.⁷² Similarly, by November 2017, Qualcomm had already announced that it is willing to license its 5G SEPs for royalties of 2.275 percent of the wholesale price of a single-mode phone, and 3.25 percent of the wholesale price of a multimode phone.⁷³

In other words, two of the largest holders of SEP portfolios for mobile electronic devices—Ericsson and Qualcomm—announced their royalties for 5G SEPs *before* the 3GPP determined the first specification of the 5G standard, *before* any 5G handsets have become available to consumers, and thus

⁶⁷ *About 3GPP Home*, 3GPP, <http://www.3gpp.org/about-3gpp/about-3gpp>.

⁶⁸ See Press Release, Samsung, Mobile Industry Works Together to Deliver Complete 5G System Standard on Time (June 14, 2018), <https://news.samsung.com/global/mobile-industry-works-together-to-deliver-complete-5g-system-standard-on-time>.

⁶⁹ ERICSSON INC., ERICSSON MOBILITY REPORT 8 (June 2018), <https://www.ericsson.com/assets/local/mobility-report/documents/2018/ericsson-mobility-report-june-2018.pdf>.

⁷⁰ Jim McGregor, *Qualcomm Sheds Light on Licensing Policy*, EE TIMES, Nov. 27, 2017, https://www.eetimes.com/author.asp?section_id=36&doc_id=1332657.

⁷¹ Press Release, Ericsson AB, Ericsson’s FRAND Licensing Terms for 5G/NR in 3GPP Release 15 (Mar. 3, 2017), <https://www.ericsson.com/assets/local/tech-innovation/patents/doc/frand-licensing-terms-for-5g-nr-in-3gpp-release-15.pdf>.

⁷² *Id.*

⁷³ Qualcomm Inc., Qualcomm 5G NR Royalty Terms Statement 1 (Nov. 19, 2017), <https://www.qualcomm.com/media/documents/files/qualcomm-5g-nr-royalty-terms-statement.pdf>.

before any firms have made significant relationship-specific investments to implement the 5G standard.⁷⁴ Hence, these two significant SEP holders have eliminated uncertainty about the royalties that they intend to charge an implementer for the use of their 5G SEPs.

3. *Repeated Interactions Between SEP Holders and Implementers Reduce Uncertainty About an SEP Holder's Future Behavior*

To the two preceding arguments one must add a third that, so far, has been largely ignored, perhaps because it is so obvious: people learn, knowledge accretes.

This idea permeates economic theory—whether we call it a repeated game⁷⁵ or Bayesian updating⁷⁶ or rational expectations⁷⁷ or the efficient market hypothesis⁷⁸ or the theory of incentives⁷⁹ or learning-by-doing⁸⁰ or something else.⁸¹ In the case of SEPs, many of the same participants typically contribute to developing and commercializing each successive generation of a standard. Those repeated interactions allow participants in the development and setting of standards to predict an SEP holder's conduct on the basis of its past practices or on the basis of the behavior of other participants. If parties can foresee the risk of holdup, they can avoid it, either by refraining from making relationship-specific investments or by entering into sufficiently complete contracts before making such investments.⁸² In short, the repeated interactions between participants in an SSO reduce uncertainty about a given party's future behavior.

⁷⁴ Nokia, another major holder of patents essential to mobile communications standards, also released its expected licensing rate for its 5G SEP portfolio in August 2018, before any 5G mobile handsets had become available to consumers. See Press Release, Nokia Corp., Nokia Licensing Rate Expectations for 5G/NR Mobile Phones (Aug. 21, 2018), https://www.nokia.com/en_int/news/releases/2018/08/21/nokia-licensing-rate-expectations-for-5gnr-mobile-phones (“Nokia expects that for mobile phones, its licensing rate for the Nokia 5G SEP portfolio will be capped at EUR 3 per device.”).

⁷⁵ See, e.g., DREW FUDENBERG & JEAN TIROLE, *GAME THEORY* 110–13 (MIT Press 1993).

⁷⁶ See, e.g., DAVID R. ANDERSON, DENNIS J. SWEENEY & THOMAS A. WILLIAMS, *STATISTICS FOR BUSINESS AND ECONOMICS* 178–83 (South-Western 11th ed. 2011).

⁷⁷ See, e.g., John F. Muth, *Rational Expectations and the Theory of Price Movements*, 29 *ECONOMETRICA* 315 (1961); see also JOHN CIRACE, *LAW, ECONOMICS, AND GAME THEORY* 119 (Lexington Books 2018).

⁷⁸ See, e.g., JOHN Y. CAMPBELL, ANDREW W. LO & A. CRAIG MACKINLAY, *THE ECONOMETRICS OF FINANCIAL MARKETS* 20–22 (Princeton Univ. Press 1997).

⁷⁹ See, e.g., Jean-Jacques Laffont & Eric Maskin, *The Theory of Incentives: An Overview*, in *ADVANCES IN ECONOMIC THEORY* 31, 32 (Werner Hildenbrand ed., Cambridge Univ. Press 1982).

⁸⁰ See, e.g., Armen Alchian, *Reliability of Progress Curves in Airframe Production*, 37 *ECONOMETRICA* 679, 680 (1963) (seminal article on learning-by-doing, finding that, as the number of airframes produced increases, the direct labor required to produce those airframes decreases).

⁸¹ These insights about learning have been part of the literature critiquing the patent-holdup conjecture since at least 2013, when I discussed them in *The Meaning of FRAND, Part I: Royalties*, *supra* note 21, at 971, 1052. As I will explain in Part IV, the market for corporate control provides the implementer yet another method for reducing the risk of patent holdup. Proponents of the patent-holdup conjecture also ignore this method of neutralizing the supposed threat of patent holdup.

⁸² See, e.g., Jean-Jacques Laffont & Jean Tirole, *Using Cost Observation to Regulate Firms*, 94 *J. POL. ECON.* 614, 635–36 (1986).

Remarkably, there is no accounting for this reduction of uncertainty over time in the seminal articles propounding the patent-holdup conjecture. This conspicuous omission is especially perplexing in Shapiro's case because some of his most noted scholarly research relies on theoretical models of how consumer information and seller reputation evolve as experience accretes over time, or on models of how game-theoretic responses evolve in repeated interactions between firms during which learning occurs.

Consider first the body of published articles emerging from or building on Shapiro's MIT dissertation, in which he states: "I argue strongly for *adaptive* expectations by consumers in response to quality changes by a seller."⁸³ Suppose that "quality change" is replaced with the phrase "ex post appropriation of quasi rent" in his argument, and the product in question is a standard-essential patent. Why are there no "adaptive expectations by consumers in response to [contractual performance] changes by a seller"? After all, Shapiro wrote that "[i]mproved information increases the speed of learning by consumers," which implies that a consumer's expectations can and will develop given the reduction of uncertainty that naturally occurs over time.⁸⁴ He also posited that, as a general rule, "as buyers learn about [a] product, the demand curve shifts over time," further highlighting the significance of learning in any repeated interaction among economic actors.⁸⁵

Consider next Shapiro's 1989 chapter on oligopoly in the *Handbook of Industrial Organization*, which relied heavily on game-theoretic analysis.⁸⁶ Consequently, topics that he discussed included finitely and infinitely repeated games between competitors, two-period games, dynamic games, learning-by-doing, Bayesian updating, and other strategic implications of an oligopolist's acquisition of information over time.⁸⁷ With respect to dynamic games, Shapiro wrote that "firms can make lasting commitments so that history matters," such that dynamic games "are *not* simple repetitions of the static competition."⁸⁸ He offered the following observation that would seem highly relevant to a given SEP holder's ability to engage in repeated rounds of opportunistic behavior directed at implementers: "Infinitely repeated games are fundamentally different from finitely repeated ones in that there is always the possibility of retaliation and punishment in the future."⁸⁹ Why, then, did Shapiro not subsequently incorporate learning, retaliation, and punishment into his model of opportunistic licensing behavior by SEP holders? He wrote

⁸³ Shapiro Dissertation, *supra* note 34, at 20 (emphasis in original).

⁸⁴ Shapiro, *Consumer Information, Product Quality, and Seller Reputation*, *supra* note 34, at 34.

⁸⁵ Shapiro, *Optimal Pricing of Experience Goods*, *supra* note 34, at 497.

⁸⁶ Carl Shapiro, *Theories of Oligopoly Behavior*, in 1 HANDBOOK OF INDUSTRIAL ORGANIZATION 329 (Richard Schmalensee & Robert Willig eds., North-Holland 1989).

⁸⁷ *Id.* at 332, 362–63, 381–82, 390–91, 399–400, 407.

⁸⁸ *Id.* at 332 (emphasis in original).

⁸⁹ *Id.* at 362.

that “firms *remember* what has happened in the past and condition their current actions on previous behavior.”⁹⁰ Shapiro so described oligopolists in 1989, but he could have said the same of implementers of SEPs in 2007 who supposedly face the risk of patent holdup at the hands of SEP holders. What explains Shapiro’s disparate consideration of the accretion of knowledge in repeated transactions when moving from the theory of oligopoly to the patent-holdup conjecture?

In addition, as I noted in the introduction, the original exegesis of the patent-holdup conjecture, which Lemley and Shapiro published in 2007, received funding from Apple, Cisco, Intel, Microsoft, and other implementers of SEPs. It is absurd to suppose that the general counsel of any of those contributing companies could thereafter claim that he or she was blindsided in a subsequent license negotiation with an SEP holder. If the top lawyers at each of those companies had read the Lemley-Shapiro article, they would have had actual notice from 2007 onward of the conjectured possibility of opportunism by SEP holders. By definition, an act of opportunism that one already expects cannot be a surprise, and thus it cannot make one vulnerable to the intended opportunism—and certainly that hypothesized act of opportunism cannot succeed if it is attempted more than a decade later, after extensive scientific debate in the public square over the relative merits of the patent-holdup conjecture.

One can extend this argument about learning beyond the handful of companies that funded Lemley and Shapiro when writing their 2007 article. As of November 2018, how many other significant implementers of SEPs have litigated patent-infringement disputes before U.S. federal district courts, the ITC, foreign courts, or international commercial arbitration panels? At a minimum, the list of companies that can no longer claim surprise by the conjectured risk of opportunism in SEP licensing extends to Apple, Cisco, Huawei, LG, Microsoft, Samsung, TCL, and the 173 other companies and entities that I identify below in Table 1. Again, having actually litigated a FRAND or RAND dispute, no senior lawyer within any of those companies would soon forget the experience or ignore its implications for future iterations of the development and setting of standards and the licensing of SEPs. Thereafter, no such lawyer working for an implementer could credibly claim that a given SEP holder’s behavior in a license negotiation is a surprise, let alone so great a surprise as to enable the SEP holder’s successful opportunism with respect to that implementer. As I once explained in a deposition, to make the contrary assumption requires one to believe that highly sophisticated professionals who negotiate patent licenses in major technology companies are rusticated bumpkins.

⁹⁰ *Id.* at 362–63 (emphasis in original).

One can extend the argument still one step further. Implementers of SEPs do not, of course, personally litigate FRAND disputes. They hire outside counsel to do so, at great expense. Law firms have represented Alcatel-Lucent, Apple, Cisco, Dell, Google, Hewlett Packard, Huawei, Intel, Juniper Networks, LG, Microsoft, Motorola Mobility (bought by Google and sold to Lenovo), NEC, Samsung, SK hynix, Sony, TCL, ZTE, and other alleged infringers in FRAND or RAND disputes over SEPs. From such representations, those law firms acquired the expertise (to complement the incentive that they already possessed) to warn their *other* clients about the conjectured risk of patent holdup. (Of course, the same argument applies to the willingness of the leading economic consulting firms to educate their litigation clients about the supposed risk of patent holdup. Rarely does a week pass without an announcement arriving in my inbox for yet another conference or webinar featuring a damages expert who is willing to sit down with patent litigators to discuss the latest developments in FRAND-royalty disputes.)

Given the amounts in controversy, it is no surprise that the lawyers who litigate disputes over FRAND royalties practice at some of the most storied of international law firms. Kirkland, Latham, Sidley, and WilmerHale are particularly active in representing alleged infringers of SEPs. Other notable firms that are experienced in litigating FRAND licensing disputes include Allen & Overy, Alston & Bird, Axinn Veltrop, Baker Botts, Bird + Bird, Boies Schiller, Cleary Gottlieb, Covington, Cravath, Fish & Richardson, Freshfields, Gibson Dunn, Kellogg Hansen, McKool Smith, Morgan Lewis, Munger Tolles, Nixon Peabody, Orrick, Perkins Coie, Quinn Emanuel, Shearman & Sterling, Sheppard Mullin, Slaughter and May, Susman Godfrey, Weil Gotshal, White & Case, Williams & Connolly, Wilson Sonsini, and Winston & Strawn. Some of these law firms, for example, represented *amici curiae* in *CSIRO v. Cisco*⁹¹ or *Microsoft v. Motorola*⁹² that included Apple, Aruba Networks, Dell, Ericsson, Hewlett-Packard, Intel, Nokia, Qualcomm, SAS Institute, Sierra Wireless, T-Mobile USA, and VIZIO. The admonitions about patent holdup that a general counsel of a company that implements an industry standard receives from one or more of these estimable law firms makes vanishingly small the probability that an SEP holder could surprise that general counsel with its royalty demand. And with no surprise, there can be no patent holdup.

Table 1 lists law firms that have filed pleadings, briefs, declarations, or other documents on behalf of companies involved in litigation concerning patent, antitrust, or contract claims (among others) in a U.S. federal court

⁹¹ Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc., 809 F.3d 1295 (Fed. Cir. 2015).

⁹² Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024 (9th Cir. 2015).

or administrative court in which the law firm either alleges patent holdup, discusses the risk of patent holdup, or cites to an academic article discussing the patent-holdup conjecture. (Table 1 does not include information concerning arbitrations on such matters, since such proceedings are typically confidential.) As of November 2018, 195 different law firms have made such filings on behalf of 180 different companies and other entities. The entries in Table 1 are so numerous that they invite one to ask: By this point in time, what *Am Law 100* law firms (denoted by asterisks in Table 1) and what *Fortune 500* technology companies have *not* expressed views on the patent-holdup conjecture in legal proceedings concerning FRAND royalties for SEPs?

Table 1. Law Firms and Respective Clients Represented in Public Proceedings Concerning SEPs and Referencing the Patent-Holdup Conjecture

Law Firm	Client(s) Represented
Adduci Mastriani & Schaumberg LLP	Apple; Carsem; Garmin; Microsoft; Nokia; Western Digital
Agility IP Law	SK hynix
Ahmad Zavitsanos Anaipakos Alavi & Mensing PC	Apple; Rembrandt Wireless Technologies; Saint Lawrence Communications
Akin Gump Strauss Hauer & Feld LLP*	Lenovo; Rambus
Alston & Bird LLP*	Acer; Belkin; D-Link; Dell; Gateway; HTC; Huawei; Intel; Intellisync; InterDigital; Microsoft; Nokia; Samsung; Toshiba; ZTE
Andrews Kurth LLP	LG; Toshiba
Antoni Albus LLP	Cambridge Silicon Radio
Arnold & Porter LLP*	IDC Research
BakerHostetler*	Funai
Baker Botts LLP*	Dell; KPN; Samsung
Bancroft PLLC	American Association of Advertising Agencies; Ford; Verizon
Bartlit Beck Herman Palenchar & Scott LLP	Hewlett-Packard
Beck Bismonte & Finley LLP	SK hynix
Berger & Montague	American Antitrust Institute; Consumer Federation of America

Law Firm	Client(s) Represented
Bier Legal	Qualcomm
Bingham McCutchen LLP	Dolby Laboratories; Qualcomm
Blank Rome LLP*	Polycom
Boies, Schiller & Flexner LLP*	Apple; MediaTek
Bracewell & Giuliani LLP	Aruba Networks; Cisco; Hewlett-Packard; Ruckus; Safeway; SAS Institute
Bridges & Mavrakakis LLP	Apple
Brinks Gilson & Lione	FutureWei; Huawei; Microsoft; National Grange of the Order of Patrons of Husbandry; Nokia; Samsung; ZTE
Bryan Cave LLP*	Belkin; Commission Junction; FastClick; GN Netcom; Kyocera; MediaPlex; Mezimedia; Motorola; ValueClick; Web Clients
Cannata O'Toole Fickes & Almazan LLP	Reuters
Capshaw DeRieux LLP	Transition Networks
Carr & Ferrell LLP	HTC; S3G Graphics
Cetra Law Firm LLC	Apple
Cleary Gottlieb Steen & Hamilton LLP*	Broadcom
Cochran & Owen LLC	Commission Junction; FastClick; MediaPlex; Mezimedia; ValueClick; Web Clients
Colvin Hudnell LLP	Lotes
Computer Law Group LLP	Golden Bridge
Connolly Bove Lodge & Hutz LLP	ZTE
Consovoy McCarthy Park PLLC	Dolby Laboratories
Constantine Cannon LLP	American Antitrust Institute; National Consumers League
Cooley LLP*	Apple; Qualcomm
Covington & Burling LLP*	Apple; FutureWei; Hewlett-Packard; Hisense; Huawei; Nokia; Qualcomm; Samsung
Cravath Swaine & Moore LLP*	Qualcomm
Crone Hawxhurst LLP	Samsung
Crowell & Moring LLP*	Avaya; Ericsson; Samsung

Law Firm	Client(s) Represented
Cuneo, Gilbert & LaDuca LLP	The American Antitrust Institute
The Dacus Firm PC	Acer; Avaya; Belkin; D-Link; Dell; Gateway; Intel; Nokia; Toshiba
Dan Johnson Law Group	Foxconn; Hon Hai
The Davis Firm PC	Polycom
Day Casebeer Madrid and Batchelder	Qualcomm
Desmarais LLP	Intellisync; Nokia
Dewey & LeBouef LLP	Rambus
Dickstein Shapiro LLP	LG; NEC; Toshiba
Dillon & Gerardi	Qualcomm
Dinsmore & Shohl LLP	LG
DLA Piper LLP*	Cambridge Silicon Radio; Qualcomm; Samsung
Dorsey & Whitney LLP	Institute of Electrical and Electronics Engineers
Dovel & Luner	Network-1
Drinker Biddle & Reath LLP*	Institute of Electrical and Electronics Engineers; Microsoft; Oasis Open; The Open Group; PCI Industrial Computer Manufacturers
Duane Morris LLP*	Cisco
Dunlap Bennett & Ludwig PLLC	Avaya
Farella Braun & Martel LLP	Dell
Farnan LLP	TQ Delta
Fenwick & West LLP*	Intercede
Findlay Craft PC	Alcatel-Lucent; TCL
Finnegan Henderson Farabow Garrett & Dunner LLP	Axis Communications; Ericsson; Exedea; HTC; InterDigital; LG; Philips; Rambus; Realtek; Sony
Fisch Sigler LLP	Juniper Networks

Law Firm	Client(s) Represented
Fish & Richardson PC*	Apple; Arista Networks; Arris; AsusTek; Biostar; EliteGroup Computer Systems; EVGA; Galaxy Microsystems; GBt; Gigabyte Technology; Gracom Technology; Hewlett-Packard; Huawei; Jatou Technology; LG; MSI; Palit Microsystems; Pine Technology; Samsung; Sparkle Computer; Toshiba; ZOTAC
Foley & Lardner LLP*	Acer; Belkin; D-Link; Dell; Gateway; Intel; Qualcomm; Toshiba
Foster Murphy Altman & Nickel PC	Agere Systems; LSI; Sony
Fredrikson & Byron PA	Avery Dennison
Freeborn & Peters LLP	Samsung
Freitas & Weinberg LLP	Acer; Belkin; D-Link; Dell; Gateway; Intel; SK hynix; Toshiba
Gibson Dunn & Crutcher LLP*	Apple; AT&T; Cisco; Compal; Cricket; Dell; Ericsson; FIH; Hewlett-Packard; Hon Hai; Intel; Nokia; Pegatron; T-Mobile; Wistron
The Gikkas Law Firm	Lotes
Gillam & Smith LLP	Apple; Juniper Networks; Saint Lawrence Communications; Sony
Goldman Ismail Tomaselli Brennan & Baum LLP	Apple
Goodwin Procter LLP*	Qualcomm
Gordon & Rees LLP	Pantech; Samsung
Greenberg Traurig LLP*	LG; Rambus
HC Park & Associates	Pantech
Haltom & Doan	Hewlett-Packard
Harrigan Leyh Farmer & Thomsen LLP	Microsoft
Harris Beach PLLC	Haier

Law Firm	Client(s) Represented
Haynes & Boone LLP*	Altera; Belkin; Cisco; CME Group; Ericsson; Garmin; GN Netcom; Hewlett-Packard; Kyocera; Logitech; Motorola; Nest Labs; Netgear; Newegg; Rackspace Hosting; Safeway; Samsung; SAS Institute; Symantec; Wal-Mart; Xilinx
The Heartfield Law Firm	Hewlett-Packard
Heim Payne & Chorush LLP	Rembrandt Wireless Technologies
Hennigan Dorman LLP	Golden Bridge
Heyman Enerio Gattuso & Hirzel LLP	InterDigital
Hogan Lovells LLP*	Apple
Hunton & Williams LLP*	Lotes
Irell & Manella LLP	Broadcom; Research in Motion
Jones Day*	Freescale Semiconductor; Qualcomm
K&L Gates LLP*	Bluetooth SIG; Dell; STMicroelectronics; Wistron
Kaufman Dolowich & Voluck LLP	ZTE
Keker, Van Nest & Peters LLP	Acer; Arista Networks; Belkin; D-Link; Dell; Gateway; Intel; Netgear; T-Mobile; Toshiba
Kellogg Hansen Todd Figel & Frederick PLLC	Dell
Kerr Russell	Aruba Networks; Cisco; Hewlett-Packard; Linksys
Kilpatrick Townsend & Stockton LLP*	Agere Systems; Belkin; General Instrument; GN Netcom; Kyocera; LSI; Motorola; Samsung; Seagate Technology; SK hynix
King & Spalding LLP*	Alcatel-Lucent; Dolby Laboratories; IBM; L-3 Communications; Nokia
Kirby McInerney LLP	GIC Private Limited
Kirkland & Ellis LLP*	Acer; Andrew Corp.; Belkin; Cisco; D-Link; Dell; Gateway; Intel; Linksys; Motorola; Samsung; Toshiba
Klarquist Sparkman LLP	Amazon
Knobbe Martens Olson & Bear LLP	T-Mobile

Law Firm	Client(s) Represented
Kramer Levin Naftalis & Frankel LLP*	Lotes
Latham & Watkins LLP*	Apple; Honeywell; InterDigital; IPR Licensing; Saint Lawrence Communications
Littler Mendelson PC*	SK hynix
Locke Lord LLP*	Xtera
Lowenstein Sandler LLP	Aruba Networks; Cisco; Hewlett-Packard; Ruckus; Safeway; SAS Institute
Manatt, Phelps & Phillips LLP	Sceptre
Mann Tindel Thompson	Huawei; Metaswitch Networks
Mauriel Kapouytian Woods LLP	Apple
Mayer Brown LLP*	HTC; Marvell; Motorola; Samsung
The Mazingo Firm PC	3S-Smart Software Solutions GmbH
McAndrews, Held & Malloy Ltd	Broadcom; TQ Delta
McCarter & English	InterDigital; Qualcomm
McDermott Will & Emery LLP*	AMX; Analog Devices; Aruba Networks; Exede; Extreme Networks; Funai; Hewlett-Packard; HTC; Linear Technology; ZTE
McGuire Woods LLP*	Sony
McKenna Long & Aldridge LLP	Broadcom
McKool Smith PC	Ericsson; Golden Bridge; Optis Wireless Technology; Rambus; Rovi; T-Mobile; Wi-Fi One
Merchant & Gould	Transition Networks
Mintz Levin Cohn Ferris Glovsky & Popeo PC*	Graphics Properties Holdings
MoloLamken LLP	Ericsson
Morgan Franich Fedkin Siamas & Kays LLP	Qualcomm
Morgan, Lewis & Bockius LLP*	Dolby Laboratories; Foxconn; Hon Hai; Qualcomm
Morris James LLP	Extreme Networks; Hewlett-Packard; ZTE
Morris Nichols Arshnt & Tunnell LLP	AT&T; Cisco; Cricket; Linksys; Nokia; T-Mobile

Law Firm	Client(s) Represented
Morrison & Foerster LLP*	Apple; Hitachi; Huawei
Munger, Tolles & Olson LLP	Rambus
Nelson Bumgardner Albritton PC	Network-1
Newman Du Wors LLP	Microsoft
Nicoll Davis & Spinella	Institute of Electrical and Electronics Engineers
Nixon & Vanderhye PC	Toshiba
Nixon Peabody LLP*	Aruba Networks; Dell; Hewlett-Packard; Intel; Newegg; Sierra Wireless; Xilinx
Nolan Barton Bradford & Olmos LLP	Shin Nishibori
Norton Rose Fulbright US LLP*	Apple; Qualcomm
Ogletree Deakins Nash Smoak & Stewart PC*	Nokia
O'Melveny & Myers LLP *	Acer; Belkin; D-Link; Dell; Gateway; Intel; Samsung; SK hynix; Toshiba
Olavi Dunne LLP	Barnes & Noble
Orrick Herrington & Sutcliffe LLP*	Apple; Broadcom; Nanya Technology; NeXT; NVIDIA; Panasonic; SK hynix
Parker, Bunt & Ainsworth PC	Acer; Belkin; D-Link; Dell; Gateway; Intel; Toshiba
Paul Hastings LLP*	Aruba Networks; Hewlett-Packard; HTC; Rambus; T-Mobile
Pepper Hamilton LLP*	InterDigital; IPR Licensing
Perkins Coie LLP*	Broadcom; HTC; Intel; NVIDIA; Sony; T-Mobile
Pierce Bainbridge Beck Price & Hecht LLP	Samsung
Pillsbury Winthrop Shaw Pittman LLP*	Cambridge Silicon Radio; Samsung; ZTE
Potter Minton	Acer; Alcatel-Lucent, AMX; Belkin; D-Link; Dell; Gateway; GN Netcom; Huawei; Intel; KPN; Kyocera; Motorola; Samsung; T-Mobile; Toshiba
Procopio Cory Hargreaves Savitch LLP	Belkin; Cellco; GN Netcom; Kyocera; Motorola
Proskauer Rose LLP*	Panasonic; Philips; Zenith Electronics

Law Firm	Client(s) Represented
Quinn Emanuel Urquhart & Sullivan LLP*	Audio Partnership; Avery Dennison; Barnes & Noble; Broadcom; Cisco; Dell; Garmin; General Instrument; Google; MediaTek; Metaswitch Networks; Motorola; NVIDIA; Nokia; Oppo; Qualcomm; Samsung; SK hynix; Sony; Toshiba
Reed Smith LLP*	Acer; Belkin; D-Link; Dell; Gateway; Intel; Motorola; Netgear; Optis Wireless Technology; Realtek; Siemens; Toshiba
Reese LLP	Hoai Dang
Richards, Layton & Finger PA	ZTE
Rimon PC	Lotes
Robins Kaplan LLP	INVT SPE
Ropes & Gray LLP*	General Instrument; Huawei; Motorola; Nokia; Samsung; ZTE
Schiff Hardin LLP	NEC
Schnader Harrison Segal & Lewis LLP	Funambol
Shelton IP Law PC	Hewlett-Packard
Sheppard Mullin Richter & Hampton LLP*	HTC; Samsung; TCL; U-Blox AG
Shook Hardy & Bacon LLP*	Sprint
Sidley Austin LLP*	AsusTek; Association for Competitive Technology; Dell; Huawei; Microsoft; Motorola; Nokia; Rambus; Realtek; SK Hynix; T-Mobile; Tellabs; ZTE
Siebman Burg Phillips & Smith LLP	Bluetooth SIG; Huawei
Simpson Thacher & Bartlett LLP*	Hewlett-Packard
Singer Bea LLP	Samsung
Skadden Arps*	Rambus
Skiermont Derby LLP	3S-Smart Software Solutions GmbH
Smith, Katzenstein & Jenkins LLP	InterDigital
Squire Patton Boggs*	Honeywell; Samsung
Stepto & Johnson LLP*	General Instrument; IBM; Motorola; Samsung

Law Firm	Client(s) Represented
Sterne Kessler Goldstein & Fox	Adaptix
Stone & Magnanini	Broadcom
Stroock & Stroock & Lavan LLP	Sony
Summit Law Group	General Instrument; Motorola
Susman Godfrey LLP	KPN
Sutherland Asbill & Brennan LLP	3S-Smart Software Solutions GmbH
The Tailieu Law Firm LLP	Motorola
Taylor & Patchen LLP	Apple
TechKnowledge Law Group LLP	Nanya Technology
Tensegrity Law Group LLP	Apple; Arista Networks; NeXT; SK hynix
Troutman Sanders LLP*	Motorola
Valerian Law	Reuters
Vasquez Benisek & Lindgren LLP	Garretcom
Venable LLP*	Lockheed Martin
Vinson & Elkins LLP*	Kingston Technology; Lenovo
Walker Stevens Cannom Yang LLP	Rambus
Ward & Smith PA	KPN
Ward, Smith & Hill PLLC	Apple; KPN; Network-1; Saint Lawrence Communications
Weil, Gotshal & Manges LLP*	Apple; InterDigital; NeXT; Pegatron; SK hynix
White & Case LLP*	Google; HTC; Rackable Systems; Rambus; Red Hat; SAP America
Wiggin and Dana	Qualcomm
Williams & Connolly LLP*	Nokia; Samsung
Williams Morgan PC	Alcatel-Lucent
Wilmer Cutler Pickering Hale & Dorr LLP*	Alcatel-Lucent; Apple; Aruba Networks; Broadcom; Dell; Hewlett-Packard; Intel; Kaspersky Lab; Newegg; Rambus; SAS Institute; Sierra Wireless; Symmetry; T-Mobile; Toshiba; Vizio; Xilinx
Wilson Robertson & Cornelius PC	Hewlett-Packard
Wilson Sonsini Goodrich & Rosati PC*	Allied Telesis; Arista Networks; HTC; InterDigital; IPR Licensing

Law Firm	Client(s) Represented
Winston & Strawn LLP*	Dell; Ericsson; Exede; HTC; Motorola
Wolf Greenfield & Sacks PC	Sony
Wong Cabello Lutch Rutherford & Brucceleri LLP	Polycom
Yarbrough & Wilcox PLLC	Acer; Axis Communications; Belkin; D-Link; Dell; Gateway; Intel; Toshiba
Yarmuth Wilsdon PLLC	General Instrument; Motorola
Young Conaway Stargatt & Taylor LLP	Andrew Corp.; FutureWei; Huawei

Source: Bloomberg Law. Dataset on file with author.

Notes: To identify the law firms and represented clients listed in Table 1, I used the docket search function available on Bloomberg Law. To identify dockets for cases in which a law firm filed in the docket a document referencing patent holdup, I searched three keywords using Bloomberg Law's docket-search function: (1) "patent holdup," (2) "patent hold-up," and (3) "patent hold up." My search query generated a total of 513 search results (including both state and federal case dockets) as of November 2, 2018. I excluded state case dockets and focused only on federal case dockets. (The vast majority of search results were from federal case dockets; the search query generated only nine search results from state case dockets.) I also excluded PTAB dockets, because the vast majority of patent-holdup references found on PTAB case dockets were not readily attributable to any law firm. By clicking on each search result, I then used the "Next Keyword" function on Bloomberg Law to identify the specific document or documents containing a match to one or more of the keywords used in my search query. If any of the identified documents (1) alleged patent holdup, (2) discussed the risk of patent holdup, (3) cited to an academic article discussing the patent-holdup conjecture, or (4) contained some combination of those three, I then identify in Table I the law firm that filed the document and the client on whose behalf the document was filed. In some cases, the identified document containing the patent-holdup reference was a court order or opinion. In those situations, I identify all firms listed as parties on the case docket, because, presumably, all parties would be aware of the court's order or opinion. The dockets that I searched included cases involving patent infringement, antitrust claims, contract claims, and section 337 investigations at the ITC, among others. The table is current as of November 2, 2018.

* indicates a law firm that was listed on the *Am Law 100* in 2017; there are 69 such firms listed in Table 1.

In sum, there is no reason to assume that a negotiation for a license to an SEP portfolio involves "uncertainty" of the nature required in Williamson's holdup model.

C. *The Assumption of Opportunism*

Proponents of the patent-holdup conjecture assume that, once the infringer has made a relationship-specific investment, the SEP holder will, with certainty, act opportunistically toward the implementer by offering a royalty that exceeds the legitimately FRAND range. For example, Scott Morton testified before Congress that an SEP holder “[has] no reason” to “turn down . . . additional profits” from engaging in behavior that she regards to constitute patent holdup.⁹³ However, economists have rebutted that assertion by providing at least two cogent reasons why the SEP holder might find it to be in its greater self-interest to forgo opportunism and offer the implementer a genuinely FRAND royalty.⁹⁴

First, the recursive nature of developing and setting standards discourages opportunistic behavior by SEP holders. Again, learning occurs, knowledge accretes. Negotiating parties understand that other participants in the standardization process can punish, in future rounds, bad behavior occurring in the current round of negotiation—for example, by declining to incorporate the SEP holder’s technologies into a standard’s next generation or release. Given that recursive process, it is more reasonable to expect that the SEP holder will maximize its payoff over multiple periods by collaborating with the implementer, rather than by acting opportunistically against the implementer.⁹⁵

Second, it is not clear that the SEP holder’s expected profit from engaging in patent holdup will exceed its expected profit from entering into a license agreement on legitimately FRAND terms. Engaging in holdup could impose significant costs on the SEP holder. The failure to execute a license agreement will delay the SEP holder’s receipt of compensation for several years, and the need to enforce its SEPs through legal proceedings will require the SEP holder to incur litigation costs. The risk of facing possible antitrust liability (particularly outside the United States) further reduces the SEP holder’s incentives to engage in holdup by increasing the potential costs of such behavior, regardless of whether the antitrust theories in question make any sense as an economic matter.⁹⁶ The sum of those expected incremental costs

⁹³ Scott Morton Testimony, *supra* note 7, at 5.

⁹⁴ See, e.g., Epstein, Kieff & Spulber, *supra* note 56, at 20; J. Gregory Sidak, *Does the International Trade Commission Facilitate Patent Holdup?*, 1 CRITERION J. ON INNOVATION 601, 607–08, 614–15 (2016); J. Gregory Sidak, *The Meaning of FRAND, Part II: Injunctions*, 11 J. COMPETITION L. & ECON. 201, 231 (2015).

⁹⁵ See, e.g., Epstein, Kieff & Spulber, *supra* note 56, at 20; Einer Elhauge, *Do Patent Holdup and Royalty Stacking Lead to Systematically Excessive Royalties?*, 4 J. COMPETITION L. & ECON. 535, 548–49 (2008); Sidak, *The Meaning of FRAND, Part I: Royalties*, *supra* note 21, at 971; see also Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 11; Larouche & Schuett, *Repeated Interaction in Standard Setting*, *supra* note 21, at 4.

⁹⁶ See Sidak, *The Meaning of FRAND, Part II: Injunctions*, *supra* note 94, at 247–57; J. Gregory Sidak, *The Tempting of American Antitrust Law: An Open Letter to President Trump*, 2 CRITERION J. ON INNOVATION 201, 202–03 (2017).

of attempting to execute a strategy of patent holdup could exceed the SEP holder's expected incremental increase in royalty revenue from that strategy.

In sum, it is not reasonable to assume that an SEP holder always would expect greater profit from engaging in holdup than from accepting legitimately FRAND compensation for the licensing of its SEPs. It is therefore incorrect to assume that an SEP holder will systematically act opportunistically when negotiating license terms with an implementer. Scott Morton and Shapiro concede that “[m]any holders of SEPs do license at FRAND rates, perhaps due to concerns about reputation or retaliatory conduct by others in their industries.”⁹⁷ Yet, in their public statements, congressional testimony, and policy recommendations, these two leading proponents of the patent-holdup conjecture repeatedly assert that SEP holders will systematically engage in holdup.⁹⁸

Perhaps aware of the erroneous assumption of SEP holder opportunism underlying the patent-holdup conjecture, some proponents claim that patent holdup can occur even without Williamson's requirement of opportunism—the vividly described “self-interest seeking with guile.”⁹⁹ For example, Shapiro, in his 2007 article co-authored with Farrell and other CRA colleagues, said that the “pure economics [of holdup] are largely unaffected by whether or not guile is involved.”¹⁰⁰ Similarly, Scott Morton testified to Congress in 2016 that an SEP holder's exercise of its statutory right to request an exclusion order from the ITC under section 337 of the Tariff Act of 1930¹⁰¹ “allows [the] SEP owner[] to engage in anticompetitive holdup.”¹⁰² In her opinion, even the patent holder's mere “*threat* of an inappropriately granted exclusion order,” which Scott Morton defines as any exclusion order issued against an infringer that is neither judgment-proof nor outside the personal jurisdiction of a federal district court, “creates an *extortion-like* environment and forces

⁹⁷ Fiona M. Scott Morton & Carl Shapiro, *Strategic Patent Acquisitions*, 79 ANTITRUST L.J. 463, 473, 475 (2014).

⁹⁸ *Id.* at 490; Scott Morton Testimony, *supra* note 7, at 2–3, 5; Shapiro, Patent Holdup: Myth or Reality?, *supra* note 12, at 18.

⁹⁹ WILLIAMSON, THE ECONOMIC INSTITUTIONS OF CAPITALISM, *supra* note 40, at 47.

¹⁰⁰ Farrell, Hayes, Shapiro & Sullivan, *supra* note 4, at 604; *id.* (“Hold-up generally leads to economic inefficiency that contracting parties, and courts interpreting contracts, often try to avoid. ‘Bad’ behavior (such as deception) is not logically necessary for such inefficiency, but hold-up can powerfully reward deception and concealment.” (citing *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297, 310–14 (3d Cir. 2007))). *But see* WILLIAMSON, THE ECONOMIC INSTITUTIONS OF CAPITALISM, *supra* note 40, at 47 (defining opportunism as “self-interest seeking with guile”).

¹⁰¹ 19 U.S.C. § 1337(a)(1)(B).

¹⁰² Scott Morton Testimony, *supra* note 7, at 3. Scott Morton asserts: “For implementers that can be sued in Federal court for damages and reasonable royalties, the ITC is a duplicative venue.” *Id.* This statement is incorrect. Congress has given the patent holder several distinct remedies for infringement, only one of which is the right to seek a remedy from a federal court. *See* 35 U.S.C. § 281 (“A patentee shall have remedy by civil action for infringement of his patent.”). A second remedy is the right to petition the ITC to exclude from importation into the United States any product that infringes a U.S. patent. *See* 19 U.S.C. § 1337(a)(1)(B). Section 337(a)(1) of the Tariff Act of 1930 expressly provides that a violation of section 337 is “unlawful, and when found by the Commission to exist shall be dealt with, *in addition to any other provision of law*, as provided in this section [19 U.S.C. § 1337].” *Id.* § 1337(a)(1) (emphasis added).

implementers to pay more than the ex ante economic value of the patented technology.”¹⁰³ However, it is not opportunistic for an SEP holder to litigate a private cause of action created by a federal statute; to the contrary, litigating that private cause of action is the legitimate exercise of a legal right that Congress gave patent holders through its enactment of a public law. By definition, all economic actors have notice of the existence of a public law. It is published in *Statutes at Large*, if not also codified in the United State Code, as in the case of section 337. Therefore, an SEP holder’s mere request for an injunction or an exclusion order (let alone its mere threat to make such a request) supplies no basis upon which to assert or assume that the SEP holder is acting opportunistically. It is unsurprising and altogether proper for an SEP to avail itself of its statutory right to an exclusion order.

D. Summation

In sum, the theories presented by the proponents of the patent-holdup conjecture do not satisfy the requirements of Williamson’s theory of holdup. Shapiro’s definition of patent holdup violates at least two requirements of Williamson’s theory of holdup—opportunism and relationship-specific investment. Similarly, Scott Morton’s theory of patent holdup does not satisfy *any* of the three requirements of Williamson’s theory of holdup. In short, regardless of whatever Shapiro and Scott Morton might think they are describing, it is not an economic theory that flows from the insights that earned Williamson his Nobel Prize.

III. DOES EMPIRICAL EVIDENCE SUPPORT THE PATENT-HOLDUP CONJECTURE?

The patent-holdup conjecture lacks empirical support.¹⁰⁴ As early as 2008, Vincenzo Denicolò, Damien Geradin, Anne Layne-Farrar, and Jorge Padilla found that “proof of prevalent, recurring patent holdup . . . in high-tech industries [is] extremely weak.”¹⁰⁵ In 2013, Joshua Wright, then a commissioner of the Federal Trade Commission (FTC), observed that “empirical evidence of

¹⁰³ Scott Morton Testimony, *supra* note 7, at 3 (emphasis added).

¹⁰⁴ See, e.g., Alexander Galetovic, Stephen Haber & Ross Levine, *An Empirical Examination of Patent Hold-Up*, 11 J. COMPETITION L. & ECON. 549, 551 (2015) (“While an extensive theoretical literature examines the possibilities for SEP holdup, Damien Gerardin [sic], Anne Layne-Farrar, and Jorge Padilla, and Jonathan Barnett note that there is very little empirical evidence that SEP holdup actually occurs, and that such evidence as exists is inconclusive.” (citing Damien Geradin, Anne Layne-Farrar & Jorge A. Padilla, *Competing Away Market Power? An Economic Assessment of Ex Ante Auctions in Standard Setting*, 4 EUR. COMPETITION J. 443 (2008); Jonathan M. Barnett, *From Patent Thickets to Patent Networks: The Legal Infrastructure of the Digital Economy*, 55 JURIMETRICS J. 1 (2014))).

¹⁰⁵ Vincenzo Denicolò, Damien Geradin, Anne Layne-Farrar & A. Jorge Padilla, *Revisiting Injunctive Relief: Interpreting eBay in High-Tech Industries with Non-Practicing Patent Holders*, 4 J. COMPETITION L. & ECON. 571, 600 (2008).

patent hold-up is . . . unremarkable” and that, “[d]espite the amount of attention patent hold-up has drawn from policymakers and academics, there have been relatively few instances of litigated patent hold-up among the thousands of standards adopted.”¹⁰⁶ In a 2014 retrospective, Layne-Farrar concluded that “the empirical studies conducted thus far have not shown that holdup . . . is a common problem in practice.”¹⁰⁷ In November 2017, the Assistant Attorney General in the Antitrust Division of the U.S. Department of Justice, Makan Delrahim, similarly emphasized the “shaky empirical foundations for the possibility that unilateral hold-up in the standard-setting context will result in above-competitive royalty rates.”¹⁰⁸ Thus, many economists and some U.S. government officials have concluded that the patent-holdup conjecture lacks empirical substantiation.

Furthermore, economists who have empirically tested the predictions of the patent-holdup conjecture have found that their findings contradict those predictions.¹⁰⁹ For example, the proponents of the patent-holdup conjecture predict that holdup in SEP licensing would result in “higher prices, less product choice and less investment [in innovation].”¹¹⁰ However, in 2017, Alexander Galetovic and Stephen Haber found that, contrary to those predictions, between 1994 and 2013, products incorporating SEPs exhibited *higher* rates of innovation than did products that did not rely on SEPs.¹¹¹ They measured the rate of innovation by analyzing the relative rates of change in quality-adjusted prices and found that the rates of innovation for products that rely on SEPs significantly exceeded the economy-wide average.¹¹²

¹⁰⁶ Joshua D. Wright, Comm’r, Fed. Trade Comm’n, Remarks at the Center for the Protection of Intellectual Property Inaugural Academic Conference: The Commercial Function of Patents in Today’s Innovation Economy 20 (Sept. 12, 2013), https://www.ftc.gov/sites/default/files/documents/public_statements/ssos-frand-and-antitrust-lessons-economics-incomplete-contracts/130912cpip.pdf.

¹⁰⁷ ANNE LAYNE-FARRAR, PATENT HOLDUP AND ROYALTY STACKING: THEORY AND EVIDENCE: WHERE DO WE STAND AFTER 15 YEARS OF HISTORY? 2 (OECD 2014), [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/WD\(2014\)%2084&doclanguage=en](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/WD(2014)%2084&doclanguage=en).

¹⁰⁸ Makan Delrahim, Assistant Attorney Gen., U.S. Dep’t of Justice, Remarks as Prepared for Delivery at the USC Gould School of Law’s Center for Transnational Law and Business Conference—Application of Policy to Technology and IP Licensing: Take It to the Limit: Respecting Innovation Incentives in the Application of Antitrust Law 4 n.6 (Nov. 10, 2017) (citing Sidak, *The Antitrust Division’s Devaluation of Standard-Essential Patents*, *supra* note 6, at 61); *see also* Makan Delrahim, Assistant Attorney Gen., U.S. Dep’t of Justice, Remarks as Prepared for Delivery at the IAM’s Patent Licensing Conference: Antitrust Law and Patent Licensing in the New Wild West 2 (Sept. 18, 2018) [hereinafter Delrahim, *Antitrust Law and Patent Licensing in the New Wild West*] (“[T]he theory and evidence of unilateral ‘hold-up’ by patent-holders does not provide an adequate basis to condemn such conduct under the antitrust laws generally.”).

¹⁰⁹ *See, e.g.*, Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21.

¹¹⁰ Fiona M. Scott Morton, Deputy Assistant Attorney Gen. for Econ. Analysis, Antitrust Div., U.S. Dep’t of Justice, The Role of Standards in the Current Patent Wars 5 (Dec. 5, 2012), <https://www.justice.gov/atr/file/518961/download>; *see also* sources cited *supra* note 17.

¹¹¹ *See* Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 8; *see also* Galetovic, Haber & Levine, *supra* note 104, at 551–55; Daniel F. Spulber, *Standard Setting Organisations and Standard Essential Patents: Voting and Markets*, 128 ECON. J. (forthcoming 2018) (manuscript at 26) (“With a drastic innovation, the market outcome with SEPs generates greater social welfare than the alternative standard without SEPs.”).

¹¹² Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 7.

In addition, Galetovic and Haber found that “there was rapid entry of new firms[,] . . . so much so that industrial concentration, measured with the number of devices sold, actually fell in this industry over time.”¹¹³ Therefore, their empirical results contradict the predictions that patent holdup will result in higher quality-adjusted prices, fewer products, or less innovation.

As of November 2018, proponents of the patent-holdup conjecture have failed to reconcile their theory with the empirical evidence refuting it. Although Shapiro and other proponents purport to have responded to the empirical criticism of the patent-holdup conjecture, in fact they have ignored the vast majority of those substantive criticisms and have failed to explain why empirical evidence contradicts the predictions of the patent-holdup conjecture. For example, in response to John Golden’s thoughtful criticisms published in 2007,¹¹⁴ Lemley and Shapiro failed to provide any rigorous empirical analysis proving their claim that patent holders are overcompensated; instead, they simply asserted: “In our article, we offered several *theoretical* reasons to believe that judicial determinations of reasonable royalties *might* systematically overcompensate patent owners where multicomponent products are at issue.”¹¹⁵ Similarly, the attempts by Shapiro and other proponents to address the lack of affirmative empirical evidence supporting the patent-holdup conjecture, as well as their attempts to defend that conjecture in the face of contradictory empirical evidence, have been superficial, ineffective, and unpersuasive. In October 2015, for example, Shapiro said in response to my criticisms of the patent-holdup conjecture that I was ignoring the large body of empirical research supporting the general theory of holdup—which is to say, authentically Williamsonian holdup.¹¹⁶ That statement is incorrect. By October 2015, I had already published many substantive criticisms of the patent-holdup conjecture that Shapiro simply ignored.¹¹⁷

A. Have Proponents of the Patent-Holdup Conjecture Provided Empirical Evidence of Patent Holdup?

As of November 2018, none of the major proponents of the patent-holdup conjecture have provided a rigorous analysis demonstrating empirical support for the patent-holdup conjecture. For example, none of Shapiro’s scholarly

¹¹³ *Id.* at 8.

¹¹⁴ John M. Golden, “Patent Trolls” and Patent Remedies, 85 TEX. L. REV. 2111 (2007).

¹¹⁵ Mark A. Lemley & Carl Shapiro, *Reply: Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 2163, 2171 (2007) (emphasis added).

¹¹⁶ Shapiro, *Patent Holdup: Myth or Reality?*, *supra* note 12, at 24.

¹¹⁷ See, e.g., 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. 713 (2008); J. Gregory Sidak, *Patent Holdup and Oligopsonistic Collusion in Standard Setting Organizations*, 5 J. COMPETITION L. & ECON. 123 (2009); Sidak, *The Meaning of FRAND, Part I: Royalties*, *supra* note 21; Sidak, *The Meaning of FRAND, Part II: Injunctions*, *supra* note 94; Sidak, *The Antitrust Division’s Devaluation of Standard-Essential Patents*, *supra* note 6.

writings on the topic presents a single regression or other form of econometric analysis of a testable hypothesis, which is the quotidian stuff of any research assistant to an eminent professor of economics at a major research university in the United States—or, for that matter, of any junior analyst at an economic consulting firm that supports expert witnesses in commercial litigation. Shapiro's lack of empirical curiosity is striking, though consistent with the paucity of econometric analysis in his many scholarly writings on patent licensing since the 1980s.¹¹⁸

In this respect, Shapiro's analysis of the patent-holdup conjecture (and of patent licensing more generally) resembles the approach that he adopted when testifying in April 2018 as the expert economic witness for the Department of Justice in its failed challenge to the AT&T-Time Warner

¹¹⁸ Shapiro has authored or co-authored the following articles, book chapters, and books concerning patent licensing. Of the 31 pieces of scholarship below, I found only one article, from 1992, containing an econometric analysis of a testable hypothesis, which I note in a parenthetical. See Melamed & Shapiro, *supra* note 14; Stuart Graham, Peter Menell, Carl Shapiro & Tim Simcoe, *Final Report of the Berkeley Center for Law & Technology Patent Damages Workshop*, 25 TEX. INTELL. PROP. L.J. 115 (2017); Carl Shapiro, *Patent Remedies*, 106 AM. ECON. REV.: PAPERS & PROC. 198 (2016); Fiona Scott Morton & Carl Shapiro, *Patent Assertions: Are We Any Closer to Aligning Rewards to Contribution?*, in 16 INNOVATION POLICY AND THE ECONOMY 89 (William B. Kerr, Josh Lerner & Scott Stern eds., Univ. of Chicago Press 2016); Aaron Edlin, Scott Hemphill, Herbert Hovenkamp & Carl Shapiro, *The Actavis Inference: Theory and Practice*, 67 RUTGERS U. L. REV. 585 (2015); Scott Morton & Shapiro, *Strategic Patent Acquisitions*, *supra* note 97; Mark A. Lemley & Carl Shapiro, *A Simple Approach to Setting Reasonable Royalties for Standard-Essential Patents*, 28 BERKELEY TECH. L.J. 1135 (2013); Aaron Edlin, Scott Hemphill, Herbert Hovenkamp & Carl Shapiro, *Activating Actavis*, 28 ANTITRUST 16 (2013); Carl Shapiro, *Injunctions, Hold-Up, and Patent Royalties*, 12 AM. L. & ECON. REV. 280 (2010); Joseph Farrell & Carl Shapiro, *How Strong Are Weak Patents?*, 98 AM. ECON. REV. 1347 (2008); Carl Shapiro, *Patent Reform: Aligning Reward and Contribution*, in 8 INNOVATION POLICY AND THE ECONOMY 111 (Adam B. Jaffe, Josh Lerner & Scott Stern eds., Univ. of Chicago Press 2007); Farrell, Hayes, Shapiro & Sullivan, *supra* note 4; Lemley & Shapiro, *Patent Holdup and Royalty Stacking*, *supra* note 2; Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSP. 75 (2005); Carl Shapiro, *Patent System Reform: Economic Analysis and Critique*, 19 BERKELEY TECH. L.J. 1017 (2004); VARIAN, FARRELL & SHAPIRO, *supra* note 14; Joseph Farrell & Carl Shapiro, *Intellectual Property, Competition, and Information Technology* (Univ. of California, Berkeley Competition Pol'y Ctr. Working Paper No. CPC-0445, 2004); Carl Shapiro, *Antitrust Limits to Patent Settlements*, 34 RAND J. ECON. 391 (2003); Carl Shapiro, *Antitrust Analysis of Patent Settlements Between Rivals*, 17 ANTITRUST 70 (2003); Shapiro, *Technology Cross-Licensing Practices: FTC v. Intel (1999)*, *supra* note 3; Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in 1 INNOVATION POLICY AND THE ECONOMY 119 (Adam B. Jaffe, Josh Lerner & Scott Stern eds., Univ. of Chicago Press 2000); Carl Shapiro, *Setting Compatibility Standards: Cooperation or Collusion?*, in EXPANDING THE BOUNDARIES OF INTELLECTUAL PROPERTY: INNOVATION POLICY FOR THE KNOWLEDGE SOCIETY 81 (Rochelle Cooper Dreyfuss, Diane Leenheer Zimmerman & Harry First eds., Oxford Univ. Press 2001); Richard J. Gilbert & Carl Shapiro, *Unilateral Refusals to License Intellectual Property and International Competition Policy*, in COMPETITION AND TRADE POLICIES: COHERENCE OR CONFLICT 65 (Einar Hope & Per Maeleng eds., Routledge 1998); Richard Gilbert & Carl Shapiro, *Antitrust Issues in the Licensing of Intellectual Property: The Nine No-No's Meet the Nineties*, 1997 BROOKINGS PAPERS ON ECON. ACTIVITY: MICROECON. 283 (1997); Richard J. Gilbert & Carl Shapiro, *An Economic Analysis of Unilateral Refusals to License Intellectual Property*, 93 PROC. NAT'L ACAD. SCI. USA 12749 (1996); Joseph Farrell & Carl Shapiro, *Standard Setting in High-Definition Television*, 1992 BROOKINGS PAPERS ON ECON. ACTIVITY: MICROECON. 1, 55–56 (1992) (“To determine the role of network affiliation in determining when a station adopted color, we estimated a hazard rate model using data on adoption dates and network affiliation.”); Richard Gilbert & Carl Shapiro, *Optimal Patent Length and Breadth*, 21 RAND J. ECON. 106 (1990); Michael L. Katz & Carl Shapiro, *R&D Rivalry with Licensing or Imitation*, 77 AM. ECON. REV. 402 (1987); Michael L. Katz & Carl Shapiro, *How to License Intangible Property*, 101 Q.J. ECON. 567 (1986); Michael L. Katz & Carl Shapiro, *On the Licensing of Innovations*, 16 RAND J. ECON. 504 (1985); Carl Shapiro, *Patent Licensing and R&D Rivalry*, 75 AM. ECON. REV. 25 (1985).

merger, *United States v. AT&T Inc.*¹¹⁹ Shapiro used a Nash bargaining model to predict the merger's effects on the price of Turner television programming that AT&T would acquire in the merger and then would be offering to unaffiliated multichannel video programming distributors (MVPDs) that competed with AT&T's own MVPD business.¹²⁰ Shapiro testified that the merger would raise prices because AT&T could credibly threaten to deny an unaffiliated MVPD access to Turner programming indefinitely—an outcome called a permanent “blackout” of such content on the MVPD's platform.¹²¹

Judge Richard Leon disagreed. He found in his June 2018 order dismissing the case that “the inputs and assumptions of Professor Shapiro's model are not sufficiently grounded in the evidence—a fact that ‘undermine[s]’ my ‘confidence in the reliability and factual credibility’ of his projections.”¹²² A subsequent *amicus* brief of 37 economists and antitrust scholars urged the U.S. Court of Appeals for the D.C. Circuit to affirm Judge Leon's order and explained that Shapiro's bargaining model “assumes that a permanent blackout” by AT&T of Turner television content desired by unaffiliated MVPDs “would be the relevant and credible fallback outcome of a failure of the bargaining parties to reach an agreement. But there is no theoretical reason why that must be so, and there is no theoretical basis to reject an evidence-based conclusion to the contrary.”¹²³ Although Judge Leon's order dismissing *United States v. AT&T* was obviously not criticizing a model by Shapiro concerning the patent-holdup conjecture, the parallels to FRAND licensing disputes are obvious.¹²⁴ At a higher level of generality, Judge Leon's order certainly does criticize the methodological proclivity of an expert economic witness to use a theoretical economic model to opine on a real-world dispute

¹¹⁹ 310 F. Supp. 3d 161 (D.D.C. 2018), *appeal docketed*, No. 18-5214 (D.C. Cir. July 13, 2018); *see also* Expert Report of Carl Shapiro, *United States v. AT&T, Inc.*, No. 1:17-cv-02511 (D.D.C. Feb. 2, 2018) [hereinafter Shapiro Report (Redacted), *United States v. AT&T*], <https://www.justice.gov/atr/case-document/file/1081336/download>; Expert Rebuttal Report of Carl Shapiro, *United States v. AT&T, Inc.*, No. 1:17-cv-02511 (D.D.C. Feb. 26, 2018) [hereinafter Shapiro Rebuttal Report (Redacted), *United States v. AT&T*], <https://www.justice.gov/atr/case-document/file/1081321/download>.

¹²⁰ *United States v. AT&T*, 310 F. Supp. 3d at 223 n.35 (“Professor Shapiro's opinion incorporates the ‘key’ recognition that each side's bargaining leverage ‘is based on what would happen if there were no deal.’” (citing Trial Tr. 2193:16–18, Apr. 11, 2018)). Shapiro relied heavily on the credibility of threats made during bargaining. *See* Shapiro Report (Redacted), *United States v. AT&T*, *supra* note 119, at 41 & n.169, 42 & n.172; Shapiro Rebuttal Report (Redacted), *United States v. AT&T*, *supra* note 119, at 5 n.10, 41. Curiously, Shapiro cited, as the basis for his bargaining model of the merger's predicted competitive effects, Nobel laureate John Nash's 1950 article (John F. Nash, Jr., *The Bargaining Problem*, 18 *ECONOMETRICA* 155 (1950))—but not Nash's 1953 article (John Nash, *Two-Person Cooperative Games*, 21 *ECONOMETRICA* 128 (1953)), which, unlike the 1950 article, explicitly introduced threats into the bargaining game.

¹²¹ *United States v. AT&T*, 310 F. Supp. 3d at 223.

¹²² *Id.* at 226 (alteration in original) (citing *United States v. Anthem Inc.*, 855 F.3d 345, 363 (D.C. Cir. 2017)).

¹²³ Brief *Amici Curiae* of 37 Economists, Antitrust Scholars, and Former Government Antitrust Officials in Support of Appellees and Supporting Affirmance at 16, *United States v. AT&T, Inc.*, No. 18-5214 (D.C. Cir. Sept. 26, 2018), 2018 WL 4628092.

¹²⁴ When reviewing the award of a reasonable royalty for patent infringement, the Federal Circuit has found that “[t]he Nash [bargaining] theorem arrives at a result that follows from a certain set of premises” but “itself asserts nothing” about the real-world reliability of those premises. *VirnetX, Inc. v. Cisco Sys., Inc.*, 767 F.3d 1308, 1332 (Fed. Cir. 2014) (analyzing Nash, *The Bargaining Problem*, *supra* note 120).

without having laid the empirical foundation for that opinion. This particular methodological approach to proving critical economic assertions prompted Judge Leon to remark, “For starters, I couldn’t help but notice that the more and more questions were raised during the trial about the reliability of Professor Shapiro’s theory and model, the more the Government appeared to be minimizing the importance of his analysis.”¹²⁵

In their efforts to claim empirical support for the patent-holdup conjecture, some proponents of the patent-holdup conjecture have attempted to rely on the literature from transaction-cost economics. For example, in *Patent Holdup: Myth or Reality?*, Shapiro in 2015 referenced the hundreds of papers that proffer empirical support for the existence of Williamsonian holdup, which Shapiro then suggested also served as empirical support for his own patent-holdup conjecture.¹²⁶ However, as I explain in Part II, one cannot infer the patent-holdup conjecture from Williamson’s holdup theory. Consequently, the many papers that Shapiro cited as empirical support for Williamson’s holdup theory are simply not probative of whether patent holdup systematically occurs in practice.

In the same withdrawn paper from 2015, Shapiro also said that the lack of evidence of actual patent holdup is unsurprising, given that transaction-cost economics does not predict that holdup will systematically arise in practice.¹²⁷ Instead, he said, transaction-cost economics teaches that companies will adopt behavioral, structural, and contractual changes to avoid opportunism. In other words, holdup will rarely occur in practice because firms adopt mechanisms to mitigate that risk. Shapiro consequently made the breathtaking argument that one cannot evaluate the validity of the patent-holdup conjecture by seeking empirical evidence that holdup actually occurs.¹²⁸ Shapiro surely understands that bargaining theory teaches that only credible threats can influence the outcome of a commercial negotiation.¹²⁹ So, Shapiro’s argument that implementers rationally adapt to defend against the would-be opportunism of SEP holders raises some embarrassing questions for the patent-holdup conjecture. If implementers can readily adapt to defeat an

¹²⁵ *United States v. AT&T*, 310 F. Supp. 3d at 220. Steven Salop, a professor at Georgetown University Law Center and a Senior Consultant to CRA, tries to rescue Shapiro in Steven C. Salop, *The AT&T/Time Warner Merger: Judge Leon Garbled Professor Nash*, J. ANTITRUST ENFORCEMENT (forthcoming 2018). However, Salop defines away the problem by declining to analyze the empirical foundations of Shapiro’s model. Consequently, Salop has no basis to opine that Judge Leon was wrong in rejecting Shapiro’s particular application of a Nash bargaining model. See *id.*, manuscript at 2 (“Judge Leon also rejected the empirical inputs that were used by DOJ’s expert economist, Professor Carl Shapiro, in his quantitative analysis, though this article will not analyze these issues.”).

¹²⁶ Shapiro, *Patent Holdup: Myth or Reality?*, *supra* note 12, at 8.

¹²⁷ *Id.* at 5.

¹²⁸ *Id.* at 11.

¹²⁹ See, e.g., Nash, *Two-Person Cooperative Games*, *supra* note 120, at 130 (“Supposing *A* and *B* to be rational beings, it is essential for the success of the threat that *A* be compelled to carry out his threat *T* if *B* fails to comply. Otherwise it will have little meaning.”).

SEP holder's attempted opportunism, was the SEP holder's "threat" of patent holdup ever credible? If, indeed, the threat of holdup was never credible, why should we give any evidentiary weight—in economic theory, economic policy, or litigation—to the dire narratives that, by Shapiro's own logic, would seem to resolve inexorably again and again to the same happy ending in which SEP holders make only noncredible threats of patent holdup? And why, exactly, in Shapiro's narrative do rational SEP holders persist in making futile threats of patent holdup that everyone knows are transparently devoid of credibility?

Three years later, in his 2018 article with Melamed, Shapiro presents a different argument, yet he still fails to provide empirical support for the patent-holdup conjecture. Melamed and Shapiro assert: "Economic theory predicts that SEP holders will exploit their positions, and both anecdotal evidence and litigated cases suggest that they have done so."¹³⁰ This claim is at once ambiguous and underwhelming. Melamed and Shapiro suddenly introduce the phrase "exploit their positions" as a vague stand-in to saying directly, "engage in patent holdup." Moreover, they assert that "anecdotal evidence" (which they never explain) and "litigated cases" merely "suggest" the existence of supposedly exploitative behavior by SEPs (which, given the ambiguous choice of language by Melamed and Shapiro, might or might not include charging a royalty that exceeds the ceiling of the range of legitimately FRAND royalties).

Another distinguished economist has also purported to rely on "litigated cases" in finding empirical evidence for the patent-holdup conjecture. Nancy Rose—an economics professor at MIT, on leave at the time and serving as the Deputy Assistant Attorney General for Economic Analysis in the Antitrust Division—delivered a keynote address at a conference on patent law at George Washington University on November 5, 2015, one month after Shapiro's address to the IEEE-SIIT.¹³¹ For a PowerPoint slide entitled, "Have Institutions Eliminated Holdup?," Rose writes: "Anecdotal evidence from court decisions: patentees often demand royalties well in excess of RAND."¹³² Under these headings are three bar graphs comparing the court-determined FRAND royalty to the FRAND royalty that the SEP holder had initially offered the implementer in *Microsoft v. Motorola*, *In re IP Innovatio Ventures*,

¹³⁰ Melamed & Shapiro, *supra* note 14, at 2117 (citing *Microsoft Corp. v. Motorola Inc.*, 795 F.3d 1024 (9th Cir. 2015); *Ericsson Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201 (Fed. Cir. 2014); *In re Innovatio IP Ventures, LLC Patent Litig.*, No. 11 C 9308, 2013 WL 5593609 (N.D. Ill. Oct. 3, 2013)).

¹³¹ Nancy Rose, Deputy Assistant Attorney General for Economic Analysis, Antitrust Division, U.S. Department of Justice, Presentation at the Patents in Telecoms Conference: An Economist's Perspective on Holdup (Nov. 5–6, 2015) [hereinafter Rose Presentation], <https://www.scribd.com/presentation/319854262/Rose-Nov5-Patents-in-Telecoms>. Curiously, Rose's presentation is not archived among the speeches of former Deputy Assistant Attorneys General for the Antitrust Division. See *Speeches by the Former Assistant and Deputy Assistant Attorneys General*, U.S. DEP'T OF JUSTICE, ANTITRUST DIV., <https://www.justice.gov/atr/speeches-former-assistant-and-deputy-assistant-attorneys-general> (last updated Aug. 16, 2018).

¹³² Rose Presentation, *supra* note 131, at 13.

and *Realtek v. LSI*, which in all three cases exceeded the court-determined FRAND royalty.¹³³ Rose’s observation of the large gap between the SEP holder’s initial royalty offer and the court-determined royalty in these litigated cases is unremarkable when one recognizes that FRAND constitutes a range of royalties, rather than a single point.¹³⁴ It is conceivable that the FRAND royalty range for a given license for SEPs can be quite large, particularly in highly contentious cases that result in litigation, with the SEP holder bargaining for a royalty at the upper bound of the range and the implementer bargaining for a royalty at the lower bound of the range. One cannot merely assume that, if such a gap exists, the SEP holder necessarily attempted to hold up the implementer.¹³⁵

When one turns to the four litigated cases that Melamed, Shapiro, and Rose claim are evidence “suggest[ing]” that SEP holders systematically engage in patent holdup, the facts are otherwise. In the first case that Melamed and Shapiro cite, *Ericsson v. D-Link*, the Federal Circuit considered whether the district court had erred in failing to instruct the jury to account for the risk of patent holdup and royalty stacking when calculating a FRAND royalty.¹³⁶ The Federal Circuit found that the district court had not erred, because, “[i]n deciding whether to instruct the jury on patent hold-up . . . , the district court must consider the evidence on the record before it.”¹³⁷ The Federal Circuit agreed with the district court’s finding that the infringer “failed to provide evidence of patent-holdup and royalty stacking sufficient to warrant a jury instruction.”¹³⁸ It emphasized that “[c]ertainly something more than a general argument that these phenomena are possibilities is necessary.”¹³⁹ Thus, the reasoning in *Ericsson v. D-Link* contradicts rather than support the

¹³³ *Id.*

¹³⁴ J. Gregory Sidak, *Is a FRAND Royalty a Point or a Range?*, 2 CRITERION J. ON INNOVATION 401 (2017).

¹³⁵ Judge James Robart did define a range of RAND royalties in *Microsoft v. Motorola*. Microsoft Corp. v. Motorola, Inc., No. C10-1823, 2013 WL 2111217, at *4 (W.D. Wash. Apr. 25, 2013) (Robart, J.) (defining the RAND ranges for Motorola’s H.264 SEP portfolio and 802.11 SEP portfolio). However, as I have explained elsewhere, there are reasons to believe that Judge Robart did not *correctly* identify the RAND range for Motorola’s SEP portfolios. See Sidak, *The Meaning of FRAND, Part I: Royalties*, *supra* note 21, at 968 (“Judge Robart’s analysis is wrong. Its implicit economic assumptions consistently bias the estimate of the FRAND royalty in favor of the infringer.”).

¹³⁶ *Ericsson Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1233 (Fed. Cir. 2014) (“D-Link argues that the jury should have been instructed on the concepts of patent hold-up and royalty stacking because it argues that the jury should know the mischief that can occur if RAND royalty rates are set too high. Many of the amicus briefs echo D-Link’s concerns.”).

¹³⁷ *Id.* at 1234.

¹³⁸ *Id.* (citing *Ericsson Inc. v. D-Link Sys., Inc.*, No. 6:10-cv-00473, 2013 WL 4046225, at *25–26 (E.D. Tex. Aug. 6, 2013)).

¹³⁹ *Id.*; see also *Ericsson Inc. v. TCL Comm’n Tech. Holdings, Ltd.*, No. 2:15-cv-00011-RSP, 2018 WL 2149736, at *5 (E.D. Tex. May 10, 2018) (“Though this case did not deal with a patent declared essential to an industry standard, the Federal Circuit’s point [in *Ericsson v. D-Link*] applies equally to testimony about unidentified patents that potentially cover the accused devices and the royalties those patents might demand. Indeed, Federal Circuit precedent suggests that TCL’s theory about features covered by other unidentified patents would be unreliable opinion without actual evidence of royalty stacking.”), *appeal docketed*, No. 18-2003 (Fed. Cir. May 24, 2018).

thesis of Melamed and Shapiro that SEP holders systematically engage in opportunistic behavior.

In *Innovatio*—the second case that Melamed, Shapiro, and Rose cite—Judge James Holderman calculated a FRAND royalty for Innovatio’s SEPs while accounting for the *possibility* of patent holdup.¹⁴⁰ Judge Holderman never found that Innovatio had, in fact, engaged in patent holdup. Thus, the reference by Melamed, Shapiro, and Rose to *Innovatio* at best is ambiguous empirical evidence that patent holdup might have occurred in this particular case, but it certainly is not evidence that patent holdup commonly occurs.

In the third case that Melamed, Shapiro, and Rose cite as evidence that patent holdup exists, *Microsoft v. Motorola*, the Ninth Circuit affirmed¹⁴¹ Judge James Robart’s finding that the SEP holder, Motorola, had violated its FRAND commitment by, among other things, failing to offer to license its SEPs to Microsoft in exchange for a FRAND royalty.¹⁴² Similarly, in *Realtek v. LSI*—the fourth case, which Rose cites but Melamed and Shapiro do not cite—Judge Ronald Whyte held that LSI violated its contractual obligation to offer the alleged infringer a license on RAND terms.¹⁴³ However, these two cases in which a court found that an SEP holder violated its FRAND obligation certainly do not constitute empirical evidence of a *systematic* patent-holdup problem any more than *Innovatio* does. Moreover, in both *Microsoft v. Motorola* and *Realtek v. LSI* the implementer successfully defeated the SEP holder’s alleged attempt at holdup, by means of a breach-of-contract claim brought in federal court. Evidence that attempts by SEP holders to engage in patent holdup have failed is not equivalent to affirmative evidence that patent holdup is routinely a successful strategy for SEP holders.

In fact, during Judge Robart’s 2012 trial in *Microsoft v. Motorola*, Microsoft’s expert economic witness, Kevin Murphy of the University of Chicago, invoked the patent-holdup conjecture.¹⁴⁴ Yet, on cross examination, Murphy could not identify a single real-world instance of the phenomenon, but instead merely speculated about the “possibility” of patent holdup if the SEP holder sought an injunction:

¹⁴⁰ *In re Innovatio IP Ventures, LLC Patent Litig.*, No. 11 C 9308, 2013 WL 5593609, at *9 (N.D. Ill. Oct. 3, 2013).

¹⁴¹ *Microsoft Corp. v. Motorola Inc.*, 795 F.3d 1024, 1057 (9th Cir. 2015).

¹⁴² *Id.* at 1053 (“The fact that Motorola’s patents were of minor import to the H.264 standard, for example, was evidence from which the jury could infer that demanding a 2.25% royalty rate was not a good-faith effort to realize the value of the technology, but rather an attempt to capitalize on the value of the standard itself—that is, to obtain the hold-up value.”).

¹⁴³ *Realtek Semiconductor Corp. v. LSI Corp.*, 946 F. Supp. 2d 998, 1008 (N.D. Cal. 2013).

¹⁴⁴ At the time of his testimony, Murphy was affiliated with Navigant Consulting, Inc.; however, Charles River Associates had already announced that Murphy would soon move his consulting practice from Navigant to CRA. See Press Release, Charles River Associates, Renowned Economist Kevin M. Murphy to Become Senior Consultant to the Antitrust & Competition Economics Practice at Charles River Associates (CRA) (June 22, 2012), <https://www.businesswire.com/news/home/20120622005049/en/Renowned-Economist-Kevin-M.-Murphy-Senior-Consultant>; Press Release, Charles River Associates, Charles River Associates (CRA) Welcomes 40-Person Litigation Consulting Team, Accelerates Start Date

Q: Sir, do you have any specific evidence that any of Motorola's licenses were the product of hold-up?

A: Again, I know we are not supposed to mention names. There is one where there was—there was an injunction sought. An injunction in an ex post environment by its very nature involves an element of hold-up, because an injunction would deny you the right not just to the patent in question but to the standard. Things that involve injunctions inherently bring hold-up into the equation.

Q: You are aware that that company that we are talking about had an earlier license from 2003, correct?

A: Yes. But once you are in an ex post environment there is definitely the possibility of hold-up.¹⁴⁵

Murphy did not explain, among other things, why an SEP holder's low likelihood of receiving an injunction after the Supreme Court's decision six years earlier in *eBay* would still suffice to empower the SEP holder to threaten an implementer credibly with patent holdup.¹⁴⁶

of Previously Announced Key Senior Hires Including Kevin M. Murphy, Mark E. Zmijewski, Robert H. Topel, and Nicholas J. Weir (Jan. 31, 2013), <https://www.businesswire.com/news/home/20130131006749/en/Charles-River-Associates-CRA-Welcomes-40-Person-Litigation>.

Murphy previously was a principal at Chicago Partners, LLC. See, e.g., Rebuttal Report of Kevin M. Murphy on behalf of National Music Publishers' Association, Inc., the Songwriters Guild of America and the Nashville Songwriters Association International at 2 ¶ 6, In the Matter of Mechanical and Digital Phonorecord Delivery Rate Adjustment Proceeding, Dkt. No. 2006-3 CRB DPRA, Copyright Royalty Judges, Library of Congress (filed Apr. 3, 2008), <https://www.crb.gov/proceedings/2006-3/copyright-owners/kevin-murphy-rebuttal-statement-related-exhibits.pdf>. Navigant purchased Chicago Partners in 2008 for \$73 million in cash and stock. See Press Release, Navigant Consulting, Inc., Navigant Consulting Acquires Chicago Partners, Adds World-Class Economic and Financial Analysis Expertise to Navigant's Global Dispute and Business Consulting Platform (May 1, 2008), <https://www.businesswire.com/news/home/20080501005989/en/Navigant-Consulting-Acquires-Chicago-Partners>. Murphy was one of six "Members" of Chicago Partners whose signature was required on the acquisition agreement. See Purchase and Sale Agreement by and Among Navigant Consulting, Inc., Chicago Partners, L.L.C., and the Members Listed on the Signature Pages Hereto, Dated as of April 18, 2008, in Navigant Consulting, Inc., Current Report (SEC Form 8-K), Exhibit 2.1 (filed Apr. 24, 2008). According to section 3.1 of the purchase and sale agreement, "The Members own membership interests representing greater than 80% of the issued and outstanding limited liability company interests in the Company." *Id.* at 16.

¹⁴⁵ November 13, 2012 Verbatim Report of Proceedings at 182:13–25, *Microsoft Corp. v. Motorola, Inc.*, No. C10-1823, 2013 WL 2111217 (W.D. Wash. Apr. 25, 2013) (Robart, J.), ECF No. 629 (testimony of Kevin M. Murphy) [hereinafter Kevin Murphy Testimony].

¹⁴⁶ See *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006).

It appears that Murphy, although a prolific and respected scholar, has never written any articles about the FRAND or RAND obligation, SEPs, the patent-holdup conjecture, or the royalty-stacking conjecture. On cross-examination during Judge Robart's trial in *Microsoft v. Motorola*, Murphy testified:

Q. But prior to this case, you had never published any articles about RAND, correct?

A. No, I don't think that I have, no.

Kevin Murphy Testimony, *supra* note 145, at 164:20–22. Various lists of Murphy's publications and working papers also do not identify any writings on these topics before or since 2012. See *Kevin*

Furthermore, even if one agrees that the respective breaches by Motorola and LSI of their FRAND commitments equate to attempts to engage in patent holdup (which, as I explain below in Part III.C, is a proposition with which I disagree), the Ninth Circuit's decision in *Microsoft v. Motorola* and the Northern District of California's decision in *Realtek v. LSI* reinforce the insight (which Shapiro conceded in 2015) that implementers can readily adapt to defeat an SEP holder's attempt at opportunism. Motorola and LSI lost. Microsoft and Realtek successfully petitioned a federal district court to enforce an SEP holder's contractual obligations arising from its FRAND commitment. Melamed, Shapiro, and Rose do not explain why, given the implementer's demonstrated ability to defeat what Melamed and Shapiro consider an attempt at patent holdup by an SEP holder, a crisis looms requiring the curtailment of the SEP holder's patent rights and the increased intervention into SEP licensing practices by the world's antitrust enforcement agencies, including the FTC and the Antitrust Division. The factual evidence to date better supports the conclusion that contract law is up to the task than the conclusion that it is deficient.¹⁴⁷

B. How Have Proponents of the Patent-Holdup Conjecture Responded to Empirical Criticism?

In a section titled "Addressing the Patent Holdup Skeptics" in their 2018 article, Melamed and Shapiro purport to respond to the substantial body of criticism against the patent-holdup conjecture. However, in doing so, they continue to ignore the vast majority of the scholarly literature critical of the patent-holdup conjecture.

M. Murphy—Working Papers, CHI. BOOTH, <https://www.chicagobooth.edu/faculty/directory/m/kevin-m-murphy#awards>; *Kevin M. Murphy—Publications*, CHI. BOOTH, <https://www.chicagobooth.edu/faculty/directory/m/kevin-m-murphy#awards|BoothTab2>; *Kevin M. Murphy*, SSRN, https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=101802. Murphy faced a similar line of cross examination ten years earlier in the Microsoft antitrust litigation. See Nicholas Kulish, *Microsoft's Economics Expert Was Paid Company Consultant*, WALL ST. J., Apr. 18, 2002 ("Steven Kuney, an attorney for the states, showed the court excerpts of Mr. Murphy's academic work partially funded by Microsoft. . . . Mr. Murphy agreed with Mr. Kuney's characterization that his private consulting firm, Chicago Partners, had worked for Microsoft 'for about five years,' and that he had never written on the software industry before that time. A paid relationship with expert witnesses isn't uncommon, but Mr. Kuney emphasized that Mr. Murphy's specialty had been labor economics before he began his work for Microsoft.")

¹⁴⁷ See J. Gregory Sidak, *The FRAND Contract*, 3 CRITERION J. ON INNOVATION 1 (2018). This insight also comports with Joskow's famous study of coal contracts, in which he found that coal suppliers and electric utilities contracted around the possibility of holdup. See Joskow, *supra* note 54. It bears emphasis that contracts—such as the FRAND commitment—are not evidence of patent holdup. If holdup were a real threat, in the absence of contracting, one would expect to observe vertical integration, which, as I explain in Part IV, is not prevalent in SEP-related industries when contracts have failed. Moreover, without further study, Joskow's insights cannot be automatically applied to SEP licensing as proof that holdup will occur, for significant differences exist between the coal industry and SEP-related industries, such as the number of reasonable substitutes and the rate of innovation.

Melamed and Shapiro cite only two academic articles that criticize the patent-holdup conjecture.¹⁴⁸ Conversely, in an article that I published in 2015, I identified 21 academic articles from more than two dozen economists and lawyers that had disproved or disputed various assumptions and predictions of the patent-holdup conjecture.¹⁴⁹ Since the publication of that article, many more articles refuting the patent-holdup conjecture have appeared in the scholarly literature.¹⁵⁰ Thus, the attempt by Melamed and Shapiro to respond to the “patent holdup skeptics” fails at the outset because it ignores the majority of criticism that others have leveled at the patent-holdup conjecture.

Even the responses of Melamed and Shapiro to the select criticism that they choose to acknowledge fail to defend the patent-holdup conjecture. For example, in response to the empirical refutation of the patent-holdup conjecture that Galetovic, Haber, and Ross Levine offer, Melamed and Shapiro argue:

The basic shortcoming of these studies is that they do not offer a sensible but-for world in the absence of opportunism as a comparator by which to assess observed behavior. For example, noting that cell phone technology has advanced rapidly in recent years does not prove a lack of costly opportunism by the owners of SEPs for the thousands of technologies included in cell phones.¹⁵¹

So, for Melamed and Shapiro, the fact that there are one billion more mobile devices in use than there are human beings on Earth could actually be evidence of market failure if these scholars could construct a rosier counterfactual ostensibly resulting from a different legal regime in which holders of SEPs for mobile devices received lower royalties.¹⁵² To borrow a cherished cliché in Washington, Melamed and Shapiro would make the perfect the enemy of the good. Implicit in their criticism of Galetovic, Haber, and Levine is the assumption that Melamed and Shapiro can divine the counterfactual world—a gift that one Nobel laureate in literature famously doubted anyone can possess:

¹⁴⁸ Melamed & Shapiro, *supra* note 14, at 2117 n.21 (citing Galetovic, Haber & Levine, *supra* note 104); *id.* at 2120 n.27 (citing 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 (2017)).

¹⁴⁹ Sidak, *The Antitrust Division’s Devaluation of Standard-Essential Patents*, *supra* note 6, at 61–62 n.49.

¹⁵⁰ See, e.g., Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21; Jonathan M. Barnett, *Has the Academy Led Patent Law Astray?*, 32 BERKELEY TECH. L.J. 1313 (2017).

¹⁵¹ Melamed & Shapiro, *supra* note 14, at 2117 (citing Galetovic, Haber & Levine, *supra* note 104, at 549, 552 & n.6, 564–70).

¹⁵² According to GSMA Intelligence, as of November 2018, the number of mobile connections exceeds 8.9 billion. *Global Data*, GSMA INTELLIGENCE, <https://www.gsmainelligence.com/>. As of November 2018, the world population exceeds 7.6 billion. *Current World Population*, WORLDOMETERS, <http://www.worldometers.info/world-population/>.

What might have been is an abstraction
 Remaining a perpetual possibility
 Only in a world of speculation.¹⁵³

What if, in the world of speculation that Melamed and Shapiro inhabit, the counterfactual state of affairs delivered something worse than what the real world has already dealt the rest of us? To compare a real-world market outcome with “what would have happened” if government had flawlessly intervened in a way that Melamed and Shapiro might prefer is to ignore the law of unintended consequences and to fall prey to what Harold Demsetz has called the “nirvana fallacy.”¹⁵⁴ By what standard of proof should one judge the plausibility of the supposedly brighter world that never was?

Granted, evidence presented by Galetovic, Haber, and Levine does not show that an SEP holder has never engaged in opportunistic behavior when licensing its SEPs. However, Melamed and Shapiro ignore the salient implications of these empirical refutations. They fail to recognize that the absence of evidence that SEP holders *do* systematically engage in patent holdup, coupled with the evidence that an industry that extensively relies on SEPs has a higher rate of innovation than other industries, undermines the plausibility of the patent-holdup conjecture. On the basis of the available evidence, and in the absence of evidence substantiating the patent-holdup conjecture, it is more reasonable than not to infer that patent holdup does not systematically occur in practice. Indeed, the essential task of any theoretical model is to generate testable hypotheses. If those hypotheses are empirically rejected, of what use is the theory?

After failing to rebut the empirical evidence contradicting the predictions of the patent-holdup conjecture, Melamed and Shapiro then pivot in their 2018 article to levying their own criticisms of the related yet separate issue of patent holdout, which describes opportunism on the side of the implementer that is attempting to avoid royalty payments for its infringement of SEPs or to pay a royalty that is below the legitimate floor of the FRAND range.¹⁵⁵ Melamed and Shapiro attempt to refute three separate arguments:

¹⁵³ T.S. ELIOT, *Burnt Norton*, in *COLLECTED POEMS 1909–1935*, at 183 (Faber & Faber Ltd. 1936).

¹⁵⁴ See Harold Demsetz, *Information and Efficiency: Another Viewpoint*, 12 J.L. & ECON. 1 (1969); see also J. Gregory Sidak, *How Commissioner Vestager’s Mistaken Views on Standard-Essential Patents Illustrate Why President Trump Needs a Unified Policy on Antitrust and Innovation*, 1 CRITERION J. ON INNOVATION 721, 726–27 (2016). Although I criticize Nancy Rose’s adherence to the patent-holdup conjecture, see *supra* text accompanying notes 131–135 and *infra* text accompanying notes 179–208, to her credit she, unlike other adherents of the patent-holdup conjecture, readily acknowledges the nirvana fallacy, which she addressed in the context of airline deregulation: “The policy trade-off is not between imperfect markets and perfect regulation, but choosing which flaws—market or regulatory—are less costly. In many cases, the imperfectly competitive market is far superior to inherently imperfect regulation. This conclusion, while familiar to students of economic regulation, is far too often neglected in discussions that presume one simply needs ‘better regulation’ or ‘better-intentioned’ regulators to correct a given market failure.” Nancy L. Rose, *After Airline Deregulation and Alfred Kahn*, 102 AM. ECON. REV. 376, 378 (2012).

¹⁵⁵ Melamed & Shapiro, *supra* note 14, at 2117.

(1) that efforts to prevent an SEP holder's *ex post* opportunism will result in under-compensation of SEP holders;¹⁵⁶ (2) that SEP holders can also be locked in to a technology due to the R&D costs associated with developing that technology, and thus SEP holders are also vulnerable to opportunism;¹⁵⁷ and (3) that patent holdout is "a more serious problem" than patent holdup.¹⁵⁸

I disagree with Melamed's and Shapiro's attempted refutations of arguments regarding the SEP holder's need to protect against an implementer's opportunism in negotiating a license for the use of the holder's SEPs. Contrary to the view of Melamed and Shapiro, implementers have been found to engage in opportunism during license negotiations for the use of SEPs.¹⁵⁹ However, even if one accepts their contention that SEP holders are not harmed by patent holdout or other forms of opportunism by implementers (which I do not), that contention still offers no empirical support for the patent-holdup conjecture. Even if there were an absence of factual evidence or *a priori* arguments that implementers systematically engage in patent holdout or other forms of opportunism, it still would not follow logically that SEP holders systematically engage in patent holdup.

In sum, as of November 2018, the proponents of the patent-holdup conjecture have failed to explain why courts, regulators, administrative agencies, and arbitrators should assume as an evidentiary matter that SEP holders systematically engage in patent holdup, given the absence of any empirical evidence to that effect.

C. Arguments That Proponents of the Patent-Holdup Conjecture Ignore

In the patent-holdup conjecture, a tacit but necessary implication is that a royalty for an SEP that exceeds the range of legitimately FRAND rates contains an increment of holdup value and is thus evidence that patent holdup has occurred. However, to describe the FRAND range (as a theoretical rather than computational matter), courts have invoked the concept of the *ex ante* incremental value of the patented technology.¹⁶⁰ Yet, that methodology artificially suppresses the ceiling of the FRAND range for multiple reasons. Determining a royalty for a technology chosen for inclusion in

¹⁵⁶ *Id.* at 2118.

¹⁵⁷ *Id.*

¹⁵⁸ *Id.* at 2120.

¹⁵⁹ See, e.g., Certain 3G Mobile Handsets and Components Thereof, Inv. No. 337-TA-613, 2015 WL 6561709, at *26 (USITC Apr. 27, 2015) (Initial Determination on Remand) ("There is however, one course of action that can clearly demonstrate bad faith, and that is a failure to meaningfully negotiate. . . . Other evidence that supports the finding of reverse holdup is the clear gain that occurs daily for MMO [respondents Microsoft Mobile Oy and Nokia, Inc.].").

¹⁶⁰ See, e.g., Microsoft Corp. v. Motorola, Inc., No. C10-1823]LR, 2013 WL 2111217, at *13 (W.D. Wash. Apr. 25, 2013) (Robart, J.) ("[E]x ante examination of the incremental contribution of the patented technology to the standard can be helpful in determining a RAND rate in the context of a dispute over a RAND royalty rate.").

the standard on the basis of that technology's incremental value over the next-best alternative would be the equivalent of modeling competition between technologies as a static Bertrand pricing game without capacity constraints.¹⁶¹ I extensively critique this *ex ante* incremental value thesis in *The Meaning of FRAND, Part I: Royalties*.¹⁶² It is odd that Melamed and Shapiro, in purporting to respond to the critics of the patent-holdup conjecture, completely ignore the flaws that I identified in 2013 in the patent-holdup conjecture's particular definition of, and reliance on, the *ex ante* incremental value of a patented invention. Melamed gave me detailed comments on a draft of my 2013 article and accordingly received my acknowledgment in the introductory footnote.¹⁶³ Furthermore, Shapiro was in the audience at the Toulouse School of Economics in May 2013 when I presented a draft of the article at a conference on SEPs that Jean Tirole had organized.

I review in the following sections the relevant points from the *The Meaning of FRAND, Part I: Royalties*, as well as from a related article published in 2016, *Tournaments and FRAND Royalties*,¹⁶⁴ that Melamed and Shapiro ignore in their 2018 response to critics of the patent-holdup conjecture. Those un rebutted criticisms explain why the implicit economic assumptions of the *ex ante* incremental value thesis—as that methodology has been explained at a theoretical level by proponents of the patent-holdup conjecture—consistently bias the estimate of the FRAND royalty in favor of the infringer.

I. *The Inapplicability to Standard Setting of a Static Bertrand Pricing Game Without Capacity Constraints*

According to the *ex ante* incremental value thesis, if two inventors each develop a similar substitute technology, and the two technologies would generate an equal amount of value to a manufacturer, then the manufacturer would need to pay only a nominal FRAND royalty for the technology chosen for adoption into the standard, because the two inventors would compete to sell their respective technologies and thus would enable the manufacturer to bid down the FRAND royalty to nearly zero. The argument that a FRAND royalty

¹⁶¹ Bertrand competition describes a (static) situation in which each competing firm's strategy consists of its choice of the price at which to sell its output. See, e.g., MICHAEL L. KATZ & HARVEY S. ROSEN, MICROECONOMICS 504–08 (McGraw-Hill 3d ed. 1998); CARLTON & PERLOFF, *supra* note 41, at 171–72. Formally, one can view the degree of product differentiation in a Bertrand pricing game as measuring the incremental value of a technology. As technologies become more differentiated, the incremental value of the best technology over the next-best technology increases, and the Bertrand-equilibrium price approaches the monopolist price. As technologies become less differentiated, the incremental value of the best technology over the next-best technology decreases, and the Bertrand-equilibrium price approaches the perfectly competitive price. See *id.* at 172–74; JEAN TIROLE, THE THEORY OF INDUSTRIAL ORGANIZATION 210–12 (MIT Press 2002) (1988).

¹⁶² See Sidak, *The Meaning of FRAND, Part I: Royalties*, *supra* note 21, at 968–86.

¹⁶³ *Id.* at 931 n.*.

¹⁶⁴ J. Gregory Sidak, *Tournaments and FRAND Royalties*, 1 CRITERION J. ON INNOVATION 101 (2016).

is effectively zero implicitly depends on modeling competition between the technologies in standards development and standards setting as a static Bertrand pricing game without capacity restraints. However, the argument that a price war between SEP holders would drive down a FRAND royalty nearly to zero requires one to make at least three heroic assumptions: (1) that there is no differentiation between the competing (substitute) technologies, (2) that the inventors lack any outside option for monetizing their technologies, and (3) that each inventor has some ancillary revenue stream generating a positive return to its participation in the SSO, such that the inventor can cover the costs of that participation. When assumptions (1) and (2) are met, the SEP holder cannot receive a positive payoff from any use of its SEP, including participation in the SSO. However, unless the costs of participation are zero, the SEP holder still will not participate, absent some ancillary revenue stream. The ancillary revenue source could arise from vertical integration or some other form of multiproduct output that enables the SEP holder to internalize some of the benefit arising from the standard by offering an SEP at a zero royalty. In any case, this ancillary revenue stream is a significant deviation from the traditional assumptions underlying Bertrand competition.

What empirical evidence indicates that an SSO could simultaneously choose from *many* substitute technologies for each and every facet of a standard, and that those substitute technologies are all homogeneous in terms of price and quality? None. If all substitute technologies were homogeneous, then standard setting would essentially be a lottery—and a most peculiar lottery at that, with a winner who receives only a penny for his troubles. The *ex ante* incremental value thesis ignores the need to ensure the continued participation of inventors in the current standard and in future standards.

Compared with a static Bertrand pricing game without capacity constraints, a more appropriate model for determining a FRAND royalty is a tournament. Economists have long studied the effects of tournament structures and prizes on effort levels.¹⁶⁵ All things being equal, higher prize levels lead to better performances by the participants, and higher marginal returns to effort cause participants to exert greater effort.¹⁶⁶

In standard setting, firms invest not only in developing patents, but also in competing to have their technologies adopted into a standard. This form of

¹⁶⁵ See Edward P. Lazear & Sherwin Rosen, *Rank-Order Tournaments as Optimum Labor Contracts*, 89 J. POL. ECON. 841 (1981); H. Lorne Carmichael, *The Agents-Agents Problem: Payment by Relative Output*, 1 J. LAB. ECON. 50 (1983); Clive Bull, Andrew Schotter & Keith Weigelt, *Tournaments and Piece Rates: An Experimental Study*, 95 J. POL. ECON. 1 (1987); see also Robert Gibbons & John Roberts, *Economic Theories of Incentives in Organizations*, in THE HANDBOOK OF ORGANIZATION ECONOMICS 56, 67 (Robert Gibbons & John Roberts eds., Princeton Univ. Press 2013).

¹⁶⁶ See Ronald G. Ehrenberg & Michael L. Bognanno, *Do Tournaments Have Incentive Effects?*, 98 J. POL. ECON. 1307, 1322 (1990); see also Ronald G. Ehrenberg & Michael L. Bognanno, *The Incentive Effects of Tournaments Revisited: Evidence from the European PGA Tour*, 43 INDUS. & LAB. REL. REV. 74-S (1990).

rivalry exemplifies dynamic competition, in which firms compete not *within* the market but *for* the market.¹⁶⁷ If the winner of that tournament—whose patented technology the SSO adopts into the standard—is not compensated for that additional investment, how can one expect patent holders to invest in participation in the collective development and setting of open standards? Investment in innovation would flow instead into proprietary standards—of precisely the sort which, if they proved to be commercially successful, fuel titanic disputes over monopolization or abuse of dominance.

The “winner-take-all” nature of standard setting increases the risk to inventors and their investors. Using the *ex ante* incremental value thesis and other rent-shifting proposals that view low prices as the sole objective of standard setting fails to compensate inventors and their investors for their risk bearing. Recall Scott Morton’s candid statement that FRAND “basically means a very low price.”¹⁶⁸ A royalty that excludes all value associated with the patent’s essentiality for the standard will deter investments in contributions to the standard.

In contrast, a tournament-based model would consider that the expected payoff for each participant must satisfy each participant’s individual-rationality constraint. Consequently, the aggregate payoff—which in this case equals the FRAND royalty itself—must exceed the sum of the costs of participation *for each participant*. The optimal FRAND royalty will need to be determined given the optimal number of contestants in the standard-setting tournament. However, the answer to that question exceeds the scope of this article.

2. *The Invention’s Marginal Contribution to the Standard Versus the Invention’s Incremental Value Over the Next-Best Substitute*

The incremental value of a specific patent does not reflect its marginal contribution to the standard. For example, railroad transportation was standardized during the nineteenth century. Suppose that various steam engine designs existed, and the incremental value of the best design over the second-best might have been slight. (Diesel and electric locomotives were not feasible alternatives until decades later.) However, the steam engine likely had a high marginal contribution to the standard, relative to other technologies in the standard, such as the precise gauge of the track (1434 millimeters, or 4 feet, 8-½ inches), which initially was subject to considerable variation.¹⁶⁹

¹⁶⁷ See Harold Demsetz, *Why Regulate Utilities?*, 11 J.L. & ECON. 55, 57 & n.7 (1968); see also J. Gregory Sidak & David J. Teece, *Dynamic Competition in Antitrust Law*, 5 J. COMPETITION L. & ECON. 581 (2009). For a related explanation of the static versus dynamic benefits of standardization, see Jonathan D. Putnam, *Economic Determinations in “Franchising”-Setting: A Guide for the Perplexed*, 41 FORDHAM INT’L L.J. 953 (2018).

¹⁶⁸ See *supra* note 23 and accompanying text.

¹⁶⁹ See, e.g., DOUGLAS J. PUFFERT, *TRACKS ACROSS CONTINENTS, PATHS THROUGH HISTORY: THE ECONOMIC DYNAMICS OF STANDARDIZATION IN RAILWAY GAUGE* (Univ. of Chicago Press 2009); FRANCIS WHISHAW, *THE RAILWAYS OF GREAT BRITAIN AND IRELAND: PRACTICALITY DESCRIBED AND ILLUSTRATED*

The critical distinction is that *ex ante* incremental value compares the patent to other *substitute* patents that existed before the technology's adoption into the standard (various steam engine designs), whereas the marginal contribution to the standard compares a given patent's contribution to the standard with the contributions made by other *complementary* patents adopted into the standard (the chosen steam engine design versus the chosen track gauge).

3. *The Mistaken Timing of the Hypothetical Negotiation in the Ex Ante Incremental Value Thesis*

The *ex ante* incremental value thesis is “not *ex ante* enough.” To be unbiased and intellectually rigorous, the chosen moment of the hypothetical negotiation between the willing licensor and the willing licensee should be pushed back in time not merely from *Georgia-Pacific*'s moment of first infringement¹⁷⁰ to the moment of the SSO's standard adoption, but rather all the way back to the moment when the inventor decided whether or not to monetize his invention within the open standard of an SSO rather than outside the SSO through a proprietary standard or some other business strategy predicated on exclusion rather than open access. At that earlier moment, both the inventor (the future patent holder) and the implementer still have outside options to the hypothetical negotiation. Both the seller and the buyer of innovative inputs intended for the downstream product still have substitution opportunities. *Neither* party at that anterior moment is subject to lock in or holdup.¹⁷¹

That moment more closely resembles the Rawlsian original position, in which the inventor and implementer are both still veiled in ignorance of the commercial potential of the technology before them. In contrast, as described by the proponents of the patent-holdup conjecture, the *ex ante* incremental value thesis is selective, asymmetric, and therefore inherently biased: it sets a FRAND rate so as to restore the implementer—but not the inventor—to the original position. The buyer in the hypothetical negotiation would still have substitution opportunities, but the inventor would not. Despite the fact that this argument has been part of the intellectual debate on the patent-holdup conjecture since at least 2013, as of 2017 Shapiro still evidently considered

(John Weale 1842) (repub. David & Charles 1969); Warton W. Evans, *The Narrow Gauge Question*, THE ARGUS (MELBOURNE, VICTORIA), Oct. 2, 1872, at 15, <http://trove.nla.gov.au/ndp/del/article/5839798>.

¹⁷⁰ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970).

¹⁷¹ See also Putnam, *supra* note 167, at 974 (“[U]nder the static standardization model, the division between the ‘ex ante’ and ‘ex post’ period occurs prior to the implementer’s investment in the standardized technology—preferably, under the standard paradigm, prior to the SDO’s [standards development organization’s] selection of the technology. This choice of negotiation date blunts the innovator’s supposedly superior and undeserved bargaining power, by giving the SDO the freedom to select a different technology. But . . . under the dynamic standardization model, this date coincides with the point in time *after* each of the innovators has sunk its investment in R&D, but *before* the SDO has committed to reward any of the innovators by selecting its innovation.” (emphasis in original)).

only the infringer's sunk costs to be relevant to picking the proper timing of the hypothetical negotiation, while he ignored entirely the patent holder's sunk costs.¹⁷²

4. *The Neglected Costs of Acquiring the Next-Best Noninfringing Alternative*

The *ex ante* incremental value thesis ignores the implementer's acquisition cost of the next-best noninfringing substitute, and thus it mischaracterizes what a FRAND royalty commitment represents. Consider the following. First, if a patent is essential to a standard, then it will have positive value as an implementation patent in a counterfactual world in which the standard does not exist and inventors instead choose to monetize their inventions through other business strategies. Second, more than one firm will receive positive value in licensing the rights to practice the patent in this counterfactual world. Those assumptions are not strong ones. However, based on those assumptions alone, licensees would be willing to pay more than the measure of the patent's *ex ante* incremental value. So long as the *ex ante* incremental value exceeds the difference in the licensing price for two competing patented technologies, the licensees will purchase the rights to the higher-valued technology at a price up to the incremental value of that patent *plus* the price of lawfully acquiring the right to use the less valuable patent. So, even under these relatively weak assumptions, the price for the patent must exceed the *ex ante* incremental value.

For example, if a Lincoln is worth \$4000 more to me than a Ford, I still must pay, say, \$40,000 for the Lincoln—not \$4000—because other buyers have their own private valuations of the Lincoln and have bid up its price. The price I must pay for the Lincoln is still \$40,000, and not only the \$4000 of incremental value that the Lincoln gives me over the Ford. Granted, in some cases, it might be possible for the implementer to acquire the rights to the next-best noninfringing substitute at zero additional expense, such as if the technology exists in the public domain. But one cannot generalize this condition, and it is fallacious economic reasoning simply to assume that

¹⁷² Graham, Menell, Shapiro & Simcoe, *supra* note 118, at 123 (“The mainstream view is that the hypothetical bargain occurs just prior to the date on which the infringement began. A good theoretical rationale for this time frame is that it helps avoid basing the royalty on holdup value: the amount the owner could extract *ex post* based on the user's sunk costs. If so, however, should the timing ever be moved back even earlier, i.e., to the date before the *defendant* incurred any sunk costs? This probably would be impractical in many instances, but there is (arguably) an emerging consensus that in FRAND cases the time frame should be the date before the standard is adopted.” (emphasis added)). A similar bias in reasoning appears in Arthur J. Gajarsa, William F. Lee & A. Douglas Melamed, *Breaking the Georgia-Pacific Habit: A Practical Proposal to Bring Simplicity and Structure to Reasonable Royalty Damages Determinations*, 26 TEX. INTELL. PROP. L.J. 51, 53 (2018) (“An accurate assessment of damages would award the patent holder the market value of a license to use the patented technology. . . . It is the amount to which they would have agreed had they negotiated at arm's length for patent clearance before the *infringer* had committed to using the patented technology.” (emphasis added) (citing Lee & Melamed, *supra* note 17, at 392–93)).

the next-best alternative is free. The cost of acquiring the next-best alternative is a fact-specific inquiry that courts must determine on a case-by-case basis. Thus, the *ex ante* incremental value thesis provides no assurance that the licensee's incremental profit from using the patent in suit rather than the next-best noninfringing substitute will translate into a high enough royalty to enable the patent holder to recover the sunk costs of developing the patented technology.

5. *The Failure to Disaggregate the Increment of the Implementer's Bargaining Power Attributable to the Implicit but Erroneous Assumption That Implementers Collectively Negotiate as a Monopsonist*

A particularly serious error of economic reasoning inherent in the *ex ante* incremental value thesis is the failure to disaggregate the degree of bargaining power that an individual implementer would wield vis-à-vis an SEP holder from the degree of bargaining power that all implementers would collectively wield vis-à-vis the same SEP holder if they were coordinating their purchases as a monopsonist. If it is to have any economic defensibility at all, the hypothetical negotiation at the time of standard adoption is properly cast as a series of simultaneous, bilateral negotiations between the SEP holder and each of the implementers. It is incorrect to treat that hypothetical negotiation in the FRAND context as a single transaction occurring between one SEP holder and a solitary agent representing all implementers. The difference between the two versions of the hypothetical negotiation is the increment in bargaining power that implementers gain when they act collectively. It is well understood in economic theory that a monopsonist pays a lower price for an input (and consumes a lower volume of the input) than do competing buyers acting individually.¹⁷³ It is similarly incorrect to assume implicitly in the hypothetical negotiation that implementers (who are horizontal competitors in the various markets for downstream products) may lawfully exchange information with one another about the prices that they are bilaterally negotiating with the SEP holder, so that implementers can collusively simulate monopsony power.

To equate, without any adjustment for monopsonistic negotiation, the *ex ante* incremental value of a given SEP to its FRAND price is to assume tacitly that implementers may lawfully acquire and exploit monopsony power to reduce the SEP's price. Such an interpretation of the FRAND commitment demands that the SSO must play the role of a buyer's cartel in the purchase of a given technology input. However, the law does not permit implementers to do so. Section 1 of the Sherman Act forbids horizontal price

¹⁷³ See Sidak, *Patent Holdup and Oligopsonistic Collusion in Standard-Setting Organizations*, *supra* note 115, at 142–46; see also MANKIW, *supra* note 41, at 374.

fixing among buyers as well as sellers.¹⁷⁴ Clearly, the monopsonistic suppression of the competitive price for the license to an SEP would exceed the legitimate purpose of the FRAND commitment as an ancillary restraint¹⁷⁵ that increases economic efficiency. At a minimum, this erroneous interpretation of the FRAND commitment would make the contract void at common law for being contrary to the public interest.

To advance economic efficiency and increase consumer surplus, the ancillary restraint needs only to ensure that the selection of the standard does not empower the patent holder to charge implementers a monopoly price after the SSO has selected the patent holder's technology and made the patent covering that technology essential to the standard. To interpret the FRAND price as being the monopsony price goes too far—as a matter of legal analysis, as a matter of economic analysis, and as a matter of common sense. No plausible interpretation of the FRAND commitment should conclude that the inventor consented to receiving a royalty suppressed to the monopsony level.

D. *The Similar Lack of Empirical Support for the Royalty-Stacking Conjecture*

When discussing the patent-holdup conjecture, scholars and commentators often mention another theoretical concern in SEP negotiations that some believe to be closely related to the issue of patent holdup: royalty stacking.¹⁷⁶ In their 2007 article, Lemley and Shapiro explained that “[r]oyalty stacking refers to situations in which a single product potentially infringes on many patents, and thus may bear multiple royalty burdens.”¹⁷⁷ The royalty-stacking conjecture predicts that the sum of all royalties that each SEP holder demands might impose an excessive royalty burden on the licensee—the

¹⁷⁴ 15 U.S.C. § 1; see also *Mandeville Island Farms v. Am. Crystal Sugar Co.*, 334 U.S. 219 (1948); *Todd v. Exxon Corp.*, 275 F.3d 191, 201 (2d Cir. 2001) (“[A] horizontal conspiracy among buyers to stifle competition is as unlawful as one among sellers.”); *Knevelbaard Dairies v. Kraft Foods, Inc.*, 232 F.3d 979 (9th Cir. 2000); *Vogel v. Am. Soc’y of Appraisers*, 744 F.2d 598 (7th Cir. 1984).

¹⁷⁵ The doctrine of ancillary restraints originated in the English common law in 1711 in *Mitchel v. Reynolds* and permits two or more firms to restrain competition among themselves if doing so is essential to their creation of a new market, product, or productive efficiency. (1711) 24 Eng. Rep. 347 (Q.B.). Such cooperation among firms benefits consumers. However, Congress outlawed any contract in restraint of trade when it enacted section 1 of the Sherman Act in 1890. 15 U.S.C. § 1. This language sweeps so broadly that, if taken literally, it would outlaw cooperation among firms that manifestly benefits consumers. It is not surprising, therefore, that within only nine years the Supreme Court qualified the literalism of section 1 when it incorporated the doctrine of ancillary restraints into American antitrust jurisprudence. *Addyston Pipe & Steel Co. v. United States*, 175 U.S. 211 (1899). The Court affirmed the opinion of Judge (later, President and Chief Justice) William Howard Taft for the Sixth Circuit, which held that a covenant “merely ancillary to the main purpose of a lawful contract, and necessary to protect the covenantee in the full enjoyment of the legitimate fruits of the contract” is not unlawful. *United States v. Addyston Pipe & Steel Co.*, 85 F. 271, 282 (6th Cir. 1898).

¹⁷⁶ See, e.g., Lemley & Shapiro, *Patent Holdup and Royalty Stacking*, *supra* note 2, at 2010–17; Farrell, Hayes, Shapiro & Sullivan, *supra* note 4, at 613; Scott Morton & Shapiro, *Strategic Patent Acquisitions*, *supra* note 97, at 477; Scott Morton & Shapiro, *Patent Assertions: Are We Any Closer to Aligning Reward to Contribution?*, *supra* note 118, at 94.

¹⁷⁷ Lemley & Shapiro, *Patent Holdup and Royalty Stacking*, *supra* note 2, at 1993.

royalty stack—and thereby limit the licensee’s ability to commercialize its product.¹⁷⁸ According to Lemley and Shapiro, royalty stacking compounds the issue of patent holdup: “As a matter of simple arithmetic, royalty stacking magnifies the problems associated with injunction threats and holdup, and greatly so if many patents read on the same product.”¹⁷⁹

Like the patent-holdup conjecture, the royalty-stacking conjecture presents testable hypotheses that one can either confirm or reject with empirical analysis. Galetovic and Haber summarize the implications of the royalty-stacking conjecture in their 2017 article:

The mechanics of royalty stacking mean that it would only take a few patent owners to devastate an industry. High cumulative royalty rates levied on manufacturers mean that they must charge a price for their products that is so high that it will exclude all but a few buyers. Royalty stacking is not, therefore, consistent with a thriving industry: the incentives for incumbent manufacturing firms to invest are weak, the incentives for new manufacturing firms to enter are nil, and the incentives for technology developers are eroded by royalty rates that might not pay for their R&D expenditures. In short, if royalty stacking is actually taking place, then the market will stagnate in the long run.¹⁸⁰

However, as of November 2018, there is no empirical evidence showing that any of these deleterious implications of the royalty-stacking conjecture have materialized.

Many legal and economic scholars have made similar observations. For example, Damien Geradin, Anne Layne-Farrar, and Jorge Padilla empirically analyzed the patents related to the third-generation (3G) cellular telephone technology—one industry that Lemley and Shapiro explicitly offer as an example of patent holdup and royalty stacking¹⁸¹—and concluded that there is no evidence of royalty stacking among the more than sixty companies involved

¹⁷⁸ See, e.g., *id.* at 1993–94.

¹⁷⁹ *Id.* at 1993; see also Farrell, Hayes, Shapiro & Sullivan, *supra* note 4, at 641; Mark A. Lemley, *Ten Things to Do About Patent Holdup of Standards and One Not To*, 48 B.C. L. REV. 149, 152 (2007). But see Daniel F. Spulber, *Patent Licensing and Bargaining with Innovative Complements and Substitutes*, 70 RES. ECON. 693, 709 (2016) (“The present analysis shows that royalty stacking need not occur with different market institutions, notably bargaining between IP owners and producers. In particular, with non-cooperative licensing offers and negotiation of royalty rates between IP owners and producers, total royalties will be less than the royalties chosen by a bundled monopoly IP owner. The result that total royalties are less than the bundled monopoly benchmark holds even if there are many patented inventions. Total royalties are less than the benchmark with innovative complements and substitutes.”); Daniel F. Spulber, *Complementary Monopolies and Bargaining*, 60 J.L. & ECON. 29, 30–35 (2017).

¹⁸⁰ Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 31–32 (footnotes omitted).

¹⁸¹ See Lemley & Shapiro, *Patent Holdup and Royalty Stacking*, *supra* note 2, at 2025–27 (evaluating allegations of royalty stacking in 3G cellular technology using empirical evidence).

in the standard.¹⁸² Similarly, Galetovic and Kirti Gupta tested the observable implications of the royalty-stacking conjecture in the mobile wireless device industry between 1994 and 2013, analyzing over 300 firms that participated in the development of the global third-generation and fourth-generation wireless cellular standards. They found that, contrary to the predictions of the royalty-stacking conjecture, the number of SEP holders in the industry grew between 1994 and 2013, sales increased significantly, real average selling price (controlling for technological generation) decreased, the gross margin of SEP holders and implementers showed no long-run downward trend, and the number of device manufacturers increased.¹⁸³

Proponents of the royalty-stacking conjecture often invoke studies purporting to show that the royalty stack for standard-compliant products, such as a smartphone, is exorbitantly high, which they claim is evidence that royalty stacking occurs. For example, Lemley and Shapiro claimed in 2007 that “stacked royalties” can be as high as 40 percent of the total price of a smartphone.¹⁸⁴ A 2014 unpublished paper by Ann Armstrong of Intel and Joseph Mueller and Timothy Syrett of WilmerHale (Intel’s law firm) estimated “potential patent royalties in excess of \$120 on a hypothetical \$400 smartphone,” or 30 percent of the price of the hypothetical smartphone.¹⁸⁵

Before discussing the evidence refuting the royalty-stacking conjecture, it bears emphasis that the unpublished paper by Armstrong, Mueller, and Syrett suffers from several significant weaknesses. First, it is unclear whether the authors are measuring the royalty stack only from smartphone SEPs or from all patents used in a smartphone. Second, the authors do not address the opposing literature. They did not initially address the opposing literature available in 2014, nor have they attempted to incorporate the opposing literature that has been published since 2014. Third, although the authors stated

¹⁸² See Damien Geradin, Anne Layne-Farrar & A. Jorge Padilla, *The Complements Problem Within Standard Setting: Assessing the Evidence on Royalty Stacking*, 14 B.U. J. SCI. & TECH. L. 144, 159–61 (2008); see also Geradin & Rato, *supra* note 21, at 127–28; Denicolò, Geradin, Layne-Farrar & Padilla, *supra* note 105, 598–99 (2008).

¹⁸³ Alexander Galetovic & Kirti Gupta, *Royalty Stacking and Standard Essential Patents: Theory and Evidence from the World Mobile Wireless Industry 5* (Hoover IP², Working Paper Series No. 15012, Mar. 2017). Kevin Murphy, in his testimony as Microsoft’s expert economic witness in *Microsoft v. Motorola*, admitted that he had not seen any evidence of royalty stacking in that case:

Q: You would agree there is no stacking problem that has materialized?

A: I would say it hasn’t. In my opinion, based on the evidence I have seen, I don’t think it is there to date. As I stated in my answer here, I think there still is a potential problem, and particularly, if you allow hold-up to occur, it is much more likely to be a problem.

Kevin Murphy Testimony, *supra* note 145, at 178:21–179:2.

¹⁸⁴ Lemley & Shapiro, *Patent Holdup and Royalty Stacking*, *supra* note 2, at 2026.

¹⁸⁵ Ann Armstrong, Joseph Mueller & Timothy Syrett, *The Smartphone Royalty Stack: Surveying Royalty Demands for the Components Within Modern Smartphones 2* (May 29, 2014) (unpublished manuscript), <https://www.wilmerhale.com/en/insights/publications/the-smartphone-royalty-stack>.

that they intended to submit the paper for publication,¹⁸⁶ as of November 2018, the paper still appears after more than four years not to have been published in any journal.

In addition, legal and economic scholars have refuted the studies purporting to show an exorbitant aggregate SEP royalty or total royalty. In 2015, Keith Mallinson, an engineering consultant in the mobile telecommunications industry, estimated the total monetary burden that royalties for mobile communications SEPs actually impose on manufacturers of mobile handsets and then compared that aggregate royalty to total global handset revenues for 2014.¹⁸⁷ He found that the aggregate royalty for 2G, 3G, and 4G SEPs was approximately 5 percent of global handset revenues.¹⁸⁸ In 2016, I replicated Mallinson's study and confirmed that the aggregate SEP royalty that implementers paid in 2013 and 2014 was between 4 and 5 percent of global handset revenues for handsets practicing the 3G and 4G standards.¹⁸⁹ Using a slightly different methodology, Galetovic, Haber, and Lew Zaretski also estimated the aggregate royalty in the entire mobile phone value chain—including both SEPs and non-SEPs—and found that the average aggregate royalty was less than 4 percent of the average selling price of the device.¹⁹⁰

The proponents of the royalty-stacking conjecture have failed to rebut these studies or produce empirical evidence that affirmatively supports their theory. Therefore, the proponents of the patent-holdup cannot assert that holdup is exacerbated by royalty stacking, for the simple reason that the empirical evidence does not support the existence of royalty stacking in the licensing of SEPs.

E. Are Economic and Legal Scholars Who Refute the Patent-Holdup Conjecture "Patent-Holdup Deniers?"

Instead of defending the patent-holdup conjecture in an intellectually rigorous manner, Shapiro sought to discredit economists who have exposed the fallacies of the patent-holdup conjecture by calling them "patent-holdup deniers" and thus invoking the opprobrium of being called "climate-change

¹⁸⁶ *Id.* at 1 n.2 ("The authors intend to submit the final version of this article for publication in a journal.")

¹⁸⁷ Keith Mallinson, *Cumulative Mobile-SEP Royalty Payments No More Than Around 5% of Mobile Handset Revenues*, WISEHARBOR (Aug. 29, 2015), <http://www.wisearbor.com/pdfs/Mallinson%20on%20cumulative%20mobile%20SEP%20royalties%20for%20IP%20Finance%202015Aug19.pdf>.

¹⁸⁸ *Id.*

¹⁸⁹ See J. Gregory Sidak, *What Aggregate Royalty Do Manufacturers of Mobile Phones Pay to License Standard-Essential Patents?*, 1 CRITERION J. ON INNOVATION 701 (2016).

¹⁹⁰ See Alexander Galetovic, Stephen Haber & Lew Zaretski, *An Estimate of the Average Cumulative Royalty Yield in the World Mobile Phone Industry: Theory, Measurement and Results*, 42 TELECOMM. POL'Y 263, 263 (2018); *id.* at 265 ("We estimate patent royalties in the entire mobile phone value chain, including not only mobile SEPs on which Mallinson and Sidak concentrated, but also the value of royalties for audio and video codecs, imaging, operating systems, semiconductors, and the other components that go into a mobile phone."); see also Alexander Galetovic, Stephen Haber & Lew Zaretski, *Is There an Anticommons Tragedy in the World Smartphone Industry?*, 32 BERKELEY TECH. L.J. 1527 (2018).

deniers”—that is, people who deny a proposition in the face of supposedly overwhelming scientific evidence supporting it.¹⁹¹ During the question period following Shapiro’s speech to the IEEE-SIIT on October 6, 2015, Brussels antitrust lawyer Trevor Soames (a barrister then at Shearman & Sterling, now at Quinn Emanuel) objected to Shapiro’s description of his critics as “holdup deniers,” which Soames, a self-described environmentalist, considered an inappropriate semantic device for dumping Shapiro’s critics into the same cauldron as climate-change deniers.¹⁹²

Shapiro’s keynote speech purported to answer his critics, yet Soames exposed it before an audience of sophisticated professionals and scholars as exemplifying the political use of the English language—hiding behind a metaphor that George Orwell would say “ha[s] lost all evocative power and [is] merely used because [it] save[s] people the trouble of inventing phrases for themselves.”¹⁹³ With a barrister’s élan, Soames showed that the effect of Shapiro’s denunciation of his critics as “deniers” was to tilt the inquiry by insisting (without merit) that its starting point was a consensus that the conjecture in question was a firmly established scientific truth. Shapiro’s defense of the patent-holdup conjecture thus radiated a sense of entitlement rather than a willingness to engage in a genuine intellectual debate over the merits of his theory. The result, Soames showed, was something less than a scholar’s serious response to scientific criticisms of his research that others had carefully documented and brought to his attention. One cannot know why Shapiro afterwards withdrew his speech from the public domain; but, for anyone attending the conference, the possibility that the cause was Soames’ colloquy with Shapiro would be hard to dismiss out of hand.¹⁹⁴

Nancy Rose relied on similarly specious arguments when addressing the patent-holdup conjecture’s lack of empirical evidence. Like Shapiro in October 2015, and like Melamed and Shapiro in the *Yale Law Journal* in 2018, Rose began her keynote address at a conference on patent law at George Washington University in November 2015 (one month after Shapiro’s address to the IEEE-SIIT) with an appeal to authority, claiming that the patent-holdup conjecture had descended from the work of not one Nobel

¹⁹¹ Shapiro, Patent Holdup: Myth or Reality?, *supra* note 12, at 19.

¹⁹² The climate-change-denier sobriquet itself offends many for its calculated shock value of piggybacking on the phrase “Holocaust denial.” See, e.g., John Wihbey, ‘Denier,’ ‘Alarmist,’ ‘Warmist,’ ‘Contrarian,’ ‘Confusionist,’ ‘Believer,’ YALE CLIMATE CONNECTIONS, Aug. 16, 2012, <http://www.yaleclimateconnections.org/2012/08/denier-alarmist-warmist-contrarian-confusionist-believer/> (“The use of ‘climate denier’ now has the unique distinction of being both inappropriately specific—tied to the killing of six million Jews by the Nazis—and so mundane as to be a cliché.”).

¹⁹³ Orwell, *supra* note 27, at 357. Contrast Shapiro’s unfortunate choice of rhetorical device with Diedre McCloskey’s assessment that Gary Becker exemplified someone whose use of metaphors aided “the form and substance of good arguments” and made him “an economic poet, which is what we expect of our theorists.” MCCLOSKEY, *supra* note 54, at 13.

¹⁹⁴ As noted above, the IEEE video-recorded the conference but has not made recordings of the various sessions and speeches available to the public.

laureate in economics, but three: Oliver Williamson, Ronald Coase, and John Nash.¹⁹⁵ She then explained how, with the evolution of industries reliant on standards, patent holdup has become a powerful real-world problem in need of a solution.¹⁹⁶

As I explain in Part III.A, Rose said that three lawsuits provided “[a]necdotal evidence from court decisions” that “patentees *often* demand royalties well in excess of RAND.”¹⁹⁷ That is an empirical proposition about the existence and relative frequency of patent holdup by SEP holders, yet Rose also said that one cannot observe empirical evidence of patent holdup.¹⁹⁸ Accompanied by a PowerPoint slide featuring a NASA photograph of space, Rose analogized patent holdup to “dark matter,”¹⁹⁹ the invisible substance that mysteriously affects the expansion of the universe.²⁰⁰ Rose argued that, like dark matter, patent holdup is undetectable.²⁰¹

Rose’s address was another curious example of an MIT-trained economist subordinating economic analysis to an argument predicated on an inapt metaphor. For two reasons, Rose’s disquisition on dark matter is junk science unbecoming of either her professorship at one of the world’s preeminent research universities or her position at the time as the government’s top anti-trust economist.

First, Rose incorrectly analogizes dark matter to patent holdup. Scientists know of dark matter’s existence because they have observed its actual effects. In other words, scientists developed the concept of dark matter to explain effects that were already *empirically evident* in astronomical data.²⁰² In contrast, the patent-holdup conjecture claims to explain effects that are not evident in economic data.

Second, Rose’s argument attempted to draw two conclusions that are contradictory to each other. She claimed that patent holdup is undetectable through empirical evidence, because it rarely occurs in practice; yet, she simultaneously urged antitrust agencies to intervene in markets to combat patent holdup by SEP holders because it is so prevalent. That reasoning is nonsensical because it contradicts itself.

A theory that one cannot subject to attempts at falsification is inherently unscientific. It is entitled to little weight in the scientific community,

¹⁹⁵ Rose Presentation, *supra* note 131, at 2.

¹⁹⁶ *Id.* at 11–17.

¹⁹⁷ *Id.* at 13 (emphasis added) (identifying, without citations, *Motorola v. Microsoft* [*Microsoft v. Motorola*], *In re Innovatio IP Ventures*, and *Realtek v. LSI*).

¹⁹⁸ *Id.* at 14.

¹⁹⁹ *Id.* at 10.

²⁰⁰ See, e.g., *Dark Energy, Dark Matter*, NASA, <https://science.nasa.gov/astrophysics/focus-areas/what-is-dark-energy> (“We know how much dark energy there is because we know how it affects the universe’s expansion. Other than that, it is a complete mystery.”).

²⁰¹ Rose Presentation, *supra* note 131, at 10.

²⁰² *Dark Energy, Dark Matter*, NASA, *supra* note 200.

and it would be considered insufficiently reliable to be admissible as expert testimony pursuant to Federal Rule of Evidence 702 for the reasons that the Supreme Court explained in *Daubert*.²⁰³ It is revealing—indeed, damning—that, instead of defending the patent-holdup conjecture in a scientific manner, the leading proponents of the patent-holdup conjecture have sought to discredit economic and legal scholars who have exposed the conjecture’s flaws by denouncing them as “patent-holdup deniers.” However, that epithet is inapt, for it is neither founded on principles of economic theory nor relevant to addressing the fallacies that these many scholars have legitimately exposed in the patent-holdup conjecture. In a word, such rhetoric is unscientific. It cannot assist a court or any other decision-making body in deciding whether the patent-holdup conjecture is reliable scientific evidence in the face of the theoretical and empirical critiques refuting it.

IV. PATENT HOLDUP AND THE MARKET FOR CORPORATE CONTROL

A rational firm that expects a significant risk of holdup would not sink resources into relationship-specific investments, knowing that its quasi-rents might be opportunistically appropriated. Typically, contracts can protect such relationship-specific investments. However, even if a contractual solution is infeasible, or if a firm has miscalculated the potential for opportunism in a business relationship, the harm from opportunism can be mitigated, or even eliminated, through the market for corporate control.

A. The Market for Corporate Control as a Tool for Resolving Commercial Disputes and Deterring Williamsonian Holdup

When the owners of a firm choose to organize it as a publicly traded corporation, one thing that they incidentally do is to consent to resolve any future dispute with a third party by allowing it simply to acquire control of the firm. This particular implication of one’s choice of the form of business organization has received little attention in the literature on either corporate governance or dispute resolution—and, to my knowledge, it has escaped any attention in the literature on the patent-holdup conjecture altogether.

For ease of exposition, suppose that both parties to a dispute are publicly traded corporations. Simply put, in any dispute or negotiation between two publicly traded corporations, each party has the outside option to resolve the dispute by buying control of the other, either in a consensual sale or in an unsolicited control transaction such as a hostile tender offer. For any publicly traded firm, the market for corporate control always provides an alternative

²⁰³ See *supra* text accompanying note 11.

means of dispute resolution by mooted the litigation between the disputants upon placing them under common ownership and control. What once was an interfirm dispute over price to be resolved by an external finder of fact becomes an intrafirm transfer-pricing decision dictated by management. In Williamson's terminology, the control over productive (but disputed) assets moves from market to hierarchy.²⁰⁴ So viewed, the market for corporate control provides implementers a method for resolving disputes over patent holdup, as well as disputes over monopolization or breach of contract or intentional business torts.²⁰⁵

For present purposes, consider how one company can acquire a controlling interest in another as a means to resolve an intercorporate dispute arising from the risk of Williamsonian holdup. A strategic acquisition aligns incentives between previously antagonistic corporations and is therefore a classic solution to the problem of opportunism. Vertical integration is a traditional and recognized method of resolving Williamsonian holdup disputes.²⁰⁶ Indeed, the Nobel Prize committee said in its summary of Williamson's work that his "*main* contribution was to formulate a theory of vertical integration."²⁰⁷

At a minimum, the potential harm from an instance of holdup is bounded by the costs of acquiring corporate control of the firm engaging in the holdup. If equity markets are efficient, the cost of acquiring a controlling interest in a firm should be offset by the underlying value of the acquired company. Then, the net cost of acquiring that controlling interest is limited to the transaction costs in the market for corporate control. (It is possible that the value of a specific patent owned by a firm exceeds the value of the firm itself, if the firm's other assets and liabilities have a negative net value. Therefore, it is not always the case that an infringer can claim (as I have observed in actual litigation) that a patent (or a portfolio of patents) must not be worth much

²⁰⁴ OLIVER E. WILLIAMSON, *MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS* (Free Press 1983).

²⁰⁵ The analysis of how corporate control relates to antitrust harm is a prominent part of literature produced by the Chicago school of law and economics. See, e.g., Henry G. Manne, *Mergers and the Market for Corporate Control*, 73 J. POL. ECON. 110, 119 (1965) ("This is not to suggest that the antitrust norm of competition in the product market need be entirely sacrificed to the norm of competition in the market for corporate control. Rather it points up some of the serious problems with current antitrust doctrine. The market for corporate control implies a number of important advantages which must be compared to those existing in present antitrust enforcement. Among the advantages of the former, as we have seen, are a lessening of wasteful bankruptcy proceedings, more efficient management of corporations, the protection afforded non-controlling corporate investors, increased mobility of capital, and generally a more efficient allocation of resources."); see also Eugene F. Fama & Michael C. Jensen, *Separation of Ownership and Control*, 26 J.L. & ECON. 301 (1983); Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure*, 3 J. FIN. ECON. 305 (1976).

²⁰⁶ See, e.g., Klein, Crawford & Alchian, *supra* note 38.

²⁰⁷ ECONOMIC SCIENCES PRIZE COMMITTEE OF THE ROYAL SWEDISH ACADEMY OF SCIENCES, *supra* note 20, at 7(19) (emphasis added).

because the damages for patent infringement that the patent holder seeks exceed its market capitalization.)

Thus, in some cases, corporate control might be a less costly alternative to acquiring a patent itself. In such situations, one would be more likely to find that the patent holder has adopted an antitakeover provision, such as a poison pill; in the extreme case, the patent holder would shield itself entirely from unsolicited corporate control transactions by going private.

One need not acquire 100 percent of the company threatening to engage in holdup to defeat its opportunistic behavior. A victim of holdup need purchase only enough equity in the opportunistic firm to exert control over that corporation. The actual share of stock required to exert control over a publicly traded corporation will depend on the distribution of shares of that corporation and its corporate governance structure. However, a firm that buys a large enough equity stake in the patent holder can then directly control the patent holder's business practices, including its licensing practices for its intellectual property.

In addition, if patent holdup threatened economic efficiency, then upstream and downstream firms from the patent holder and the implementer could turn to the market for corporate control to alleviate any harm. For example, if holdup between a patent holder and a smartphone manufacturer slowed technological development of mobile standards or increased mobile device prices, a network operator (such as AT&T or Verizon) or a downstream applications provider (such as Amazon, Google, or Microsoft) would have the incentive to acquire the patent holder and eliminate the inefficiency created by its strategy of holdup.

Put differently, any commercial dispute between publicly traded corporations, including a dispute allegedly due to patent holdup, can be resolved through the market for corporate control. An implementer can rectify its "problem," cast generally as an excessive royalty demand, by internalizing the source of the "problem." If holdup harms economic efficiency beyond merely changing the distribution of profits between patent holders and implementers, then the potential benefits to vertical integration are even greater, as they would allow the integrated firm to internalize the benefits of the increased efficiency as well.

B. The Absence of Control Transactions as Evidence of the Nonexistence or Contractual Solubility of Williamsonian Holdup

If holdup persists in a particular industry, such as mobile communications, one should observe evidence of acquisitions to defeat that holdup. That major implementers of industry standards and participants in mobile communications, such as Apple, do not avail themselves of this solution, even though

many have ample cash reserves and the ready ability to raise external funding, strongly suggests that implementers do not genuinely consider harm from patent holdup to threaten their business.

Rather, the evolution of the mobile communications industry exhibits the opposite pattern. In the early stages of standard setting for mobile communications, relatively more of the major participants in SSOs were vertically integrated.²⁰⁸ By 2018, some of the largest SEP holders, such as Nokia and Ericsson, no longer manufactured standard-compliant handsets; conversely, some of the largest manufacturers of standard-compliant mobile devices today have relatively modest SEP portfolios.²⁰⁹ That no large implementer has used an unsolicited transaction to acquire corporate control of companies such as Ericsson, Nokia, or Qualcomm calls into question the validity of the patent-holdup conjecture, because one of the most obvious predictions that would follow if patent holdup does occur has not come to pass. (The symmetric argument also applies. If a large SEP holder engaged in systematic holdup, reducing the profits and market values of downstream implementers, the SEP holder would have an incentive to integrate forward into device manufacturing by acquiring the undervalued implementers.)

Occam's razor implies that the best explanation for why we do not observe hostile takeovers of publicly traded SEP holders is simply that patent holdup does not occur often enough in the real world to pose a problem to implementers. In contrast, it is implausible that a large implementer would passively endure the harm from patent holdup when that firm could readily stop that harm by undertaking a transaction in the market for corporate control.

Thus, the revealed behavior of implementers implies that contracting around potential holdup—whether through voluntarily negotiated licenses or through litigation that culminates after a war of attrition in a worldwide settlement, license, and release—is more advantageous to an implementer than is purchasing a controlling equity stake in an SEP holder, such as Ericsson, Nokia, or Qualcomm. Such behavior is evidence that the charges of opportunistic behavior that implementers have leveled against certain SEP holders are not so serious as to have a material effect on the implementers' access to critical standard-essential technology. The absence of vertical acquisitions suggests that the actual harm arising from patent holdup is either nonexistent or already successfully deterred through the use of existing contractual arrangements.

²⁰⁸ See Sidak, *Testing for Bias to Suppress Royalties for Standard-Essential Patents*, *supra* note 6, at 332.

²⁰⁹ See *id.*

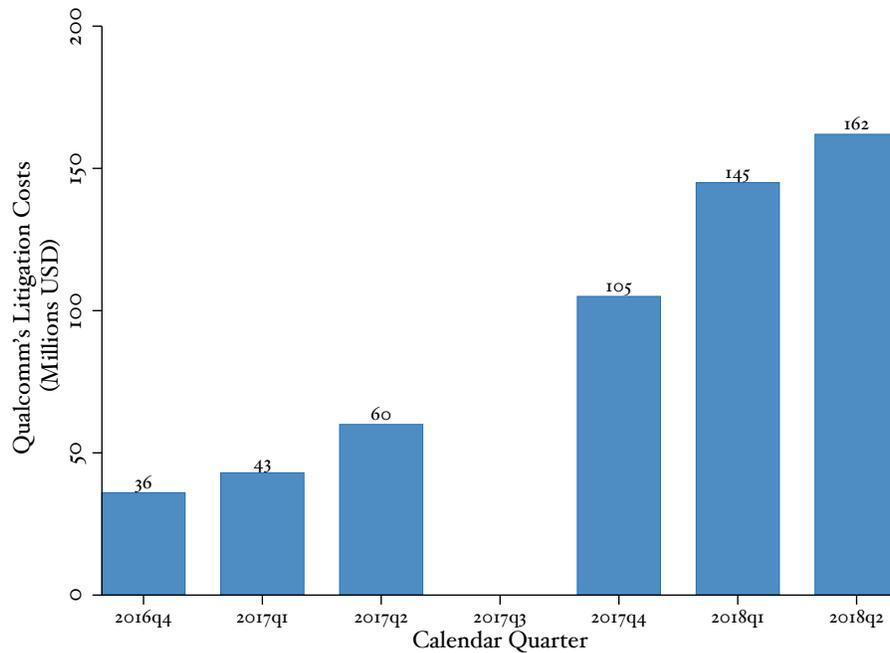
C. *What Can One Infer from Broadcom's Unsuccessful Attempt to Acquire Corporate Control of Qualcomm?*

On November 6, 2017, Broadcom made an unsolicited bid to buy Qualcomm for \$105 billion.²¹⁰ Broadcom's unsolicited tender offer, however, was not evidence that patent holdup was occurring. At that time, Qualcomm had sued Apple for patent infringement and refusal to pay royalties that it owed Qualcomm.²¹¹ Figure 1 shows Qualcomm's aggregate litigation costs from the fourth quarter of 2016, before the filing of any legal disputes with Apple, through the second quarter of 2018 (the most recent quarter for which data are available from Qualcomm's quarterly filings of its SEC Form 10-Q).

²¹⁰ See Michael J. de la Merced, *Broadcom Targets Qualcomm in Largest-Ever Tech Deal*, N.Y. TIMES, Nov. 6, 2017.

²¹¹ *Id.* On October 26, 2018, Qualcomm disclosed in a hearing in federal district court that it believes that Apple owes Qualcomm \$7 billion in past-due royalty payments. See Edvard Pettersson & Bill Callahan, *Qualcomm Says Apple Is \$7 Billion Behind in Royalty Payments*, BLOOMBERG, Oct. 26, 2018, <https://www.bloomberg.com/news/articles/2018-10-26/qualcomm-says-apple-is-7-billion-behind-in-royalty-payments>.

Figure 1. Qualcomm's Litigation Costs



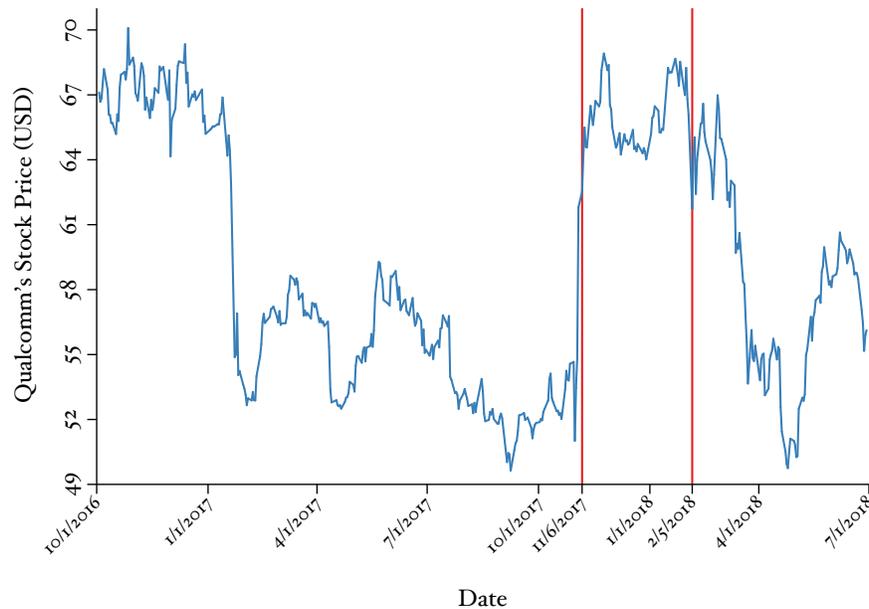
Sources: Qualcomm Inc., Quarterly Report for the Quarterly Period Ended March 25, 2018 (SEC Form 10-Q), at 32 (filed Apr. 25, 2018) (“Selling, general and administrative expenses included \$145 million and \$250 million in the second quarter and first six months of fiscal 2018, respectively, related to litigation costs, an increase of \$102 million and \$171 million, respectively.”); Qualcomm Inc., Quarterly Report for the Quarterly Period Ended June 24, 2018 (SEC Form 10-Q), at 34 (filed July 25, 2018) (“Selling, general and administrative expenses included \$162 million and \$413 million in the third quarter and first nine months of fiscal 2018, respectively, related to litigation costs, an increase of \$102 million and \$275 million, respectively.”). Qualcomm’s fiscal year commences in the fourth quarter of the calendar year. *Id.* at 7 (“The Company operates and reports using a 52–53 week fiscal year ending on the last Sunday in September.”).

Notes: The litigation costs of the first three months of fiscal 2018 can be calculated by: \$250 million – \$145 million = \$105 million. The litigation costs of the second quarter of fiscal 2017 can be calculated by: \$145 million – \$102 million = \$43 million. The litigation costs of the first quarter of fiscal 2017 can be calculated by: \$250 million – \$171 million – \$43 million = \$36 million. The litigation costs of the third quarter of fiscal 2017 can be calculated by: \$162 million – \$102 million = \$60 million. It does not appear that Qualcomm reported its litigation costs of the fourth quarter of fiscal 2017 in its annual reports or quarterly reports, as of November 2, 2018.

As Figure 1 shows, between the fourth quarter of 2016 and the second quarter of 2018, Qualcomm’s litigation costs increased by 450 percent. The three most recent quarters of publicly disclosed data imply that Qualcomm’s litigation costs for fiscal year 2018 will likely exceed half a billion dollars. In addition, Figure 2 shows that Qualcomm’s share price remained suppressed

between January and November 2017, after a decline in January 2017 following the FTC's filing of its monopolization case against Qualcomm and the disclosure that Apple was suing Qualcomm for \$1 billion.²¹²

Figure 2. Qualcomm's Share Price



Source: Market Summary: *Qualcomm, Inc.*: NASDAQ: QCOM, GOOGLE FIN., https://www.google.com/search?q=NASDAQ:QCOM&tbm=fin#scso=_Hia-W-HXIrKm_QbhiZCADQr:0.

The vertical red lines in Figure 2 indicate the dates of Broadcom's takeover bids. Qualcomm rejected Broadcom's initial bid (valued at approximately \$70 per share) as undervaluing Qualcomm's enterprise value.²¹³ Broadcom's bid appeared to be an attempt to exploit the market's suppressed valuation of Qualcomm's massive portfolio of patents in the short run by changing Qualcomm's licensing practices (including the price that Qualcomm charges

²¹² See Diane Bartz & Stephen Nellis, *Apple Files \$1 Billion Lawsuit Against Chip Supplier Qualcomm*, REUTERS, Jan. 20, 2017, <https://www.reuters.com/article/us-apple-lawsuit-qualcomm-idUSKBN1542SG>.

²¹³ de la Merced, *supra* note 210 ("The biggest issue may simply be that Qualcomm believes the current offer, worth about \$70 a share, is too low. Qualcomm's trove of patents—among the most formidable in the world of wireless networking—remains a hugely valuable asset."); see also Don Clark & Michael J. de la Merced, *Broadcom Proposes Unseating Qualcomm Board as Takeover Fight Escalates*, N.Y. TIMES, Dec. 4, 2017 ("Qualcomm has argued that the current bid was too low even as a starting point for negotiations."); *id.* ("Broadcom contends its offer was the most significant catalyst for Qualcomm's stock price in nearly a year. Its shares had traded below \$60 a share for most of the year before Broadcom announced its offer.")

implementers) in a manner more acceptable to Apple and other unlicensed manufacturers of mobile devices.²¹⁴ On February 5, 2018, Broadcom raised its offer to \$121 billion.²¹⁵

Broadcom's management did not explain in its unsolicited offer how it could lower the price of licensing Qualcomm's patent portfolio to recalcitrant implementers without constricting the licensing revenue that had enabled Qualcomm to fund its R&D. The Committee on Foreign Investment in the United States (CFIUS), concerned that Broadcom at the time was a foreign corporation and stating that "Qualcomm [is] the current leading company in 5G technology development and standard setting," recommended that President Trump block the takeover on grounds of national security.²¹⁶ On March 12, 2018, President Trump issued an executive order blocking Broadcom's attempted takeover of Qualcomm.²¹⁷

Broadcom's attempted takeover of Qualcomm illustrates how the market for corporate control provides a means to resolve patent-infringement and licensing disputes, even if the party attempting the takeover is itself not an implementer of the patents in suit. It bears emphasis that Broadcom's takeover attempt is not evidence that Qualcomm ever engaged in patent holdup. Broadcom does not manufacture smartphones or other mobile devices or wireless infrastructure,²¹⁸ and Broadcom evidently does not have a license to Qualcomm's portfolio of SEPs.²¹⁹

Rather, Broadcom's takeover attempt is evidence only that a profitable opportunity appeared to exist for a third party to acquire corporate control of Qualcomm at a depressed price. Driving down the value of a publicly traded corporation by infringing its patents can make the corporation a takeover target for reasons having nothing to do with the performance of the firm's management. It invites this important policy question: Should an implementer be allowed to suppress the share price of an SEP holder and thus put the firm into play as a takeover target? The costly and protracted manner in which FRAND disputes over SEPs are currently resolved threatens to distort the market for corporate control if an implementer that refuses to pay royalties for the use of another firm's SEPs can drive down that SEP

²¹⁴ Clark & de la Merced, *Broadcom Proposes Unseating Qualcomm Board as Takeover Fight Escalates*, *supra* note 213 ("Hock E. Tan, Broadcom's chief executive, is likely to argue that it is time to change Qualcomm's patent-licensing practices.")

²¹⁵ See Michael J. de la Merced & Don Clark, *Broadcom Raises Its Qualcomm Offer to \$121 Billion*, *N.Y. TIMES*, Feb. 5, 2018.

²¹⁶ Letter from Aimen N. Mir, Committee on Foreign Investment in the United States, to Mark Plotkin, Covington & Burling LLP, and Theodore Kassinger, O'Melveny & Myers LLP 2 (Mar. 5, 2018).

²¹⁷ Exec. Order No. 2018-05479, 83 Fed. Reg. 11,631, 11,631 (Mar. 12, 2018) ("The proposed takeover of Qualcomm by [Broadcom] is prohibited.")

²¹⁸ See Broadcom Ltd., Annual Report for the Fiscal Year Ended October 29, 2017 (SEC Form 10-K), at 3 (filed Dec. 21, 2017).

²¹⁹ See *Qualcomm Technology Licensing*, QUALCOMM, <https://www.qualcomm.com/invention/licensing> (showing that Broadcom is not listed among Qualcomm's licensees).

holder's share price and thus make the firm a target that the implementer or some third party (like a Broadcom) can buy at a distressed price. Widespread infringement expropriates the value that the capital markets impute to the intellectual property owned by an SEP holder in a way that makes it easier for the unlicensed implementer or some other third party to buy the SEP holder on the cheap.

D. The Dog That Did Not Bark in the Night

Broadcom's unsuccessful takeover of Qualcomm invites a further question: Why, with nearly \$269 billion in cash on hand in the fall of 2017,²²⁰ did Apple not purchase control of Qualcomm, a company with a market capitalization at that time of approximately \$76 billion,²²¹ and thus take ownership and control of Qualcomm's patent portfolio? If Broadcom, a much smaller company than Apple, was capable of making an unsolicited offer for Qualcomm, surely Apple was capable of doing likewise.

That Apple, having claimed, in multiple proceedings before district courts and the ITC, to have been held up by Qualcomm's licensing practices, did not launch a tender offer to acquire corporate control of Qualcomm is telling. It is the dog that did not bark in the night. Again, Occam's razor suggests that the best explanation for these observed facts is simply that there was never any patent holdup by Qualcomm that Apple needed to deter.

E. How to Override the Market for Corporate Control as a Tool for Detering Williamsonian Holdup

The argument that the market for corporate control constrains a firm's ability to engage in Williamsonian holdup is subject to an important caveat: the firm that is supposedly tempted to engage in holdup must not be shielded from an unsolicited control transaction by virtue of a poison pill or similar provision. One can take that caveat a step further. The market for corporate control will have an attenuated effect, or no effect, on a firm that is not organized as a publicly traded corporation.

²²⁰ On September 30, 2017, Apple had \$268.9 billion in cash and cash equivalents. Apple Inc., Quarterly Report for the Period Ending December 30, 2017 (SEC Form 10-Q), at 29 (filed Feb. 2, 2018).

²²¹ As of the close of trading on September 29, 2017, Qualcomm's market capitalization was \$76.41 billion. (Because September 30, 2017 was a Saturday, the stock market was closed the last day of the third quarter of 2017.) *Qualcomm Market Cap*, YCHARTS, Sept. 29, 2017, https://ycharts.com/companies/QCOM/chart/#?securitylistName=&scaleType=linear&recessions=false&source=&startDate=09%2F28%2F2017&useEstimates=false&units=&format=real&partner=basic_850&splitType=single&legendOnChart=&calcs=include:true,id:market_cap,,&securitylistSecurityId=¬e=&correlations=&securities=include:true,id:QCOM,,&endDate=09%2F29%2F2017&title=&displayTicker=false&zoom=custom"es=&useHttps=false&securityGroup=&maxPoints="eLegend=&chartView=&chartType=interactive&liveData=false.

Returning now to the controversy over the patent-holdup conjecture, the form of business organization chosen by the SEP holder has drawn little attention from proponents of the conjecture. That inattention is both surprising and ironic. There have been significant changes in the corporate control of certain portfolios of patents that are or have been used in mobile devices. Those portfolios almost certainly contain some SEPs. For example, after Northern Telecom (Nortel) went bankrupt, its patent portfolio was sold by auction in July 2011 for \$4.5 billion to Rockstar Bidco LP.²²² Rockstar was a non-practicing entity (NPE), or what some disparagingly call a “patent troll.” So much for Rockstar’s strategy for patent monetization; what of its ownership and control?

Rockstar was privately held and thus immune from an unsolicited control transaction. It was a consortium of Apple, Blackberry, Ericsson, Microsoft, and Sony. Ironically, two of those owners—Apple and Microsoft—contributed to the funding of the 2007 article by Lemley and Shapiro that launched the patent-holdup and royalty-stacking conjectures.²²³ Within two years of having acquired Nortel’s portfolio, Rockstar had sued AsusTek, Google, HTC, Huawei, LG, Pantech, Samsung, and ZTE for patent infringement.²²⁴ In 2014, Rockstar sold 4000 patents for \$900 million to the defensive patent aggregator RPX Corporation, a publicly traded company.²²⁵ RPX was subsequently acquired for \$555 million in a friendly tender offer in May 2018 by HGGC, a private equity firm.²²⁶ Thus, investors once more placed a portion of the original Rockstar patent portfolio outside the reach of an unsolicited control transaction.

²²² See Tom Hals, *Courts OK Nortel Patent Sale to Apple/RIM Group*, REUTERS, July 11, 2011.

²²³ See *supra* note 5 and accompanying text.

²²⁴ See Complaint for Patent Infringement, *Rockstar Consortium US LP v. Google Inc.*, No. 2:13-cv-893, 2013 WL 5834422 (E.D. Tex. Oct. 31, 2013); Plaintiffs Rockstar Consortium US LP and Mobilestar Technologies LLC’s Original Complaint, *Rockstar Consortium US LP v. ASUSTek Comput., Inc.*, No. 2:13-cv-894, 2013 WL 6684352 (E.D. Tex. Oct. 31, 2013); Plaintiffs Rockstar Consortium US LP and Mobilestar Technologies LLC’s Original Complaint, *Rockstar Consortium US LP v. HTC Corp.*, No. 2:13-cv-895, 2013 WL 5835409 (E.D. Tex. Oct. 31, 2013); Plaintiffs Rockstar Consortium US LP and Mobilestar Technologies LLC’s Original Complaint, *Rockstar Consortium US LP v. Huawei Inv. & Holding Co.*, No. 2:13-cv-896 (E.D. Tex. Oct. 31, 2013); Plaintiffs Rockstar Consortium US LP and Mobilestar Technologies LLC’s Original Complaint, *Rockstar Consortium US LP v. LG Elecs., Inc.*, No. 2:13-cv-898, 2013 WL 6684437 (E.D. Tex. Oct. 31, 2013); Plaintiffs Rockstar Consortium US LP and Mobilestar Technologies LLC’s Original Complaint, *Rockstar Consortium US LP v. Pantech Co.*, No. 2:13-cv-899 (E.D. Tex. Oct. 31, 2013); Plaintiffs Rockstar Consortium US LP and Mobilestar Technologies LLC’s Original Complaint, *Rockstar Consortium US LP v. Samsung Elecs. Co.*, No. 2:13-cv-900, 2013 WL 6684220 (E.D. Tex. Oct. 31, 2013); Plaintiffs Rockstar Consortium US LP and Mobilestar Technologies LLC’s Original Complaint, *Rockstar Consortium US LP v. ZTE Corp.*, No. 2:13-cv-901, 2013 WL 5978094 (E.D. Tex. Oct. 31, 2013).

²²⁵ See Ashby Jones, *Rockstar Consortium to Sell 4,000 Patents to RPX Corp. for \$900 Million*, WALL ST. J., Dec. 23, 2014.

²²⁶ See Press Release, RPX Corp., *RPX Corporation to Be Acquired by HGGC for \$10.50 Per Share* (May 1, 2018), <https://www.prnewswire.com/news-releases/rpx-corporation-to-be-acquired-by-hggc-for-10-50-per-share-300639821.html>.

V. DOES PATENT HOLDUP DIFFER
FROM THE EXERCISE OF MARKET POWER?

Some proponents of the patent-holdup conjecture conflate the concept of holdup as it is understood in transaction-cost economics and the exercise of market power as it is understood in antitrust law. Given the estimable stature of the economic and legal scholars making this error, it is important to recognize that the difference between patent holdup and market power is profound, not trivial. It was a seminal contribution to the debate over the patent-holdup conjecture—if not to antitrust policy and the theory of industrial organization more generally—for Galetovic and Haber to have explained in 2017, using relatively simple analytical tools, why a patent holder’s ability to engage in holdup is independent of whether or not the patent holder possesses market power.²²⁷ One should not confuse this 2017 article refuting the theoretical foundations of the patent-holdup conjecture (as well as the royalty-stacking conjecture) with the article that Galetovic and Haber published in 2015 with Levine, which rejects various empirically testable hypotheses of the patent-holdup conjecture.²²⁸ Melamed and Shapiro (as well as Rose and other proponents of the patent-holdup conjecture) have publicly criticized that 2015 article, but not the 2017 article. Remarkably, Melamed and Shapiro purport in their 2018 article in the *Yale Law Journal* to respond to skeptics of the patent-holdup conjecture, yet they ignore entirely the 2017 article by Galetovic and Haber that exposes, in a systematic and devastating manner, the theoretical fallacies of that conjecture.

Outlining the patent-holdup conjecture in 2007, Shapiro, Farrell, and their colleagues at CRA wrote that “a patent covering a standard may confer market power ex post that was much weaker ex ante.”²²⁹ Similarly, in 2013 Scott Morton wrote, with Kai-Uwe Kühn and Howard Shelanski, that “an SEP owner can use its resulting market power to engage in ‘hold-up.’”²³⁰ This conflation has not abated even as the scholarly literature skeptical of the patent-holdup conjecture has accumulated. In their 2018 article, Melamed and Shapiro say that, “[w]ith respect to SEPs, the most significant and immediate commercial and antitrust concern centers on the SEP owners’ command of substantial market power once the standard in question becomes widely adopted.”²³¹ Rather than rely on authentically Williamsonian holdup, these scholars instead describe an imprecise concept of “excessive” royalties (which certainly does not exist as a standalone offense in U.S. antitrust or patent law). They then mislabel that vague concept “holdup.”

²²⁷ Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 11–12.

²²⁸ Galetovic, Haber & Levine, *supra* note 104.

²²⁹ Farrell, Hayes, Shapiro & Sullivan, *supra* note 4, at 607.

²³⁰ Kühn, Scott Morton & Shelanski, *supra* note 17, at 3 (emphasis added).

²³¹ Melamed & Shapiro, *supra* note 14, at 2111.

Of course, one should not presume that the proponents of the patent-holdup conjecture care most about influencing the actions of American antitrust enforcers and courts. Other jurisdictions have more invasive doctrines of competition law and weaker procedural protection for firms accused of monopolistic conduct. To apply pressure on a U.S. firm selling its products globally, proponents of the patent-holdup conjecture can calibrate the intellectual rigor of their analysis and rhetoric to the most credulous jurisdiction.²³²

But if one does value intellectual rigor, first principles of economics teach that a firm's ability to engage in holdup, as Williamson defined it, differs from that firm's ability to charge supracompetitive prices. A patent holder's ability to engage in holdup is independent of whether it possesses market power.²³³ As I explained in Part I, a patent holder can hold up an infringer for its quasi rent if, as Williamson reasoned, (1) the infringer has made a relationship-specific investment, (2) the parties have not completely defined the terms of their transaction before the infringer has made that relationship-specific investment (thus permitting uncertainty to exist), and (3) the patent holder acts opportunistically. However, whether those conditions are present is independent of whether the patent holder has market power. Therefore, even a company with no market power might be able to engage in Williamsonian holdup; conversely, a patent holder with significant market power can control market prices regardless of whether the conditions for Williamsonian holdup exist.²³⁴ Indeed, a monopolist can negotiate a supracompetitive royalty even if the licensee has not made a relationship-specific investment.

There is also an important difference between the effect that Williamsonian holdup has on the licensee's business in the long run and the effect that a supplier's exercise of market power has. Galetovic and Haber stress that Williamsonian holdup is not a long-run economic equilibrium.²³⁵ As I explained in Part I using their example of the coffee bar, after having made a relationship-specific investment and having been held up by the landlord, the coffee bar owner will choose, in the short run, to stay in the market as long as $(R - c) \geq 0$ —that is, as long as she can continue to earn revenues that equal or exceed her short-run operating costs. In the long run, however, the Williamsonian holdup perpetrated against the coffee bar owner will compel

²³² See J. Gregory Sidak, *The Tempting of American Antitrust Law: An Open Letter to President Trump*, *supra* note 96. On Inauguration Day in 2017, I recommended that President Trump, “[b]y executive order, . . . instruct [his] administration that no official of the U.S. government may aid a foreign antitrust authority (1) that seeks to prosecute an American company doing business in its jurisdiction on a theory of ‘abuse of dominance’ that would be unlikely to withstand a motion to dismiss if instead pleaded under U.S. antitrust law in an American court or (2) that employs investigatory or judicial procedures that lack the fundamental fairness that American justice requires.” *Id.* at 204.

²³³ See Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 11–12.

²³⁴ See, e.g., MANKIW, *supra* note 41, at 298.

²³⁵ Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 11.

her to exit the market, because she will be unable to cover her long-run capital costs. That is, when the coffee bar owner must choose whether or not to make a future investment in maintaining the installation of the commercial-grade espresso machine and décor of the coffee bar, the coffee bar owner will not make another relationship-specific investment because she knows that she could be held up again and thus be denied the ability to recover the cost of that new relationship-specific investment.

Consequently, authentically Williamsonian holdup cannot recur between the same two parties in the long run. In the context of SEPs, a licensee subjected to authentically Williamsonian holdup will exit the market not later than the date by which its relationship-specific assets wear out.²³⁶ And an industry in which the licensor holds up every licensee in this authentically Williamsonian manner is untenable.²³⁷ Implementers of SEPs would cease to produce goods practicing the standard. Yet, in violation of this principle, I have heard one noted scholar testify as an expert economic witness in litigation that the SEP holder in question had been engaging in patent holdup with respect to the implementer in question in the past, was currently engaging in patent holdup against the same implementer, and would continue doing so in the future.

In contrast to authentically Williamsonian holdup, a monopoly (and the concomitant charging of monopoly prices) can be a long-run equilibrium. A licensee that pays supracompetitive prices might still be able to cover its long-run costs²³⁸ and, therefore, remain in the market in the long run.²³⁹ Put differently, a monopolist can extract supracompetitive prices from its licensee over and over again, because doing so will not drive its licensee from the market, as long as the licensee is still able to earn a long-run profit. It is critical to recognize that a monopolist has no incentive to hold up a licensee, just as a parasite has no incentive to kill its host. In contrast, by engaging in authentically Williamsonian holdup, a monopolist would drive its licensee from the market and consequently forfeit the discounted present value of the stream of monopoly profits that the monopolist otherwise could expect to receive from that licensee.²⁴⁰

In short, market power is an entirely different economic concept from the ability to engage in Williamsonian holdup. If, when saying that a royalty of a particular amount constitutes “holdup,” the proponents of the patent-holdup

²³⁶ *Id.* at 19.

²³⁷ *Id.*; see also Benjamin Klein, *Market Power in Antitrust: Economic Analysis After Kodak*, 3 SUP. CT. ECON. REV. 43, 52 (1993) (“Hold-ups’ . . . occur . . . only as a short-run phenomenon.”).

²³⁸ See Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 11.

²³⁹ See, e.g., MANKIW, *supra* note 41, at 276 (“[T]he firm exits the market [in the long run] if the revenue it would get from producing is less than its total costs.” (emphasis omitted)).

²⁴⁰ Galetovic & Haber, *The Fallacies of Patent-Holdup Theory*, *supra* note 21, at 19 (“[I]f the landlord decides to extract all the quasi rents through holdup, he has decided to forfeit exercising market power in the long run—because there will be no market in the long run.”).

conjecture really mean that the SEP holder is using market power obtained from the inclusion of its technology in the standard to extract a price that the proponents consider “excessive,” then they should say so. And they should use reliable economic methodologies to determine whether the SEP holder’s pricing practice would actually harm consumers. Under U.S. anti-trust law, high prices are not sufficient evidence from which to infer a reduction in consumer surplus, for economists well understand that the exercise of market power, legitimately obtained, can benefit the long-run interests of consumers.²⁴¹ Citing *Grinnell*, the late Justice Antonin Scalia emphasized this economic insight in 2004 in his opinion for the Supreme Court in *Trinko*:

The mere possession of monopoly power, and the concomitant charging of monopoly prices, is not only not unlawful; it is an important element of the free-market system. The opportunity to charge monopoly prices—at least for a short period—is what attracts “business acumen” in the first place; it induces risk taking that produces innovation and economic growth.²⁴²

Perhaps the proponents of the patent-holdup conjecture believe that it would be more enlightened for some newfound doctrine in American law to emulate the competition law of other prominent jurisdictions and punish the unilateral charging of high prices. But, if so, their conflating of market power and Williamsonian holdup is an intellectually incoherent means to that end.

VI. WHY THE ERRONEOUS NOMENCLATURE OF PATENT HOLDUP MATTERS

In his 2018 article *Much Ado About Hold-Up*, Contreras suggests that the difference between the meaning that holdup has in transaction-cost economics and the meaning that proponents of the patent-holdup conjecture have given it in the context of licensing SEPs does not matter because “hold-up itself is not a cognizable legal offense.”²⁴³ Instead, he adds, “[a]ntitrust and competition laws exist to sanction anticompetitive behavior in standard setting and otherwise.”²⁴⁴ Contreras emphasizes that, “for a violation of law to occur, a defendant must be shown to have engaged in legally prohibited conduct using established standards of conduct, not the ill-defined economic

²⁴¹ See, e.g., CARLTON & PERLOFF, *supra* note 41, at 99 (“[T]he prospect of receiving monopoly profits may motivate firms to develop new products, improve products, or find lower-cost methods of manufacturing. Were it not for the quest to obtain monopoly profits, firms might innovate less.”); Sidak & Teece, *Dynamic Competition in Antitrust Law*, *supra* note 167.

²⁴² *Verizon Commc’ns Inc. v. Law Offices of Curtis V. Trinko, LLP*, 540 U.S. 398, 407 (2004) (quoting *United States v. Grinnell Corp.*, 384 U.S. 563, 571 (1966)).

²⁴³ Contreras, *Much Ado About Hold-Up*, *supra* note 22, at 24 (emphasis in original).

²⁴⁴ *Id.*

concept of hold-up.”²⁴⁵ He also says that, “[t]o the extent that the broader concept of hold-up is not coterminous with these existing causes of action, it should not factor heavily in the analysis of party conduct.”²⁴⁶

Contreras is correct that, as of this moment, patent holdup is not in itself a cognizable legal offense under any U.S. public law. Beyond that point of agreement, however, I part company with Contreras, because I believe that choosing the correct nomenclature *does* matter, as is manifest in the fact that U.S. officials during the Obama administration invoked the patent-holdup conjecture to justify several official actions that went beyond addressing legally cognizable offenses under U.S. public law.

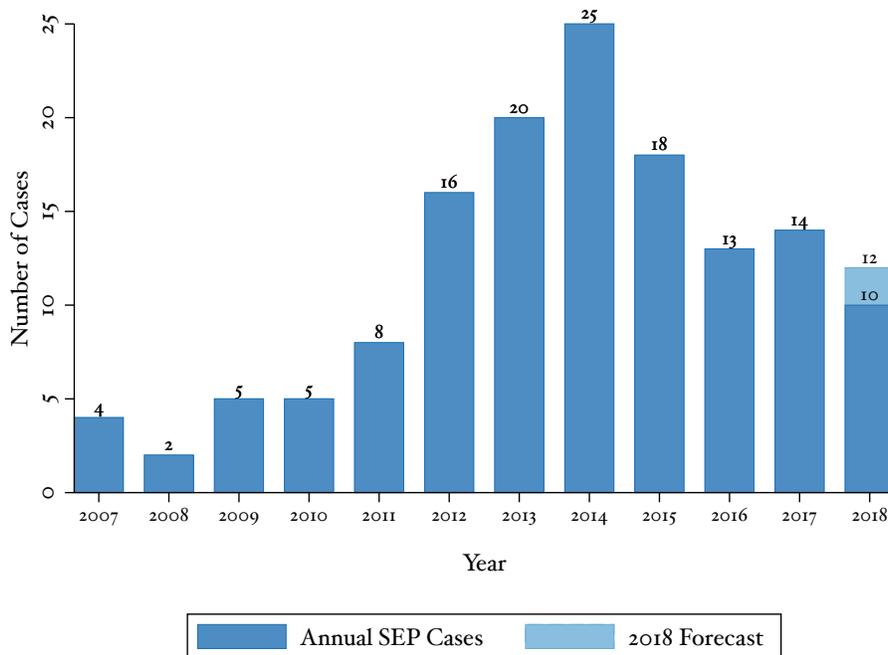
A. The Practical Implications of the Patent-Holdup Conjecture

The patent-holdup conjecture has appeared frequently in U.S. patent-infringement cases, ITC investigations, antitrust actions, and the official policy recommendations of U.S. government officers. For example, the patent-holdup conjecture has been used to restrict SEP holders’ exercise of their statutory rights, such as the right to request an injunction or exclusion order against an infringer. Some SEP holders have even faced antitrust scrutiny for requesting a court to issue a remedy against an infringer. Thus, the patent-holdup conjecture has indeed had practical implications for SEP holders, including SEP holders that did not engage in any cognizable legal offense. Figure 3 shows the number of cases in the United States from 2007 (the year in which Lemley and Shapiro debuted their theory) to 2018 concerning SEPs in which the patent-holdup conjecture was mentioned in a brief, motion, pleading, or other document in a federal or administrative court.

²⁴⁵ *Id.*

²⁴⁶ *Id.* at 25.

Figure 3. Number of U.S. Cases from 2007 to 2018 Concerning SEPs in Which the Patent-Holdup Conjecture Was Mentioned in a Brief, Motion, Pleading, or Other Document



Source: Bloomberg Law. Dataset on file with author.

Notes: I used the documents that I identified through the methodology explained in the notes for Table 1. See *supra* Table 1. For cases in which documents mentioning the patent-holdup conjecture spanned multiple years, I listed the case as occurring in the year of the most recent document mentioning the conjecture as of the publication of this article. To project the number of cases that will mention the patent-holdup conjecture in 2018, I increased by one-fifth the cases that have mentioned the patent-holdup conjecture in 2018 because, as of November 2, 2018, approximately five-sixths of 2018 have elapsed. That is, $9 + (9 \times 0.20) = 10.8$, which rounds to 11. Figure 3 is current as of November 2, 2018.

As Figure 3 shows, the number of cases mentioning the patent-holdup conjecture increased by a factor of 6.25 between 2007 and 2014 and then decreased after 2014. That trend comports with at least two hypotheses. First, the proponents of the patent-holdup conjecture might argue that an increased awareness of patent holdup and the effective enforcement of policy initiatives to curb patent holdup have resulted in fewer attempts by SEP holders to engage in patent holdup since 2014.

Alternatively, this observed pattern might represent the story arc of the patent-holdup narrative. From 2007 to 2014, the patent-holdup conjecture gained increasing popularity, resulting in more cases mentioning the theory. However, by 2015, scholars had refuted the patent-holdup conjecture on both theoretical and empirical grounds. That refutation coincided with the Federal

Circuit's significant decision on December 4, 2014 in *Ericsson v. D-Link*, in which the court required that an infringer provide specific evidence of patent holdup before invoking the theory.²⁴⁷ Since that decision, the annual number of allegations (in litigation in the United States) of patent holdup has decreased. It is useful to review the influence that the patent-holdup conjecture has had on legal proceedings in the United States.

I. *The Patent-Holdup Conjecture in Patent-Infringement Litigation*

Between 2012 and 2014, several U.S. courts presiding over patent-infringement cases discussed patent holdup when calculating damages for the infringement of SEPs subject to a FRAND commitment and when examining an SEP holder's compliance with its FRAND or RAND commitment.

For example, in the 2012 decision in *Apple v. Motorola*, Judge Barbara Crabb said that, when setting a royalty for the use of FRAND-committed SEPs, "[t]he purpose of the FRAND requirements . . . is to confine the patentee's royalty demand to the value conferred by the patent itself as distinct from the additional value—the hold-up value—conferred by the patent's being designated as standard-essential."²⁴⁸ Similarly, in *Microsoft v. Motorola* in April 2013, Judge James Robart said that, when determining whether the SEP holder complied with its RAND commitment, "[i]n the context of a dispute concerning whether or not a given royalty is RAND, a proper methodology used to determine a RAND royalty should . . . recognize and seek to mitigate the risk of patent hold-up that RAND commitments are intended to avoid."²⁴⁹ In *Innovatio* in October 2013, Judge James Holderman said that "patent hold-up is a substantial problem that RAND is designed to prevent," and that "[t]he court's RAND rate therefore must, to the extent possible, reflect only the value of the underlying technology and not the hold-up value of standardization."²⁵⁰

In September 2018, Judge James Selna, in his opinion in *TCL v. Ericsson*, considered the theoretical risk of patent holdup to be so great that he let it influence the methodology that he used to calculate a FRAND royalty for TCL's infringement of Ericsson's 2G, 3G, and 4G SEP portfolios.²⁵¹ Following a bench trial, he calculated a FRAND royalty for Ericsson's SEPs using a

²⁴⁷ 773 F.3d 1201, 1234 (Fed. Cir. 2014).

²⁴⁸ *Apple, Inc. v. Motorola, Inc.*, 869 F. Supp. 2d 901, 913 (W.D. Wis. 2012), *rev'd in part*, 757 F.3d 1286 (Fed. Cir. 2014).

²⁴⁹ *Microsoft Corp. v. Motorola, Inc.*, No. C10-1823JLR, 2013 WL 2111217, at *12 (W.D. Wash. Apr. 25, 2013) (Robart, J.). Judge Robart's case was not a patent-infringement case, although he did determine a RAND royalty.

²⁵⁰ *In re Innovatio IP Ventures, LLC Patent Litig.*, No. 11 C 9308, 2013 WL 5593609, at *9 (N.D. Ill. Oct. 3, 2013).

²⁵¹ *TCL Commc'ns Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson*, No. 14-341, 2017 WL 6611635 (C.D. Cal. Dec. 17, 2017) (Selna, J.), *amended by* 2018 WL 4488286 (C.D. Cal. Sept. 14, 2018) (Selna, J.), *appeal docketed*, No. 18-1363 (Fed. Cir. Jan. 2, 2018) [hereinafter *TCL v. Ericsson*, 2018 WL 4488286].

variation of the top-down methodology, explaining that such a methodology “can . . . prevent hold-up.”²⁵² Judge Selna explained that the top-down methodology “begins with an aggregate royalty for all patents encompassed in a standard, then determines a firm’s portion of that aggregate.”²⁵³ (Of course, the top-down approach has its limitations, because a key input—the SEP portfolio’s share of the standard—is not directly observable.²⁵⁴)

Despite the fact that TCL offered no evidence at trial that Ericsson had actually engaged in patent holdup with respect to TCL, and contrary to the Federal Circuit’s guidance in *Ericsson v. D-Link* that it is the accused infringer’s burden to present “actual evidence of hold-up” rather than “a general argument that [this] phenom[on] [is a] possibilit[y],”²⁵⁵ Judge Selna selected a FRAND royalty methodology specifically to avoid including the theoretical value attributable to patent holdup. Appeals to the theoretical risks of patent holdup permeated Judge Selna’s explanation of why he selected the top-down methodology to calculate a FRAND royalty for Ericsson’s SEPs.²⁵⁶

Judge Selna’s justification for using the top-down methodology to determine a FRAND royalty is particularly alarming given that he had in evidence a number of comparable license agreements for Ericsson’s SEPs. Such evidence is the most probative evidence for determining a FRAND royalty for Ericsson’s SEPs.²⁵⁷ Judge Selna did rely on six license agreements that Ericsson executed with Apple, Samsung, HTC, Huawei, LG, and ZTE to calculate a *nondiscriminatory* royalty for TCL’s use of Ericsson’s SEPs.²⁵⁸ He explained that “the comparable licenses and top down analysis

²⁵² *Id.* at *8.

²⁵³ *Id.* at *1.

²⁵⁴ See Sidak, *The Meaning of FRAND, Part I: Royalties*, *supra* note 21, at 1012–13.

²⁵⁵ *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1234 (Fed. Cir. 2014) (“In deciding whether to instruct the jury on patent hold-up and royalty stacking, again, we emphasize that the district court must consider the evidence on the record before it. The district court need not instruct the jury on hold-up or stacking unless the accused infringer presents actual evidence of hold-up or stacking. Certainly something more than a general argument that these phenomena are possibilities is necessary. Indeed, ‘a court should not instruct on a proposition of law about which there is no competent evidence.’” (quoting *Nestier Corp. v. Menasha Corp.-Lewisystems Div.*, 739 F.2d 1576, 1579–80 (Fed. Cir. 1984)).

²⁵⁶ Judge Selna explained that, “[w]hile this approach is not perfect, it has merit because: (1) it relies on statements that Ericsson and other SEP owners made to induce people to adopt and invest in each standard when the *risk of hold-up* was low; (2) these statements were made before the standard was adopted, providing the SEP owners with incentive to be reasonable with their overall expectations and greatly reducing the *risk of hold-up* and royalty stacking; (3) Ericsson was a licensor and licensee, giving it stronger incentive to be fair and reasonable with its own estimate; (4) Ericsson still stands by this methodology . . . and (5) it at least provides the ceiling for a FRAND rate, because increasing the royalty rate after the standard has been adopted, without showing that the increase is due to additions to the standard, is the definition of *hold-up*.” *TCL v. Ericsson*, 2018 WL 4488286, at *14 (emphasis added).

²⁵⁷ See Sidak, *The Meaning of FRAND, Part I: Royalties*, *supra* note 21, at 1001–07; J. Gregory Sidak, *Apportionment, FRAND Royalties, and Comparable Licenses After Ericsson v. D-Link*, 2016 U. ILL. L. REV. 1809, 1821–22; J. Gregory Sidak & Jeremy O. Skog, *Hedonic Prices and Patent Royalties*, 2 CRITERION J. ON INNOVATION 601, 602 (2017).

²⁵⁸ *TCL v. Ericsson*, 2018 WL 4488286, at *42–48; see also J. Gregory Sidak & Urška Petrović, *Will the CJEU’s Decision in MEO Change FRAND Disputes Globally?*, 3 CRITERION J. ON INNOVATION 301, 331–33 (2018).

act as a reasonable check on each other.”²⁵⁹ Yet, Judge Selna ultimately set the FRAND royalty for Ericsson’s SEPs using the rates calculated through his own top-down calculations, *not* the rates derived from Ericsson’s actual license agreements for its SEPs.²⁶⁰ Two prominent SEP holders in the mobile device industry, Nokia and InterDigital, filed *amicus* briefs with the Federal Circuit, disputing as reversible error these rulings in Judge Selna’s decision.²⁶¹

Thus, since at least 2012 the patent-holdup conjecture has influenced the reasoning of American judges in patent-infringement litigation involving SEPs. It is questionable, however, whether arguments related to patent holdup are necessary to avoid an excessive award of damages for the infringement of SEPs. The Supreme Court has recognized for more than 130 years that patent damages must be apportioned to the value of the invention.²⁶² Consequently, reference to the patent-holdup conjecture is unnecessary to ensure that the damages award for infringement of SEPs is not excessive. Put differently, the justification one often hears for judicial solicitude concerning the risk of patent holdup sounds very much like the hoary rationale for “apportionment” of damages for patent infringement. Perhaps arguments about the theoretical risk of patent holdup merely serve to skew the jury’s perception (or even the judge’s perception, as appears to have been the case with Judge Selna in *TCL v. Ericsson*) in such a manner as to lower the damages eventually awarded for infringement of the SEPs in suit. One wonders whether, in response, concern over this risk of cognitive bias animated the Federal Circuit’s reasoning in *Ericsson v. D-Link* that a judge need not instruct

²⁵⁹ *TCL v. Ericsson*, 2018 WL 4488286, at *51.

²⁶⁰ *Id.* (acknowledging discrepancies between the rates calculated using the top-down analysis and the rates calculated using the comparable licenses, but ultimately awarding Ericsson damages based on the rates calculated using only the top-down analysis).

²⁶¹ Brief of Amicus Curiae Nokia Technologies Oy in Support of Appellants Telefonaktiebolaget LM Ericsson and Ericsson Inc. at 9, *TCL Commc’ns Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson* (June 18, 2018) (No. 18-1363) (“The district court chose this top-down approach as its primary methodology even though it was dependent on a number of assumptions, which, if wrong, could lead to aberrant results. The district court also chose to use comparable licenses—the actual market data available for the portfolio in dispute—as only a loose check on its primary top-down approach, even though both Ericsson and TCL agreed that comparable licenses would be instructive on the issues in dispute.”); Brief of InterDigital, Inc. as Amici Curiae in Support of Defendants-Appellants at 12, *TCL Commc’ns Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson* (June 18, 2018) (No. 18-1363) (“Real world market outcomes are the most probative of value, and consequently analysis of comparable licenses should be the preferred method of analyzing FRAND terms. Resort to ‘top down’ or other patent analysis methods, when comparable licenses are available, is unwarranted, particularly in light of the many sources of unreliability inherent in attempting to analyze the contributions of literally thousands of patents to an industry standard.”).

²⁶² See, e.g., *Garretson v. Clark*, 111 U.S. 120, 121 (1884) (“The patentee . . . must in every case give evidence tending to separate or apportion the defendant’s profits and the patentee’s damages between the patented feature and the unpatented features.” (quoting *Garretson v. Clark*, 10 F. Cas. 40, 44 (N.D.N.Y. 1878)); see also *Keystone Mfg. Co. v. Adams*, 151 U.S. 139, 148 (1894); *City of Elizabeth v. Am. Nicholson Pavement Co.*, 97 U.S. 126, 138–39 (1877); *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, No. 2:14-cv-00911, at 6 (E.D. Tex. Sept. 27, 2018) (Gilstrap, J.), ECF No. 677 (“[W]hen ‘dealing with SEPs, there are two special apportionment issues that arise. First, the patented feature must be apportioned from all of the unpatented features reflected in the standard. Second, the patentee’s royalty must be premised on the value of the patented feature, not any value added by the standard’s adoption of the patented technology.” (quoting *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1232 (Fed. Cir. 2014))).

the jury to consider the risk of patent holdup when determining a FRAND royalty if the accused infringer has failed to present actual evidence of patent holdup from the facts in the record.²⁶³

2. *The Patent-Holdup Conjecture in ITC Investigations*

The patent-holdup conjecture has also limited, at least to some extent, an SEP holder's ability to obtain an exclusion order against an infringing standard-compliant product that an implementer imports into the United States. As of November 2018, no SEP holder has been able to enforce an exclusion order against products found to infringe SEPs.

On one occasion, the ITC did issue an exclusion order against a product that infringed an SEP. In June 2013, the ITC issued an exclusion order against Apple's imported products (smartphones and tablet computers) that the ITC found to infringe a FRAND-committed SEP owned by Samsung.²⁶⁴ However, in August 2013, the U.S. Trade Representative (USTR), Ambassador Michael Froman, citing general rather than specific concerns of "patent hold-up" of Apple by Samsung, vetoed the exclusion order on behalf of President Obama.²⁶⁵ In doing so, Ambassador Froman approvingly recited a 2013 joint policy statement by the U.S. Department of Justice and the U.S. Patent and Trademark Office (USPTO) regarding the risk of patent holdup at the ITC:

The policy statement expresses substantial concerns, which I strongly share, about the potential harms that can result from owners of standard-essential patents . . . who have made a voluntary commitment to offer to license SEPs on terms that are fair, reasonable, and non-discriminatory . . . , gaining undue leverage and engaging in "patent hold-up", *i.e.*, asserting the patent to exclude an implementer of the standard from a market to obtain a higher price for use of the patent than would have been possible before the standard was set, when alternative technologies could have been chosen.²⁶⁶

Ambassador Froman's letter further directed that, in future section 337 investigations involving SEPs, the ITC encourage parties to provide information on "the presence or absence of patent hold-up or reverse

²⁶³ 773 F.3d at 1234.

²⁶⁴ Notice of the Commission's Final Determination Finding a Violation of Section 337, Issuance of a Limited Exclusion Order and a Cease and Desist Order, Termination of the Investigation at 1, Certain Electronic Devices, Including Wireless Communication Devices, Portable Music and Data Processing Devices, and Tablet Computers, Inv. No. 337-TA-794 (USITC, June 4, 2013) (Final Determination).

²⁶⁵ Letter from Michael B. G. Froman, Ambassador, U.S. Trade Representative, Exec. Office of the President, to Irving A. Williamson, Chairman, U.S. Int'l Trade Comm'n 3 (Aug. 3, 2013), https://ustr.gov/sites/default/files/o8032013%20Letter_1.PDF [hereinafter USTR Letter].

²⁶⁶ *Id.* at 2.

hold-up.”²⁶⁷ In subsequent section 337 investigations involving SEPs, infringers have consistently raised concerns of patent holdup as a justification for the ITC to deny the SEP holder’s requested exclusion order against the accused articles.²⁶⁸ In 2013, for example, Farrell opined in expert economic testimony submitted on behalf of Samsung in a FRAND dispute with Ericsson that, “[f]or standard essential patents, subject to FRAND commitments,” “as a general rule, exclusion orders are detrimental to the public interest.”²⁶⁹

3. *The Patent-Holdup Conjecture and Antitrust Enforcement*

The patent-holdup conjecture has influenced U.S. antitrust enforcement in two distinct respects. First, it has motivated the Federal Trade Commission to investigate the licensing activities of SEP holders, even as the question remains unanswered whether specific SEP licensing conduct is actionable under any theory of harm recognized by U.S. antitrust law. Second, the Antitrust Division has relied on the patent-holdup conjecture to justify its prosecutorial inaction in a case where the possibility of anticompetitive conduct justified closer scrutiny. These decisions to investigate or to decline to investigate show how the patent-holdup conjecture has undoubtedly influenced U.S. antitrust enforcement policy.²⁷⁰

a. *The Federal Trade Commission*

In January 2008, the FTC investigated Negotiated Data Solutions LLC (N-Data) for allegedly renegeing on its pricing commitments after its patents had been adopted into a standard.²⁷¹ The FTC said that “N-Data’s efforts to exploit the power it enjoys over those practicing the Fast Ethernet standard

²⁶⁷ *Id.* at 3.

²⁶⁸ See, e.g., Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof, Inv. No. 337-TA-868, 2014 WL 2965327, at *81 (USITC June 13, 2014) (Initial Determination); Certain 3G Mobile Handsets and Components Thereof, Inv. No. 337-TA-613, 2015 WL 6561709, at *14 (USITC Apr. 27, 2015) (Initial Determination on Remand); Initial Determination on Violation of Section 337 and Recommended Determination on Remedy and Bond at 188, Certain Memory Modules and Components Thereof, and Products Containing Same, Inv. No. 337-TA-1023 (Public Version) (USITC Nov. 14, 2017) (Initial Determination).

²⁶⁹ Open Session Hearing Transcript at 1691:15–19, Certain Electronic Devices, Including Wireless Communication Devices, Tablet Computers, Media Players, and Televisions, and Components Thereof, Inv. No. 337-TA-862 (USITC Sept. 23, 2013) (testimony of Joseph Farrell).

²⁷⁰ Jorge Contreras has made the same observation. See Jorge L. Contreras, Taking It to the Limit: Shifting U.S. Antitrust Policy Toward Standards Development 5 (July 23, 2018) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3218360&download=yes (“Concern over the potential anticompetitive effects of patent hold-up motivated many of the FTC’s enforcement actions discussed above, including its current litigation against Qualcomm.”); see also Daniel F. Spulber, *Antitrust Policy Toward Technology Standards*, COMPETITION POLY INT’L ANTITRUST CHRON., Sept. 2016, at 1, 2 (“Antitrust policy should be based on a realistic view of the market for inventions and economic institutions. The concerns expressed by antitrust authorities about SEPs often are based on inaccurate pictures of patent licensing and the standard setting process.”).

²⁷¹ Analysis of Proposed Consent Order to Aid Public Comment at 4–8, Negotiated Data Sols., LLC, No. 051-0094, 2008 WL 258308, at *36–39 (F.T.C. Jan. 22, 2008).

and lacking any practical alternatives” is a “form of patent hold-up [that] is inherently ‘coercive’ and ‘oppressive’ with respect to firms that are, as a practical matter, locked into a standard.”²⁷² In its settlement with the FTC, N-Data agreed to enforce its patents at issue only after first offering to the implementer a one-time, fully paid-up license for a lump-sum payment of \$1000.²⁷³

The FTC also brought two separate actions against SEP holders that sought to enjoin infringers of FRAND-committed SEPs. First, in *Robert Bosch GmbH* in 2012, the FTC alleged that “[s]eeking injunctions against willing licensees of FRAND-encumbered standard essential patents, as SPX is alleged to have done here, is a form of FRAND evasion and can reinstate the risk of patent hold-up that FRAND commitments are intended to ameliorate.”²⁷⁴ Pursuant to its settlement with the FTC, Bosch (which had acquired the SEP holder in question, SPX) agreed to stop seeking to enjoin implementers for infringement of the asserted patents.²⁷⁵

Second, in *In re Motorola Mobility* in 2013, the FTC alleged that “Motorola breached its [FRAND] obligations by seeking to enjoin and exclude implementers of its SEPs, including some of its competitors, from marketing products compliant with some or all of the [relevant standards].”²⁷⁶ The FTC reasoned that, “because of the ITC’s remedial structure, filing for an exclusion order before the ITC on a FRAND-encumbered SEP significantly raises the risk of patent hold-up in concurrent licensing negotiations because an exclusion order may be entered by the ITC before a FRAND rate is reached.”²⁷⁷ Google, which had acquired Motorola, settled with the FTC by agreeing to forbear from pursuing its lawful right to injunctive relief for the infringement of its SEPs without first offering an implementer binding arbitration to establish a license agreement.²⁷⁸

It bears emphasis that none of the FTC’s investigations found a violation of U.S. antitrust law. The allegedly anticompetitive conduct consisted of either (1) the SEP holder’s failure to comply with a FRAND commitment or

²⁷² *Id.* at 5, 2008 WL 258308, at *37.

²⁷³ *Id.*; see also Alden F. Abbott, *US Government Antitrust Intervention in Standard-Setting Activities and the Competitive Process*, 18 VAND. J. ENT. & TECH. L. 225, 234 (2016).

²⁷⁴ Analysis of Agreement Containing Consent Orders to Aid Public Comment at 4, *Robert Bosch GmbH*, No. 121-0081 (F.T.C. Nov. 26, 2012).

²⁷⁵ Decision and Order at 14, *Robert Bosch GmbH*, No. 121-0081 (F.T.C. Apr. 23, 2013); see also Abbott, *supra* note 273, at 235.

²⁷⁶ Prepared Statement of the Federal Trade Commission Before the U.S. Senate Committee on the Judiciary Subcommittee on Antitrust, Competition Policy and Consumer Rights Concerning “Standard Essential Patent Disputes and Antitrust Law” 10 (July 30, 2013) [hereinafter FTC Statement] (alterations in original) (citing Complaint at 5, *Motorola Mobility LLC & Google Inc.*, No. 121-0120 (F.T.C. July 23, 2013)).

²⁷⁷ Analysis of Proposed Consent Order to Aid Public Comment at 3, *Motorola Mobility LLC & Google Inc.*, No. 121-0120 (F.T.C. July 22, 2013).

²⁷⁸ Decision and Order at 8, *Motorola Mobility LLC & Google Inc.*, No. 121-0120 (F.T.C. July 22, 2013); see also Abbott, *supra* note 273, at 235.

(2) the SEP holder's request for an injunction against an infringer. However, a breach of contract (including a breach of a FRAND commitment) is not by itself an antitrust offense.²⁷⁹ Similarly, a request for an injunction is not anticompetitive, but rather is protected by the *Noerr-Pennington* doctrine, which immunizes from antitrust liability someone who exercises her First Amendment right to petition the government for a redress of grievances.²⁸⁰ Nonetheless, these investigations by U.S. antitrust agencies from 2008 to 2013 set a strong precedent for foreign antitrust agencies less reluctant to rely on the patent-holdup conjecture in their efforts to impose antitrust liability on SEP holders.²⁸¹

In addition, as of November 2018, the FTC is pursuing a monopolization case against Qualcomm that concerns its licensing of SEPs on FRAND terms. A detailed discussion of the legal and economic arguments contained in the FTC's complaint exceeds the scope of this article. However, it is clear from the FTC's complaint (and from Judge Lucy Koh's order denying Qualcomm's motion to dismiss) that the patent-holdup conjecture figures prominently in the FTC's theory of antitrust liability.²⁸²

²⁷⁹ See Delrahim, *Antitrust Law and Patent Licensing in the New Wild West*, *supra* note 108, at 2 (“[A]n antitrust cause of action premised on a failure to abide by FRAND commitments would be inconsistent with Section 2 of the Sherman Act.”); see also *Verizon Commc'ns v. Law Offices of Curtis V. Trinko, LLP*, 540 U.S. 398, 405–06 (2004) (“[I]ncumbent LECs are required to offer three kinds of access. Already noted, and perhaps most intrusive, is the duty to offer access to UNEs on ‘just, reasonable, and nondiscriminatory’ terms That Congress created these duties, however, does not automatically lead to the conclusion that they can be enforced by means of an antitrust claim.”); *Oversight of the Enforcement of the Antitrust Laws: Hearing Before the Subcomm. on Antitrust, Competition Policy & Consumer Rights of the S. Comm. on the Judiciary*, 115th Cong. (2018) (testimony of Hon. Joseph Simons, Chairman, Federal Trade Commission), <https://www.judiciary.senate.gov/meetings/10/03/2018/oversight-of-the-enforcement-of-the-antitrust-laws> (“[J]ust the fact that there is a breach of FRAND commitment does not mean in any way that there's an antitrust violation.”) (video recording at 51:33).

²⁸⁰ See Statement of Commissioner Maureen K. Ohlhausen at 1, *Robert Bosch GmbH*, No. 121-0081 (F.T.C. Nov. 26, 2012) (“Moreover, it is unclear how the seeking of injunctive relief, in either the courts or the ITC, on a patent—even a FRAND-encumbered SEP—would not be considered protected petitioning of the government under the *Noerr-Pennington* doctrine.”); Makan Delrahim, Assistant Attorney Gen., U.S. Dep't of Justice, Remarks as Prepared for The Federal Circuit Bar Association Global Series 2018: Protecting Free-Market Patent Bargaining, Competition, and the Right to Exclude 10 (Oct. 10, 2018) (“Substituting a formal standard-setting process for the free-market process of choosing technological winners and losers does not turn the technology winner's constitutional right to exclude into a suspicious exercise of unlawful market power.”); see also *Eastern R.R. Presidents Conf. v. Noerr Motor Freight, Inc.*, 365 U.S. 127 (1961); *United Mine Workers of Am. v. Pennington*, 381 U.S. 657 (1965); *California Motor Transp. Co. v. Trucking Unlimited*, 404 U.S. 508 (1972).

²⁸¹ See Sidak, *The Tempting of American Antitrust Law: An Open Letter to President Trump*, *supra* note 96, at 203–04.

²⁸² See FTC Complaint for Equitable Relief, *supra* note 36, at 12 (“To address this ‘hold-up’ risk, SSOs often require patent holders to disclose their patents and commit to license standard-essential patents (‘SEPs’) on fair, reasonable, and non-discriminatory (‘FRAND’) terms. Absent such requirements, a patent holder might be able to parlay the standardization of its technology into a monopoly in standard-compliant products.”); Order Denying Motion to Dismiss at 3, *FTC v. Qualcomm Inc.*, No. 5:17-cv-00220, 2017 WL 2774406, at *2 (N.D. Cal. June 26, 2017) (“Importantly, before incorporating a technology into a standard, SSOs ‘often require patent holders to disclose their patents and commit to license [SEPs] on fair, reasonable, and nondiscriminatory (‘FRAND’) terms.’ Absent such requirements, a patent holder might

b. The Antitrust Division

In February 2015, in response to proposed bylaw amendments to the IEEE Standards Association's patent policy, the Antitrust Division released a business-review letter that worried more about patent holdup than the potential for collusion among implementers to suppress the royalties they pay for SEPs.²⁸³ The IEEE's revised patent policy diminished, among other things, the SEP holder's ability to enforce its patent rights against infringers of SEPs.²⁸⁴ The IEEE's revised policy also redefined FRAND so as to suppress the royalty that an SEP holder may charge for the use of its SEPs.²⁸⁵ Despite concerns about bias in the IEEE's bylaw amendment procedure, and despite the potential for anticompetitive collusion among some IEEE members that are implementers, the Antitrust Division announced that it had no intention to challenge the IEEE's proposed policy amendments. In the Division's view during the Obama administration, "[t]he threat of exclusion from a market is a powerful weapon that can enable a patent owner to hold up implementers of a standard,"²⁸⁶ and "the Update's provisions . . . may further help to mitigate hold up."²⁸⁷

4. The Policy Implications of the Patent-Holdup Conjecture

The patent-holdup conjecture also wormed its way into Obama-era policy recommendations. For example, motivated by concerns of patent holdup, the FTC took several policy actions that sought to limit an SEP holder's patent rights.

First, in March 2011, the FTC issued a report outlining mechanisms that the ITC and courts should use to mitigate the risk of patent holdup.²⁸⁸ The

be able to parlay the standardization of its technology into a monopoly in standard-compliant products." (alteration in original) (citation omitted) (quoting FTC Complaint for Equitable Relief, *supra* note 36, ¶ 49, at 12).

²⁸³ Business Review Letter from Hon. Renata B. Hesse, Acting Assistant Attorney Gen., U.S. Dep't of Justice, to Michael A. Lindsay, Esq., Dorsey & Whitney, L.L.P. 9 (Feb. 2, 2015) [hereinafter IEEE Business Review Letter], <https://www.justice.gov/sites/default/files/atr/legacy/2015/02/02/311470.pdf>.

²⁸⁴ See, e.g., Sidak, *Testing for Bias to Suppress Royalties for Standard-Essential Patents*, *supra* note 6, at 319–22. I provide a comprehensive analysis of the 2015 IEEE bylaw amendments in Sidak, *The Antitrust Division's Devaluation of Standard-Essential Patents*, *supra* note 6, at 56–60.

²⁸⁵ See, e.g., Sidak, *Testing for Bias to Suppress Royalties for Standard-Essential Patents*, *supra* note 6, at 303 ("I present here econometric analysis that reveals a biased treatment of substantive comments submitted to the IEEE by members opposed to the controversial revisions."); see also IEEE-SA Standards Board Patent Committee, IEEE-SA Patent Policy: Draft Comments, Comment ID No. 37 (Mar. 4, 2014), http://grouper.ieee.org/groups/pp-dialog/drafts_comments/PatCom_sort_by_commentID_040314.pdf (comments of Dina Kallay, Dir. for IP and Competition, Ericsson); Don Clark, *Patent Holders Fear Weaker Tech Role*, WALL ST. J., Feb. 9, 2015; Ryan Davis, *Patent Owners Take Hit with Standard-Setting Body's Rules*, LAW360, Feb. 9, 2015, <http://www.law360.com/competition/articles/619687>.

²⁸⁶ IEEE Business Review Letter, *supra* note 283, at 9.

²⁸⁷ *Id.* at 6.

²⁸⁸ FEDERAL TRADE COMMISSION, THE EVOLVING IP MARKETPLACE: ALIGNING PATENT NOTICE AND REMEDIES WITH COMPETITION (2011).

FTC recommended that, to avoid excessive damages awards stemming from patent holdup, courts should “set the hypothetical negotiation at an early stage of product development, when the infringer is making design decisions and before it has sunk costs into using the patented technology.”²⁸⁹ The FTC’s suggestion would change the courts’ standard practice of setting the damages award by estimating the royalty upon which the patent holder and the infringer would have agreed in a hypothetical negotiation just before the moment of first infringement. As I explain in Part III.C.3, this change would bias the hypothetical negotiations toward the implementer, as only the implementer, but not the inventor, would be restored to its original position. In other words, the earlier hypothetical negotiation would not be “*ex ante* enough” to permit the patent holder to have outside options to monetizing its invention through the SSO in question.²⁹⁰

Second, in December 2012, the FTC submitted an *amicus* brief to the Federal Circuit in *Apple v. Motorola* supporting the district court’s denial of an injunction for a RAND-committed SEP on that rationale that the court’s issuance of an injunction would facilitate holdup.²⁹¹ The FTC argued that, if the SEP holder “seeks an injunction not for the purpose of excluding . . . [the infringing] products from the market, but to bring [the infringer] to the table to negotiate a favorable royalty, its argument does not support an injunction against a willing licensee. On the contrary, the use of such leverage is the essence of hold-up.”²⁹² In other words, the FTC urged the Federal Circuit to limit the SEP holder’s right to an injunction on the rationale that granting its request for such a remedy would facilitate patent holdup.

Similarly, in July 2013, the FTC submitted a statement to the Senate Judiciary Committee, “Standard Essential Patent Disputes and Antitrust Law,” in which the agency listed multiple allegedly harmful effects caused by patent holdup and proposed regulatory actions to mitigate those perceived effects.²⁹³ The FTC suggested among other things that, “if a court concludes that a party, or its predecessor in interest, made a FRAND commitment with respect to a SEP, an injunction should be denied for that patent.”²⁹⁴ In other words, the FTC relied on the patent-holdup conjecture when recommending to the Senate Judiciary Committee that the federal courts limit an SEP holder’s ability to obtain an injunction.

²⁸⁹ *Id.* at 22.

²⁹⁰ See Sidak, *The Meaning of FRAND, Part I: Royalties*, *supra* note 21, at 983.

²⁹¹ Brief of Amicus Curiae Federal Trade Commission Supporting Neither Party at 7, *Apple, Inc. v. Motorola, Inc.*, 757 F.3d 1286 (Fed. Cir. 2012) (Nos. 2012-1548, 2012-1549), 2012 WL 6655899, at *7 [hereinafter FTC Amicus Brief, *Apple v. Motorola*].

²⁹² *Id.* at 12–13, 2012 WL 6655899, at *6.

²⁹³ FTC Statement, *supra* note 276, at 3–11.

²⁹⁴ FTC Amicus Brief, *Apple v. Motorola*, *supra* note 291, at 2 n.3, 2012 WL 6655899, at *7 n.3.

In addition, in January 2012, the U.S. Department of Justice and the USPTO jointly issued a policy statement warning that “the owner of [a] patented technology may gain market power and potentially take advantage of it by engaging in patent hold-up.”²⁹⁵ The agencies asserted that patent holdup could harm competition, innovation, and consumers.²⁹⁶ The joint statement recommended that, “depending on the facts of individual cases, the public interest may preclude the issuance of an exclusion order [from the ITC] in cases where the infringer is acting within the scope of the patent holder’s F/RAND commitment and is able, and has not refused, to license on F/RAND terms.”²⁹⁷ That joint policy statement motivated subsequent actions by the President of the United States. As noted above, former USTR Ambassador Froman extensively cited the joint statement of the Department of Justice and the USPTO in his letter vetoing, on behalf of President Obama, the exclusion order that the ITC had granted Samsung against Apple for infringing a Samsung FRAND-committed SEP.²⁹⁸ Thus, the Department of Justice and USPTO affirmatively relied on the patent-holdup conjecture to advocate government policies and specific actions that would in many cases deny an SEP holder an exclusion order.

In sum, the Obama administration frequently cited the patent-holdup conjecture as justifying policy interventions that would diminish the SEP holder’s rights. Under the Trump administration, however, the Antitrust Division reversed that policy.²⁹⁹ Referring to the Antitrust Division’s IEEE business review letter issued during the Obama administration, Assistant Attorney General Delrahim said in November 2017 that “this letter should never be cited for the proposition that what IEEE did is required, or that a patent holder who seeks an injunction is somehow in violation of the antitrust laws.”³⁰⁰ This reversal of policy came much to the consternation of academics and former antitrust enforcement officials, who have since expressed their longing for a continuation of the Obama administration’s

²⁹⁵ U.S. DEPARTMENT OF JUSTICE & U.S. PATENT & TRADEMARK OFFICE, POLICY STATEMENT ON REMEDIES FOR STANDARDS-ESSENTIAL PATENTS SUBJECT TO VOLUNTARY F/RAND COMMITMENTS 4 (2013).

²⁹⁶ *Id.*

²⁹⁷ *Id.* at 9.

²⁹⁸ USTR Letter, *supra* note 265, at 2 & n.3.

²⁹⁹ See, e.g., Makan Delrahim, Take It to the Limit: Respecting Innovation Incentives in the Application of Antitrust Law, *supra* note 108, at 4–7.

³⁰⁰ Makan Delrahim, Assistant Attorney Gen., U.S. Dept of Justice, Remarks as Prepared for the Leadership Conference: The Long Run: Maximizing Innovation Incentives Through Advocacy and Enforcement 9 (Apr. 10, 2018); see also Douglas H. Ginsburg, *Judge Douglas Ginsburg Interviews Makan Delrahim on Intellectual Property and Antitrust*, COMPETITION POL’Y INT’L: ANTITRUST CHRON., June 2018, at 1; David J. Teece, *Pivoting Toward Schumpeter: Makan Delrahim and the Recasting of U.S. Antitrust Towards Innovation, Competitiveness, and Growth*, 32 ANTITRUST 32, 32 (2018) (“Assistant Attorney General Makan Delrahim . . . has signaled a subtle but important shift in antitrust policy in the United States, particularly where intellectual property and competition policy issues interact or appear to collide. . . . [I]f he is to be believed, we are henceforth not going to be waylaid by economic theory alone.”).

policy pronouncements on the patent-holdup conjecture that favored implementers over SEP holders.³⁰¹

B. Can a More Precise Nomenclature Provide Clarity and Rigor?

Would using a more precise nomenclature lead to different outcomes? Would the outcomes of complex litigation and antitrust investigations change if concerns were raised regarding “excessive” royalties for SEPs, rather than the risk of patent holdup? I believe they would.

First, using the term “excessive royalties” rather than “patent holdup” would clarify that antitrust law has no role in addressing the SEP holder’s conduct.³⁰² As I explained above, U.S. courts have long recognized that a firm’s unilateral decision to charge high prices does not constitute anticompetitive conduct. The Supreme Court’s 2006 decision in *Trinko* said that the unilateral charging of monopoly prices is both lawful and “an important element of the free-market system.”³⁰³ Put differently, a firm’s unilateral charging of “excessive” patent royalties is not an antitrust violation.

The D.C. Circuit emphasized that the same principle applies in the context of SEPs. In *Rambus Inc. v. Federal Trade Commission*, the D.C. Circuit said, in an opinion by Judge Stephen Williams, that, “to be condemned as exclusionary, a monopolist’s act must have [an] anticompetitive effect. That is, it must harm the competitive process and thereby harm consumers.”³⁰⁴ The court noted that charging an above-FRAND (or above-RAND) royalty “has no particular tendency to exclude rivals and thus to diminish competition.”³⁰⁵ The D.C. Circuit acknowledged that, when an SEP holder does not honor its commitment to charge FRAND (or RAND) royalties, consumers might pay

³⁰¹ See, e.g., Letter from Michael A. Carrier, Prof., Rutgers L. Sch., et al. to Makan Delrahim, Assistant Attorney Gen., U.S. Dep’t of Justice (May 17, 2018), <https://patentlyo.com/media/2018/05/DOJ-patent-holdup-letter.pdf> (“We, 77 former government enforcement officials and professors of law, economics, and business, write to express concern with recent speeches [Mr. Delrahim] [] made that we do not believe are consistent with the broad bipartisan legal and economic consensus that has existed for over a decade regarding standard setting.”). Timothy Muris (former chairman of the FTC and senior counsel to Sidley), Douglas Melamed, and Fiona Scott Morton are among the letter’s signatories. *Id.* See also Terrell McSweeney, Comm’r, Fed. Trade Comm’n, Holding the Line on Patent Holdup: Why Antitrust Enforcement Matters 1 (Mar. 21, 2018) (“It would be unfortunate if the antitrust agencies were to unlearn the lessons of over 15 years of scholarship and bipartisan study and question their longstanding support for combatting holdup based on vague concerns about over-deterrence.”).

³⁰² The Court of Appeal of England and Wales made a significant step toward using this more appropriate terminology in its decision in *Unwired Planet International Ltd. v. Huawei Technologies Co.* For example, the court said that “[t]he owner of a SEP may still use the threat of an injunction to try to secure the payment of excessive license fees and so engage in hold-up activities.” [2018] EWCA Civ 2344 [5]. Similarly, the court said that the “purpose of the FRAND undertaking” is “to ensure that the SEP owner is not able to ‘hold-up’ implementation by demanding more than its patent or patent portfolio is worth.” *Id.* [196].

³⁰³ *Verizon Commc’ns v. Law Offices of Curtis V. Trinko, LLP*, 540 U.S. 398, 407 (2004).

³⁰⁴ 522 F.3d 456, 463 (D.C. Cir. 2008) (emphasis in original) (internal citations omitted).

³⁰⁵ *Id.* at 464.

higher prices.³⁰⁶ However, the court emphasized that, a “monopolist’s end-run around price constraints . . . does not alone present a harm to competition in the monopolized market.”³⁰⁷ Indeed, Assistant Attorney General Delrahim emphasized during a speech delivered on September 18, 2018, that “Section 2 [of the Sherman Act] . . . is agnostic to the price that a patent-holder seeks to charge after committing to [offer to license its SEPs on FRAND terms].”³⁰⁸ He also emphasized that “the Sherman Act is indifferent to price discrimination.”³⁰⁹ Therefore, recognizing that the patent-holdup conjecture merely refers to “excessive” or “above-FRAND” (or “discriminatory”) royalties would clarify that antitrust law has no role in addressing an SEP holder’s allegedly opportunistic behavior, unless there is evidence that the conduct has harmed the competitive process.

Second, recognizing that patent holdup simply refers to “excessive” or “above-FRAND” royalties would clarify that the patent-holdup conjecture has no practical relevance in American litigation. Long, theoretical discussions about whether SEP holders systematically try to obtain excessive royalties for their SEPs is irrelevant to determining whether a given SEP holder has violated its own FRAND commitment by refusing to offer to license its SEPs on legitimately FRAND terms to a given implementer. The relevant question that the finder of fact must answer is whether the SEP holder has discharged its FRAND obligation as a matter of contract law. Likewise, the question of whether an SEP holder systematically attempts to charge excessive royalties for its SEPs is irrelevant to determining damages for patent infringement. As explained in Part VI.A.1, existing laws already require courts to award damages that compensate the patent holder for the value of the invention and no more.

Third, using the correct nomenclature would also clarify the remedies necessary to address the supposed “risk” of patent holdup. If the actual concern of the proponents of the patent-holdup conjecture is that the SEP holder will try to charge a royalty that exceeds the FRAND range, then the appropriate remedy to address that problem is to enforce the SEP holder’s FRAND obligation pursuant to its contract with the SSO.³¹⁰ By enforcing the SEP holder’s FRAND contract and by setting damages for the infringement of SEPs within the FRAND range, courts will effectively prevent holdup. There is no need for the courts or Congress to rewrite the existing jurisprudence on patent infringement by, for example, systematically denying

³⁰⁶ See *id.* at 466 (“JEDEC lost only an opportunity to secure a RAND commitment from Rambus. But loss of such a commitment is not a harm to competition from alternative technologies in the relevant markets.”).

³⁰⁷ *Id.*

³⁰⁸ Delrahim, *Antitrust Law and Patent Licensing in the New Wild West*, *supra* note 108, at 7.

³⁰⁹ *Id.* at 8.

³¹⁰ See Sidak, *The FRAND Contract*, *supra* note 147.

injunctive relief for SEP holders, or by imposing antitrust liability on SEP holders that seek injunctions. There is similarly no need to resort to antitrust law to enforce existing contractual obligations. Rather, as Assistant Attorney General Delrahim has emphasized, “[m]aking the duty to license on FRAND terms enforceable under the antitrust laws would contravene the policies of the Sherman Act”³¹¹ and “create an unacceptable risk of ‘false positive’ condemnations.”³¹²

In short, contrary to the contentions of Contreras, the use of the correct nomenclature to describe the patent-holdup conjecture is *not* of trifling relevance. Using the correct nomenclature of excessive (or above-FRAND) royalties would clarify the appropriate policy remedies to address this phenomenon.

CONCLUSION

From its birth, the patent-holdup conjecture has been commissioned legal advocacy masquerading as economic science. Since 2007, skeptics have shown that the patent-holdup conjecture is flawed on theoretical grounds and devoid of empirical substantiation. Rather than respond, the proponents of the conjecture have simply ignored the most trenchant and embarrassing of those refutations. Lacking *a priori* and empirical support for the patent-holdup conjecture, and declining to face their critics head-on, the proponents instead have resorted to two rhetorical devices in the story arc of the patent-holdup conjecture.

One has been to invoke authority. The proponents claimed for a decade that their conjecture descends directly from Oliver Williamson’s Nobel-prize-winning scholarship on holdup, such that one supposedly could not criticize the logic and predictions of the patent-holdup conjecture without disputing the logic of Williamson’s seminal work. That claim was false. By 2015 at the latest, scholars in economics and law had shown the patent-holdup conjecture was not an application of Williamson’s theory of how economic actors use contracts and vertical integration to prevent the appropriation of quasi rents associated with relationship-specific investments. Yet, as of 2018, some of the leading proponents of the patent-holdup conjecture continue to invoke the Williamsonian provenance even while other proponents concede the falsity of that claim.

The second rhetorical device that the proponents of the patent-holdup conjecture have employed has been to disparage their critics for exhibiting the audacity to demand scientific proof of the conjecture’s validity. Implicit in this line of argumentation has been the clever but disingenuous attempt

³¹¹ Delrahim, *Antitrust Law and Patent Licensing in the New Wild West*, *supra* note 108, at 9.

³¹² *Id.* at 11.

to reverse the burden of proof and pretend no one would notice. Thus, the proponents, to the extent that they have stooped to address the substantive points of their critics, have argued that the critics have failed to disprove the patent-holdup conjecture. That reversal of proof is, of course, preposterous as a matter of either rhetoric or logic. Whether one is litigating a case in court or advancing a scientific theory, it is the burden of the party advancing a conjecture to prove its validity. As a matter of epistemology or of the law of evidence, it is not the burden of the critics of the patent-holdup conjecture to disprove its plausibility.

As noted above, the newest episode in the evolving story arc of the patent-holdup proponents is to confess error—to concede that patent holdup is indeed a phenomenon *sui generis*, related to Williamson's work only by false pretenses—but nonetheless to demand indulgence for that misrepresentation of the conjecture's provenance on the grounds that the falsehood should not impugn the conjecture's scientific validity. Apart from radiating a sense of intellectual entitlement, this self-administered absolution continues to leave unanswered the most devastating refutations of the patent-holdup conjecture that have accumulated in the scholarly literature since 2007.

Proponents have also ignored that the market for corporate control enables any implementer the size of Apple, Cisco, Intel, or Microsoft promptly to defeat the threat of patent holdup should it plausibly arise. Consequently, such an implementer's claim of patent holdup by a publicly traded corporation is presumptively absurd. Furthermore, a necessary condition for authentically Williamsonian holdup to occur is surprise (which requires uncertainty); however, since 2007, scores of reported lawsuits involving hundreds of law firms and implementers have discussed patent holdup. That fact forces one to ask whether there remains any major law firm or implementer in the United States as of 2018 that has not heard that implementers should inoculate themselves from the theoretical danger of holdup.

As of November 2018, the proponents of the patent-holdup conjecture have failed, in light of these refutations, to salvage their conjecture in the eyes of scholars who care about the process by which the corpus of scientific knowledge grows. As an epistemological matter, the recognition now that the conjecture is intellectually vacuous is, to borrow a verse, the bitter harvest of a dying bloom. But as a practical matter, the revealed falsity of the patent-holdup conjecture has not prevented the conjecture's success as an expedient engine of corporate advocacy. The patent-holdup conjecture has successfully influenced legal proceedings and government policies around the world. Consequently, the resources that certain Silicon Valley companies devoted to commissioning the patent-holdup narrative in 2007 and in propagating it in the years thereafter appear in retrospect to have been an exceptionally bountiful investment. It is a testament to the shrewdness of the corporate

advocacy on display that a theory so fatuous could enthrall for so long so many possessing the intellect and perspicacity to know better. After more than a decade of dystopian predictions, a reckoning is due. It is time to ask whether the patent-holdup conjecture is a hoax.

Appendix 1. Law Firms and Respective Clients Represented
in Legal Proceedings Not Concerning SEPs and Referencing
the Patent-Holdup Conjecture

Law Firm	Client(s) Represented
Adduci Mastriani & Schaumberg LLP	Apple; Beats Electronics; Barnes & Noble; Camus Wines & Spirits Group; Champagne Louis Roederer;; Cognac Ferrand; Diageo; Freixenet; Garmin; Hasbro; Hewlett-Packard; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; Sierra Wireless; Soitec; WJ Deutsche & Son; ZTE
Agility IP Law	Patriot Scientific; Phoenix Digital Solutions; Technology Properties Limited
Bancroft PLLC	Business Software Alliance; Chamber of Commerce; National Association of Manufacturers; Semiconductor Industry Association
Brann & Isaacson LLP	Beats Electronics; Champagne Louis Roederer; Camus Wines & Spirits Group; Cognac Ferrand; Diageo; Freixenet; Hasbro; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son
Brinks Gilson & Lione	ZTE
Cadwalader, Wickersham & Taft LLP	Huawei; ZTE
Cooley LLP*	Amazon; Barnes & Noble; HTC; Huawei; Nintendo
Covington & Burling LLP*	AsusTek; Dell; Hewlett-Packard; Samsung; Tessera
Cravath Swaine & Moore LLP*	Bristol-Myers Squibb; Sanofi
DLA Piper LLP*	Barnes & Noble; Patriot Scientific Corporation; Phoenix Digital Solutions; Samsung; Technology Properties Limited
Duane Morris LLP*	Cisco

Law Firm	Client(s) Represented
Fish & Richardson PC*	Abell Foundation; Acer; Amazon; Barnes & Noble; Garmin; HTC; Huawei; LG; Macronix; Nintendo; Novatel Wireless; Paice; Samsung; ZTE
Fitzpatrick Cella Harper & Scinto	Bristol-Myers Squibb; Sanofi
Foley & Lardner LLP*	Arista Networks; Arris; AsusTek; Avago Technologies; Broadcom; Comcast; HTC; Netgear; Pace; Technicolor
Foster Murphy Altman & Nickel PC	Arista Networks; Arris; AsusTek; Avago Technologies; Broadcom; Comcast; HTC; Netgear; Pace; Technicolor
Freitas & Weinberg LLP	Intellectual Ventures
Funk & Bolton PA	Intellectual Ventures
Goodwin Procter LLP*	Huawei; ZTE
Hunton & Williams LLP*	Verizon
K&L Gates LLP*	Acer; ADATA Technology; Amazon; AsusTek; Barnes & Noble; Best Buy; Dell; Hewlett-Packard; HTC; Huawei; Kingston Technology; Kyocera; LG; Logitech; Nintendo; SK hynix
Katten Muchin Rosenman LLP*	Apotex; Torpharm
Kellogg Hansen Todd Figel & Frederick PLLC	CTIA; Dell; Ford; Google; Hewlett-Packard; Intel; Marvell; Verizon; Xerox
Kenyon & Kenyon LLP	Audi; Volkswagen
Kilpatrick Townsend & Stockton LLP*	Arista Networks; Arris; AsusTek; Avago Technologies; Broadcom; Comcast; HTC; Netgear; Pace; Technicolor
King & Spalding LLP*	Amazon; Amphastar Pharmaceuticals; Hewlett-Packard; International Medication Systems; Red Hat
Kirkland & Ellis LLP*	Capital One
Klarquist Sparkman LLP	Garmin; Limelight Networks; LinkedIn; Mentor Graphics; Newegg; SAP America; SAS Institute; Symmetry; Xilinx
Kramon & Graham PA	Capital One
Latham & Watkins LLP*	Capital One

Law Firm	Client(s) Represented
Lieff Cabraser Heimann and Bernstein LLP	Intellectual Ventures
Mayer Brown LLP*	Beats Electronics; Camus Wines & Spirits Group; Champagne Louis Roederer; Cognac Ferrand; Diageo; Freixenet; Hasbro; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son
McDermott Will & Emery LLP*	Index Systems; Rovi; Starsight Telecast; United Video Properties
McKool Smith PC	Charleston Medical Therapeutics; MUSC Foundation for Research Development
Merchant & Gould	Beats Electronics; Camus Wines & Spirits Group; Champagne Louis Roederer; Cognac Ferrand; Diageo; Freixenet; Hasbro; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son
Michael Best & Friedrich LLP	NorthMobileTech
Morrison & Foerster LLP*	DNA Genotek; Huawei; Kyocera; ZTE
Motley Rice LLC	Charleston Medical Therapeutics; MUSC Foundation for Research Development
Munger, Tolles & Olson LLP	Intel
Neal, Gerber & Eisenberg LLP	Beats Electronics; Camus Wines & Spirits Group; Champagne Louis Roederer; Cognac Ferrand; Diageo; Freixenet; Hasbro; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son
O'Melveny & Myers LLP *	Samsung

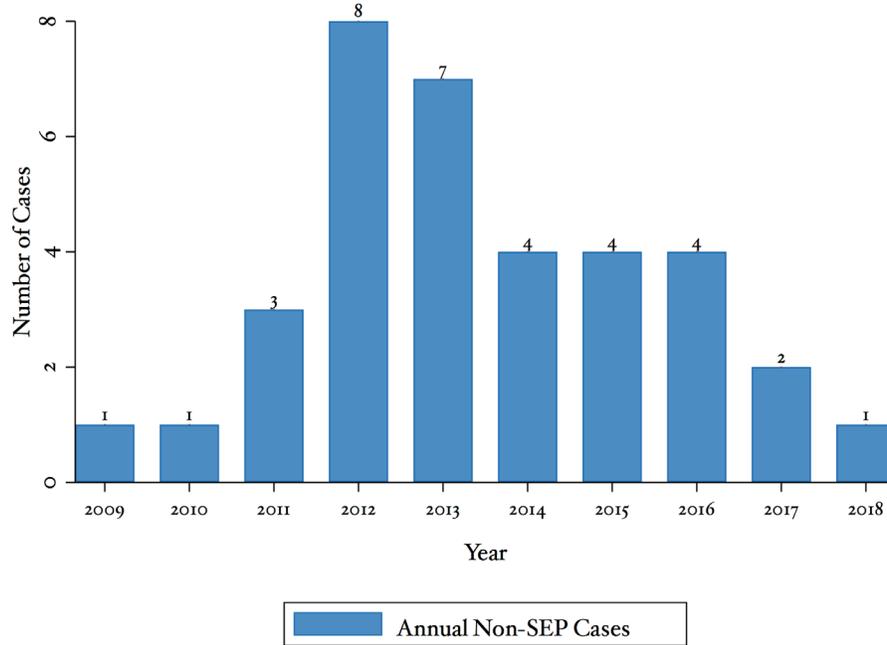
Law Firm	Client(s) Represented
Osha Liang LLP	Beats Electronics; Camus Wines & Spirits Group; Champagne Louis Roederer; Cognac Ferrand; Diageo; Freixenet; Hasbro; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son
Paul Weiss Rifkind Wharton & Garrison LLP*	Garmin
Pepper Hamilton LLP*	Cal-Maine Foods; Daybreak Foods; Hillandale Farms; Land O'Lakes; Michael Foods; Midwest Poultry Services; Moark; National Food Corp.; Norco Ranch; Nucal Foods; Ohio Fresh Eggs; R.W. Saunder; Rose Acre Farms; Sparboe Farms; United Egg Producers; United States Egg Marketers; Weaver Brothers
Perkins Coie LLP*	Beats Electronics; Camus Wines & Spirits Group; Champagne Louis Roederer; Cognac Ferrand; Diageo; Freixenet; Hasbro; HTC; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son
Pillsbury Winthrop Shaw Pittman LLP*	Huawei; ZTE
Quinn Emanuel Urquhart & Sullivan LLP*	Barnes & Noble; CTIA; Garmin; Google; Hewlett-Packard; HTC; Huawei; Intel; LG; Marvell; Nintendo; Novatel Wireless; Samsung; Xerox; ZTE
RatnerPrestia	Beats Electronics; Camus Wines & Spirits Group; Champagne Louis Roederer; Cognac Ferrand; Diageo; Freixenet; Hasbro; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son

Law Firm	Client(s) Represented
Ropes & Gray LLP*	Beats Electronics; Camus Wines & Spirits Group; Champagne Louis Roederer; Cognac Ferrand; Diageo; Freixenet; Hasbro; LG; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son
Rose, Chinitz & Rose	Amphastar Pharmaceuticals; International Medication Systems
Shaw Keller LLP	DNA Genotek
Shook Hardy & Bacon LLP*	Sprint
Simpson Thacher & Bartlett LLP*	Verizon
Solheim Billing & Grimmer SC	NorthMobileTech
Steptoe & Johnson LLP*	Beats Electronics; Camus Wines & Spirits Group; Champagne Louis Roederer; Cognac Ferrand; Diageo; Freixenet; Hasbro; Huawei; John Jameson Import Co.; L'Oreal; Licensing Executives Society; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son
Tannenbaum Helpert Syracuse & Hirschtritt LLP	Beats Electronics; Camus Wines & Spirits Group; Champagne Louis Roederer; Cognac Ferrand; Diageo; Freixenet; Hasbro; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son
Troutman Sanders LLP*	Capital One
Wilson Sonsini Goodrich & Rosati PC*	Amphastar Pharmaceuticals; International Medication Systems

Source: Bloomberg Law Dataset on file with author.

Notes: To identify the law firms and represented clients listed in Appendix 1, I used the methodology explained in the notes for Table 1. See *supra* notes to Table 1. The table is current as of November 2, 2018. * indicates a law firm that was listed on the *Am Law 100* in 2017; there are 28 such firms listed in Appendix 1.

Appendix 2. Number of U.S. Cases from 2007 to 2018 Not Concerning SEPs in Which the Patent-Holdup Conjecture Was Mentioned in a Brief, Motion, Pleading, or Other Document



Source: Bloomberg Law. Dataset on file with author.

Notes: I used the documents that I identified through the methodology explained in the notes for Table 1. See *supra* notes to Table 1. For cases in which documents mentioning the patent-holdup conjecture spanned multiple years, I listed the case as occurring in the year of the most recent document mentioning the conjecture as of the publication of this article. Appendix 2 is current as of November 2, 2018.

Appendix 3. Court Documents Referencing Patent Holdup

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
ActiveVideo Networks, Inc. v. Verizon Commc'ns Inc.	Hunton & Williams LLP; Kellogg Hansen Todd Evans & Figel PLLC; Simpson Thacher & Bartlett LLP	Verizon	Defendants' Proposed Jury Instructions at 102 n. 59, ActiveVideo Networks, Inc. v. Verizon Commc'ns Inc., No. 2:10-cv-00248 (E.D. Va. July 5, 2011)	No
Actividentity Corp. v. Intercede Grp. PLC	Fenwick & West LLP	Intercede	Defendants Intercede Ltd.'s and Intercede Group PLC's Opposition to Plaintiff Actividentity Corporation's Motion to Bifurcate Patent and Non-Patent Issues and Stay Discovery on Non-Patent Issues at 4, Actividentity Corp. v. Intercede Group PLC, No. 3:08-cv-04577 (N.D. Cal. Dec. 10, 2009)	Yes
Apple Inc. v. Acacia Research Corp.	Wilmer Cutler Pickering Hale & Dorr LLP	Apple	Complaint ¶ 53, at 21, Apple Inc. v. Acacia Research Corp., No. 5:16-cv-07266 (N.D. Cal. Dec. 20, 2016)	Yes
Apple Inc. v. Motorola Inc.	Quinn Emanuel Urquhart & Sullivan LLP	Motorola	Responsive and Opening Brief of Appellees-Cross-Appellants Motorola Mobility LLC and Motorola Solutions, Inc. at 68-69, Apple Inc. v. Motorola Inc., No. 12-1548 (Fed. Cir. Mar. 13, 2013)	Yes
Apple Inc. v. Motorola Inc.	Orrick Herrington & Sutcliffe LLP; Tensegrity Law Group LLP; Weil, Gotshal & Manges LLP	Apple; NeXT	Response and Reply Brief of Plaintiffs-Appellants Apple Inc. and NeXT Software, Inc. at 12, Apple Inc. v. Motorola, Inc., No. 12-1548 (Fed. Cir. Apr. 25, 2013)	Yes
Apple Inc. v. Motorola Inc.	Alston & Bird LLP	Nokia	Brief for Nokia Corporation and Nokia Inc. as Amici Curiae in Support of Reversal and in Support of Neither Party at 9, Apple Inc. v. Motorola Inc., No. 12-1548 (Fed. Cir. Apr. 4, 2013)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Apple Inc. v. Motorola Inc.	Sidley Austin LLP	Microsoft	Brief of Microsoft Corporation as Amicus Curiae in Support of Apple, Inc. at 20, Apple Inc. v. Motorola Inc., No. 12-1548 (Fed. Cir. Mar. 20, 2013)	Yes
Apple Inc. v. Motorola Mobility LLC	Orrick Herrington & Sutcliffe LLP; Tensegrity Law Group LLP; Weil, Gotshal & Manges LLP	Apple	Opening Brief and Addendum of Plaintiff-Appellant Apple Inc. at 7, Apple Inc. v. Motorola Mobility LLC, No. 13-1150 (Fed. Cir. July 23, 2013)	Yes
Apple Inc. v. Motorola Mobility LLC	Quinn Emanuel Urquhart & Sullivan LLP	Motorola	Response and Opening Brief and Addendum of Defendant-Appellee and Cross-Appellant Motorola Mobility, LLC at 52-53, Apple Inc. v. Motorola Mobility LLC, No. 13-1150 (Fed. Cir. Nov. 5, 2013)	Yes
Apple Inc. v. Motorola Mobility, Inc.	Cetra Law Firm LLC; Covington & Burling LLP; Tensegrity Law Group LLP; Weil, Gotshal & Manges LLP	Apple	Reply Brief in Support of Plaintiff Apple's Motion for Partial Summary Judgment at 12, Apple Inc. v. Motorola Mobility, Inc., No. 3:11-cv-00178 (W.D. Wis. June 11, 2012)	Yes
Apple Inc. v. Motorola Mobility, LLC	Bancroft PLLC	American Association of Advertising Agencies; Ford; Verizon	Brief of Verizon Communications Inc., American Association of Advertising Agencies, and Ford Motor Company as Amici Curiae in Support of Neither Party at 4-5, Apple Inc. v. Motorola Mobility, LLC, No. 12-1548 (Fed. Cir. Dec. 4, 2012)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Apple Inc. v. Motorola, Inc.	Haynes & Boone LLP	Altera; Cisco; CME Group; Garmin; Hewlett-Packard; Logitech; Nest Labs; Netgear; Newegg; Rackspace Hosting; Safeway; SAS Institute; Symantec; Wal-Mart; Xilinx	Brief of Amici Curiae Altera Corporation, Cisco Systems, Inc., CME Group, Inc., Garmin International, Inc., Hewlett-Packard Company, Logitech Inc., Nest Labs, Inc., Netgear, Inc., Newegg, Inc., Rackspace Hosting, Inc., Safeway, Inc., SAS Institute Inc., Symantec Corporation, Wal-Mart Stores, Inc., and Xilinx, Inc. Regarding Standards on Damages in Support of Neither Party at 19–20, Apple Inc. v. Motorola, Inc., No. 12-1548 (Fed. Cir. Dec. 4, 2012)	Yes
Apple Inc. v. Motorola, Inc.	Gibson Dunn & Crutcher LLP	Intel	Brief for Amicus Curiae Intel Corporation in Support of Apple Inc. and NeXT Software, Inc. at 23, Apple Inc. v. Motorola, Inc., No. 12-1548 (Fed. Cir. Mar. 20, 2013)	Yes
Apple Inc. v. Motorola, Inc.	Covington & Burling LLP; Weil, Gotshal & Manges LLP	Apple	Apple's Answer, Affirmative Defenses, and Counterclaims to Motorola, Inc. and Motorola Mobility, Inc.'s Answer and Counterclaims to Apple Inc.'s Amended Complaint ¶ 165, at 19, Apple Inc. v. Motorola, Inc., No. 1:11-cv-08540 (W.D. Wisc. Apr. 15, 2011)	Yes
Apple Inc. v. Motorola, Inc.	Weil, Gotshal & Manges LLP	Apple	Apple Inc.'s Answer, Affirmative Defenses, and Counterclaims to Motorola, Inc. and Motorola Mobility, Inc.'s Joint Counterclaims and Motorola Mobility, Inc.'s Counterclaims ¶ 93, at 11, Apple Inc. v. Motorola, Inc., No. 3:10-cv-00662 (W.D. Wis. Dec. 3, 2010)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Apple Inc. v. Motorola, Inc.	Weil, Gotshal & Manges LLP	Apple	Apple Inc.'s Answer, Affirmative Defenses, and Counterclaims to Motorola, Inc. and Motorola Mobility, Inc.'s Joint Counterclaims and Motorola Mobility, Inc.'s Counterclaims ¶ 93, at 11, Apple Inc. v. Motorola, Inc., No. 1:11-cv-08540 (N.D. Ill. Dec. 3, 2010)	Yes
Apple Inc. v. Motorola, Inc.	Bingham McCutchen LLP	Qualcomm	Brief of Amicus Curiae Qualcomm Incorporated in Support of Reversal at 14–15, Apple Inc. v. Motorola, Inc., No. 12-1548 (Fed. Cir. Mar. 20, 2013)	Yes
Apple Inc. v. Qualcomm Inc.	Boies, Schiller & Flexner LLP; Fish & Richardson PC	Apple	Redacted Complaint for Damages, Declaratory Judgment and Injunctive Relief ¶ 32, at 8, Apple Inc. v. Qualcomm Inc., No. 3:17-cv-00108 (S.D. Cal. Jan. 20, 2017)	Yes
Apple Inc. v. Samsung Elecs. Co., Ltd.	Quinn Emanuel Urquhart & Sullivan LLP	Samsung	Samsung's Motion to Dismiss Apple's Counterclaims at 12–13, Apple Inc. v. Samsung Elecs. Co., Ltd., No. 5:11-cv-01846 (N.D. Cal. Apr. 5, 2012)	Yes
Apple Inc. v. Samsung Elecs. Co., Ltd.	Morrison & Foerster LLP; Wilmer Cutler Pickering Hale & Dorr LLP	Apple	Counterclaim Defendant Apple Inc.'s Answer, Defenses and Counterclaims in Reply to Samsung's Counterclaims ¶ 23, at 33–34, Apple Inc. v. Samsung Elecs. Co., Ltd., No. 5:11-cv-01846 (N.D. Cal. July 21, 2011)	Yes
Apple Inc. v. Samsung Elecs. Co., Ltd.	White & Case LLP	Google; HTC; Rackable Systems; Red Hat; SAP America	Brief for Amici Curiae Google, Inc., HTC Corporation, HTC America, Inc., Rackable Hosting, Inc., Red Hat, Inc., and SAP America, Inc. In Support of Appellees at 14, Apple Inc. v. Samsung Elecs. Co., Ltd., No. 13-1129 (Fed. Cir. May 6, 2013)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Apple Inc. v. Samsung Elecs. Co., Ltd.	Gibson Dunn & Crutcher LLP; Morrison & Foerster LLP; Wilmer Cutler Pickering Hale & Dorr LLP	Apple	Counterclaim-Defendant Apple Inc.'s Answer, Defenses, and Counterclaims in Reply to Samsung's Counterclaims ¶ 33, at 25-26, Apple Inc. v. Samsung Elecs. Co., Ltd., No. 5:12-cv-00630 (N.D. Cal. May 31, 2012)	Yes
Apple Inc. v. Samsung Elecs. Co., Ltd.	Brinks Gilson & Lione	National Grange of the Order of Patrons of Husbandry	National Grange's Amicus Brief in Support of Defendants-Appellants' Argument for Reversing or Vacating Design Patent Damages at 9, Apple Inc. v. Samsung Elecs. Co., Ltd., No. 14-1335 (Fed. Cir. May 30, 2014)	Yes
Apple Inc. v. Telefonaktiebolaget LM Ericsson	Wilmer Cutler Pickering Hale & Dorr LLP	Apple	Apple Inc.'s Administrative Motion to File First Amended Complaint Under Seal ¶ 52, at 15, Apple Inc. v. Telefonaktiebolaget LM Ericsson, No. 3:15-cv-00154 (N.D. Cal. Jan. 15, 2015)	Yes
Apple, Inc. v. Motorola, Inc.	Dorsey & Whitney LLP	Institute of Electrical and Electronics Engineers	Brief of Amicus Curiae the Institute of Electrical and Electronics Engineers, Incorporated in Support of No Party at 15, Apple, Inc. v. Motorola, Inc., No. 12-1548 (Fed. Cir. Dec. 4, 2012)	Yes
Apple, Inc. v. Motorola, Inc.	Cuneo, Gilbert & LaDuca LLP	The American Antitrust Institute	Brief of Amicus Curiae the American Antitrust Institute, in Support of Defendants-Cross Appellants and Affirmance at 1-2, Apple, Inc. v. Motorola, Inc., No. 12-1548 (Fed. Cir. Dec. 4, 2012)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Arista Networks, Inc. v. Cisco Sys., Inc.	Keker, Van Nest & Peters LLP; Tensegrity Law Group LLP; Wilson Sonsini Goodrich & Rosati PC	Arista Networks	Plaintiff Arista Networks, Inc.'s Opposition to Defendant Cisco System, Inc.'s Motion to Dismiss the Complaint at 15, Arista Networks, Inc. v. Cisco Sys., Inc., No. 5:16-cv-00923 (N.D. Cal. Apr. 27, 2017)	Yes
Astrazeneca AB v. Apotex Corp.	Katten Muchin Rosenman LLP	Apotex; Torpharm	Corrected Non-Confidential Brief for Defendants-Appellants Apotex Corp., Apotex Inc., and Torpharm at 111, Astrazeneca AB v. Apotex Corp., No. 14-1221 (Fed. Cir. Mar. 24, 2014)	No
ASUS Computer Int'l v. InterDigital, Inc.	Sidley Austin LLP	AsusTek	Complaint ¶ 41, at 10, ASUS Computer Int'l v. InterDigital, Inc., No. 5:15-cv-01716 (N.D. Cal. Apr. 15, 2015)	Yes
Avery Dennison Corp. v. 3M Co.	Fredrikson & Byron PA; Quinn Emanuel Urquhart & Sullivan LLP	Avery Dennison	First Amended Complaint ¶ 6, at 3, Avery Dennison Corp. v. 3M Co., No. 0:11-cv-00284 (D. Minn. Dec. 1, 2011)	Yes
Bandspeed, Inc v. Acer, Inc.	Bryan Cave LLP; Procopio Cory Hargreaves Savitch LLP; Haynes & Boone LLP; Kilpatrick Townsend & Stockton LLP; Potter Minton	Belkin; GN Netcom; Kyocera; Motorola	Defendants' Motion to Dismiss Claims Three Through Eleven of Bandspeed's Amended Complaint and Brief in Support Thereof at 5, Bandspeed, Inc. v. Acer, Inc., No. 2:10-cv-00215 (E.D. Tex. Feb. 22, 2011)	Yes
Bandspeed, Inc v. Acer, Inc.	Siebman Burg Phillips & Smith LLP	Bluetooth SIG	Defendant Bluetooth SIG, Inc.'s Motion to Dismiss All Claims Against It in Bandspeed's Amended Complaint and Brief in Support Thereof at 6 n. 7, Bandspeed, Inc. v. Acer, Inc., No. 2:10-cv-00215 (E.D. Tex. Apr. 11, 2011)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Bandspeed, Inc. v. Garmin Int'l, Inc.	K&L Gates LLP	Bluetooth SIG	Defendant Bluetooth SIG, Inc.'s Motion for Summary Judgment at 30, Bandspeed, Inc. v. Garmin Int'l, Inc., No. 1:11-cv-00771 (W.D. Tex. Sept. 13, 2013)	Yes
Bandspeed, Inc. v. Garmin Int'l, Inc.	DLA Piper LLP; Pillsbury Winthrop Shaw Pittman LLP	Cambridge Silicon Radio	Defendant/Intervenor Cambridge Silicon Radio Limited's Motion to Dismiss Claims 3-5 and 8-11 of Plaintiff's Second Amended Complaint at 5, Bandspeed, Inc. v. Garmin Int'l, Inc., No. 1:11-cv-00771 (W.D. Tex. Jan. 23, 2012)	Yes
Bandspeed, Inc. v. Sony Elecs. Inc.	Andrews Kurth LLP; Dickstein Shapiro LLP; Fish & Richardson PC	LG; Toshiba	Toshiba and LG's Opposition to Plaintiff Bandspeed Inc.'s Motion for Summary Judgment on Defendants' Affirmative Defenses and Counterclaims at 12, Bandspeed, Inc. v. Sony Elecs. Inc., No. 1:11-cv-00771 (W.D. Tex. Jan. 21, 2014)	Yes
Bombardier Recreational Prods. Inc. v. Arctic Cat Inc.	Munger, Tolles & Olson LLP	Intel	Brief for Amicus Curiae Intel Corp. in Support of Petitioner at 16, Bombardier Recreational Products Inc. v. Arctic Cat Inc., No. 17-1645 (July 9, 2018)	No
Broadcom Corp. v. Qualcomm Inc.	Irell & Manella LLP; Wilmer Cutler Pickering Hale & Dorr LLP	Broadcom	Memorandum of Points and Authorities in Support of Broadcom Corporation's Motion to Dismiss, to Strike, or for Summary Judgment on Certain Affirmative Defenses and Counterclaims of Qualcomm Incorporated at 14, Broadcom Corp. v. Qualcomm Inc., No. 8:05-cv-00467 (C.D. Cal. Feb. 2, 2009)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Cambridge Silicon Radio Ltd. v. JatoTech Ventures L.P.	DLA Piper LLP	Cambridge Silicon Radio	Complaint ¶ 51, at 13–14, Cambridge Silicon Radio Ltd. v. JatoTech Ventures L.P., No. 1:12-cv-00359 (W.D. Tex. Apr. 20, 2012)	Yes
Cambridge Silicon Radio Ltd. v. JatoTech Ventures, L.P.	Antoni Albus LLP	Cambridge Silicon Radio	Complaint ¶ 51, at 13, Cambridge Silicon Radio Ltd. v. JatoTech Ventures, L.P., No. 3:12-cv-00333 (N.D. Cal. Jan. 20, 2012)	Yes
Certain 3G Mobile Handsets and Components Thereof	Gibson Dunn & Crutcher LLP	Cisco; Dell; Hewlett-Packard; Intel	Statement Regarding the Public Interest by Non-Parties Intel Corporation, Cisco Systems, Inc., Dell, Inc., and Hewlett-Packard Company at 5, Certain 3G Mobile Handsets and Components Thereof, Inv. No. 337-TA-613 (Remand) (USITC June 3, 2015)	Yes
Certain 3G Mobile Handsets and Components Thereof	Alston & Bird LLP; Sidley Austin LLP	Microsoft; Nokia	Respondents Nokia Corporation, Nokia Inc. and Microsoft Mobile OY's Petition for Review of the Initial Determination (Order No. 49) Purporting to Grant in Part Motion to Substitute Parties and Amend Notice of Investigation at 4, Certain 3G Mobile Handsets and Components Thereof, Inv. No. 337-TA-613 (Remand) (USITC June 26, 2014)	Yes
Certain 3G Mobile Handsets and Components Thereof	Latham & Watkins LLP; Wilson Sonsini Goodrich & Rosati PC	InterDigital	Complainant InterDigital's Reply Submission to the Notice of Commission to Review in Part a Final Initial Determination on Remand and Request for Written Submissions at 19, Certain 3G Mobile Handsets and Components Thereof, Inv. No. 337-TA-613 (Remand) (USITC July 20, 2015)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Audiovisual Components and Products Containing the Same	McDermott Will & Emery LLP	Funai	Funai Respondents' Petition for Review of Initial Determination at 92–93, Certain Audiovisual Components and Products Containing the Same, Inv. No. 337-TA-837 (USITC Aug. 5, 2013)	Yes
Certain Audiovisual Components and Products Containing the Same	Finnegan Henderson Farabow Garrett & Dunner LLP	Realtek	Respondent Realtek Semiconductor Corporation's Contingent Petition for Review at 58, Certain Audiovisual Components and Products Containing the Same, Inv. No. 337-TA-837 (USITC Aug. 5, 2013)	Yes
Certain Audiovisual Components and Products Containing the Same	Foster Murphy Altman & Nickel PC; Kilpatrick Townsend & Stockton LLP	Agere Systems; LSI	Complainants LSI Corporation and Agere Systems LLC's Response to Respondent Realtek Semiconductor Corporation's Contingent Petition for Review and Summary of the Same at 52, Certain Audiovisual Components and Products Containing the Same, Inv. No. 337-TA-837 (USITC Aug. 13, 2013)	Yes
Certain Audiovisual Components and Products Containing the Same	Gibson Dunn & Crutcher LLP	Cisco; Intel	Written Submission Regarding Remedy and the Public Interest by Non-Parties Intel Corporation and Cisco Systems, Inc. at 10, Certain Audiovisual Components and Products Containing the Same, Inv. No. 337-TA-837 (USITC Nov. 1, 2013)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Coaxial Cable Connectors and Components Thereof and Products Containing Same	Covington & Burling LLP	AsusTek; Dell; Hewlett-Packard; Samsung	Reply Submission of Samsung Electronics America, Inc., Samsung Electronics Co., Ltd., Samsung Semiconductor Inc., Samsung Telecommunications America, LLC, Hewlett-Packard Company, Dell, Inc., ASUS Computer International, Inc., and AsusTek Computer, Inc. in Response to the Commission's December 14, 2009 Notice to Review-in-Part a Final Determination Finding a Violation of Section 337 at 11-12, Certain Coaxial Cable Connectors and Components Thereof and Products Containing Same, Inv. No. 337-TA-650 (USITC, Jan. 27, 2010)	No
Certain Communication Equipment, Components Thereof, and Products Containing the Same	Orrick Herrington & Sutcliffe LLP; Perkins Coie LLP	Broadcom; NVIDIA	Letter from Amanda Tessar, Perkins Coie LLP, & I. Neel Chatterjee, Orrick Herrington & Sutcliffe LLP, to Hon. James R. Holbein, U.S. International Trade Commission 3 (Nov. 15, 2011)	Yes
Certain Consumer Electronics and Display Devices and Products Containing Same	Covington & Burling LLP	Samsung	Letter from Kevin B. Collins, Covington & Burling LLP, to Hon. James Holbein, U.S. International Trade Commission 2 (Mar. 19, 2012)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Consumer Electronics with Display and Processing Capabilities	Mintz Levin Cohn Ferris Glovsky and Popeo PC	Graphics Properties Holdings	Complainant Graphics Properties Holdings, Inc.'s Response to Respondent Toshiba Corporation's Petition for Review of the ALJ's Initial Determination on Violation of Section 337 at 82-83, Certain Consumer Electronics with Display and Processing Capabilities, Inv. No. 337-TA-884 (USITC Sept. 23, 2014)	Yes
Certain Consumer Electronics with Display and Processing Capabilities	Nixon & Vanderhye PC; Quinn Emanuel Urquhart & Sullivan LLP	Toshiba	Toshiba's Public Interest Statement Pursuant to 19 C.F.R. § 210.50(a)(4) at 2, Certain Consumer Electronics with Display and Processing Capabilities, Inv. No. 337-TA-884 (USITC Sept. 30, 2014)	Yes
Certain Devices Containing Non-Volatile Memory and Products Containing the Same	Fish & Richardson PC	Macronix	Letter from Christian A. Chu, Fish & Richardson PC, to Hon. Lisa R. Barton, U.S. International Trade Commission 1 (July 18, 2014)	No
Certain Digital Cable and Satellite Products, Set-Top Boxes, Gateways, and Components Thereof	Fish & Richardson PC	Arris	Letter from Ruffin B. Cordell, Fish & Richardson PC, to Lisa R. Barton, U.S. International Trade Commission 3 (Mar. 27, 2017)	Yes
Certain Dynamic Random Access Memory and NAND Flash Memory Devices and Products Containing Same	K&L Gates LLP	Acer; ADATA Technology; AsusTek; Best Buy; Dell; Hewlett-Packard; Kingston Technology; Logitech; SK hynix	Respondents Hynix Semiconductor Inc. and Hynix Semiconductor America Inc. Response to Amended Complaint and Notice of Investigation ¶195, at 35, Certain Dynamic Random Access Memory and NAND Flash Memory Devices and Products Containing Same, Inv. No. 337-TA-803 (USITC Oct. 3, 2011)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof	White & Case LLP	Google	Submission of Non-Party Google Inc. in Response to Commission Request for Submissions on Public Interest at 2–3, Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof, Inv. No. 337-TA-847 (USITC Dec. 23, 2013)	Yes
Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof	Shook Hardy & Bacon LLP	Sprint	Third Party Sprint Spectrum, L.P.'s Supplemental Statement Regarding the Public Interest at 2–3, Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof, Inv. No. 337-TA-847 (USITC Dec. 23, 2013)	Yes
Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof	Alston & Bird LLP; Desmarais LLP	Intellisync; Nokia	Nokia's Initial Written Submission in Response to the Commission's December 9, 2013 Notice at 51–52, Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof, Inv. No. 337-TA-847 (USITC Dec. 23, 2013)	Yes
Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof	Finnegan Henderson Farabow Garrett & Dunner LLP; McDermott Will & Emery LLP; Winston & Strawn LLP	HTC	Respondents' Initial Submission in Response to the Notice of Commission Determination to Review in Part a Final Initial Determination Finding a Violation of Section 337 and on the Issues of Remedy, the Public Interest, and Bonding at 46–47, Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof, Inv. No. 337-TA-847 (USITC Dec. 24, 2013)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof	McDermott Will & Emery LLP	HTC	Respondents HTC Corporation and HTC America, Inc.'s Response to the Verified Complaint Under Section 337 of the Tariff Act of 1930 at 32-33, Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof, Inv. No. 337-TA-847 (USITC July 9, 2012)	Yes
Certain Electronic Devices, Including Wireless Communication Devices, Tablet Computers, Media Players, and Televisions, and Components Thereof	Fish & Richardson PC	Samsung	Respondents Samsung Electronics Co., Ltd, Samsung Telecommunications America, LLC and Samsung Electronics America, Inc.'s Response to the Complaint and Notice of Investigation at 2, Certain Electronic Devices, Including Wireless Communication Devices, Tablet Computers, Media Players, and Televisions, and Components Thereof, Inv. No. 337-TA-862 (USITC Jan. 31, 2013)	Yes
Certain Electronic Digital Media Devices and Components Thereof	Shook Hardy & Bacon LLP	Sprint	Third Party Sprint Spectrum, L.P.'s Statement Regarding the Public Interest at 5, Certain Electronic Digital Media Devices and Components Thereof, Inv. No. 337-TA-796 (Remand) (USITC June 11, 2013)	No
Certain Electronic Imaging Devices	Perkins Coie LLP	HTC	Respondents HTC Corporation and HTC America, Inc.'s Statement on the Public Interest Pursuant to Commission Rule 210.50(a)(4) at 2, Certain Electronic Imaging Devices, Inv. No. 337-TA-850 (USITC Nov. 18, 2013)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Electronic Imaging Devices	Shook Hardy & Bacon LLP	Sprint	Third Party Sprint Spectrum, L.P.'s Statement Regarding the Public Interest at 2-3, Certain Electronic Imaging Devices, Inv. No. 337-TA-850 (USITC Nov. 21, 2013)	No
Certain Electronic Imaging Devices	Cadwalader, Wickersham & Taft LLP; Goodwin Procter LLP; Morrison & Foerster LLP; Pillsbury Winthrop Shaw Pittman LLP	Huawei; ZTE	Respondents' Submission in Response to the Commission's Request for Briefing on Certain Issues Under Review at 66-67, Certain Electronic Imaging Devices, Inv. No. 337-TA-850 (USITC Jan. 3, 2014)	No
Certain Electronic Products, Including Products with Near Field Communication ("NFC") System-Level Functionality And/Or Battery Power-Up Functionality, Components Thereof, and Products Containing Same	Baker Botts LLP	Dell	Response of Respondent Dell Inc. to the Complaint and Notice of Investigation at 29, Certain Electronic Products, Including Products with Near Field Communication ("NFC") System-Level Functionality And/Or Battery Power-Up Functionality, Components Thereof, and Products Containing Same, Inv. No. 337-TA-950 (USITC Apr. 6, 2015)	Yes
Certain Electronic Products, Including Products with Near Field Communication ("NFC") System-Level Functionality And/Or Battery Power-Up Functionality, Components Thereof, and Products Containing Same	Baker Botts LLP; Kellogg Hansen Todd Evans & Figel PLLC	Dell	Letter from Kevin J. Meek, Baker Botts LLP, & John Thorne, Kellogg, Huber, Hansen, Todd Evans & Figel PLLC, to Hon. Lisa R. Barton, U.S. International Trade Commission 3 (Feb. 25, 2015)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Encapsulated Integrated Circuit Devices and Products Containing Same	Adduci Mastriani & Schaumberg LLP	Carsem	Respondents Carsem (M) SDN BHD Recams Inc. and Carsem, Inc. Brief on Remedy, Bond and the Public Interest at 23, Certain Encapsulated Integrated Circuit Devices and Products Containing Same, Inv. No. 337-TA-501 (Remand) (USITC July 5, 2013)	Yes
Certain Flash Memory Devices and Components Thereof	Adduci Mastriani & Schaumberg LLP	Western Digital	Letter from Bernard Shek, Adduci Mastriani & Schaumberg LLP, to Lisa R. Barton, U.S. International Trade Commission 2 (Dec. 21, 2016)	Yes
Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof	Sidley Austin LLP	Microsoft	Respondent Microsoft Corporation's Petition for Review of Initial Determination at 77, Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof, Inv. No. 337-TA-752 (USITC May 7, 2012)	Yes
Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof	Gibson Dunn & Crutcher LLP	Intel	Statement Regarding the Public Interest by Non-Party Intel Corporation at 5, Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof, Inv. No. 337-TA-752 (USITC June 8, 2012)	Yes
Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof	Alston & Bird LLP	Nokia	Letter from Patrick J. Flinn, Alston & Bird LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 1-2 (June 8, 2012)	Yes
Certain Hybrid Electric Vehicles Components Thereof	Kenyon & Kenyon LLP	Audi; Volkswagen	Letter from Michael J. Lennon, Kenyon & Kenyon LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 5 (Apr. 29, 2016)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Hybrid Electric Vehicles Components Thereof	Fish & Richardson PC	Abell Foundation; Paice	Letter from Linda L. Kordziel, Fish & Richardson PC, to Hon. Lisa R. Barton, U.S. International Trade Commission 3 (May 4, 2016)	No
Certain LTE Wireless Communication Devices and Components Thereof	Finnegan Henderson Farabow Garrett & Dunner LLP	LG	Public Interest Statement of Complainants LG Electronics, Inc., LG Electronics Alabama, Inc., and LG Electronics MobileComm U.S.A. at 2-3, Certain LTE Wireless Communication Devices and Components Thereof, Inv. No. 337-TA-1051 (USITC Mar. 27, 2017)	Yes
Certain LTE- and 3G-Compliant Cellular Communications Devices	Robins Kaplan LLP	INVT SPE	Complainant INVT SPE LLC's Reply Statement Regarding the Public Interest at 2, Certain LTE- and 3G-Compliant Cellular Communications Devices, Inv. No. 337-TA-3342 (USITC Oct. 3, 2018)	Yes
Certain LTE- and 3G-Compliant Cellular Communications Devices	McDermott Will & Emery LLP	ZTE	Submission on the Public Interest by Proposed Respondents ZTE Corporation and ZTE (USA) Inc. at 2, Certain LTE- and 3G-Compliant Cellular Communications Devices, Inv. No. 337-TA-3342 (USITC Sept. 28, 2018)	Yes
Certain Magnetic Data Storage Tapes and Cartridges Containing the Same	Foster Murphy Altman & Nickel PC; Wolf Greenfield & Sacks PC	Sony	Submission on the Public Interest of Proposed Respondents Sony Corporation, Sony Corporation of America, and Sony Corporation Electronics Inc. at 4, Certain Magnetic Data Storage Tapes and Cartridges Containing the Same, Inv. No. 337-TA-1012 (USITC June 13, 2016)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Media Devices, Including Televisions, Blu-Ray Disc Players, Home Theater Systems, Tablets and Mobile Phones, Components Thereof and Associated Software	Covington & Burling LLP	Samsung	Letter from Sturgis M. Sobin, Covington & Burling LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 5 (May 28, 2013)	No
Certain Memory Modules and Components Thereof, and Products Containing Same	Sidley Austin LLP	SK hynix	Letter from Brian R. Nester, Sidley Austin LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 3 (Sept. 16, 2016)	Yes
Certain Mobile Electronic Devices, Including Wireless Communication Devices, Portable Music and Data Processing Devices, and Tablet Computers	Gibson Dunn & Crutcher LLP	Intel	Corrected Statement Regarding the Public Interest by Non-Party Intel Corporation at 5, Certain Mobile Electronic Devices, Including Wireless Communication Devices, Portable Music and Data Processing Devices, and Tablet Computers, Inv. No. 337-TA-794 (USITC Dec. 3, 2012)	Yes
Certain Mobile Telephone Handsets, Wireless Communication Devices, and Components Thereof	Adduci Mastriani & Schaumberg LLP; Alston & Bird LLP; Quinn Emanuel Urquhart & Sullivan LLP	Nokia	Nokia's Opposition to Qualcomm's Motion to Strike the Expert Reports of Profs. Shapiro and Bermann at 6, Certain Mobile Telephone Handsets, Wireless Communication Devices, and Components Thereof, Inv. No. 337-TA-578 (USITC Jan. 3, 2007)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Motion-Sensitive Sound Effects Devices and Image Display Devices and Components and Products Containing Same	Adduci Mastriani & Schaumberg LLP	Apple; Hewlett-Packard	Letter from V. James Adduci II, Adduci Mastriani & Schaumberg LLP, to Hon. James Holbein, U.S. International Trade Commission 3 (Apr. 14, 2011)	No
Certain Network Devices, Related Software and Components Thereof (I)	Fish & Richardson PC	Arista Networks	Respondent Arista's Public Interest Submission Under 210.50(a) at 5, Certain Network Devices, Related Software and Components Thereof (I), Inv. No. 337-TA-944 (USITC Mar. 17, 2016)	Yes
Certain Optical Disc Drives, Components Thereof, and Products Containing the Same	O'Melveny & Myers LLP	Samsung	Letter from Ryan K. Yagura, O'Melveny & Myers LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 5 (Sept. 18, 2013)	No
Certain Products Containing Interactive Program Guide and Parental Control Technology	McDermott Will & Emery LLP	Index Systems; Rovi; Starsight Telecast; United Video Properties	Complainants' Motion to Strike Respondent Netflix Inc.'s Fourth Affirmative Defense at 6-7, Certain Products Containing Interactive Program Guide and Parental Controls Technology, Inv. No. 337-TA-845 (USITC July 18, 2012)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Products Having Laminated Packaging, Laminated Packaging, and Components Thereof	Adduci, Mastriani & Schaumberg LLP; Brann & Isaacson LLP; Mayer Brown LLP; Merchant & Gould; Neal, Gerber & Eisenberg LLP; Osha Liang LLP; Perkins Coie LLP; RatnerPrestia; Ropes & Gray LLP; Steptoe & Johnson LLP; Tannenbaum Helpert Syracuse & Hirschtritt LLP	Beats Electronics; Camus Wines & Spirits Group; Champagne Louis Roederer; Cognac Ferrand; Diageo; Freixenet; Hasbro; John Jameson Import Co.; L'Oreal; Maisons Marques & Domaines; Moet Hennessy; Pernod Ricard; Remy Cointreau; Sidney Frank Importing Co.; WJ Deutsche & Son	Respondents' Opposition to Complainant Lamina Packaging Innovations, LLC's "Contingent Petition for Review of Order No. 15: Initial Determination on the Economic Prong of the Domestic Industry Requirement" at 49, Certain Products Having Laminated Packaging, Laminated Packaging, and Components Thereof, Inv. No. 337-TA-874 (USITC July 17, 2013)	No
Certain Semiconductor Devices, Semiconductor Device Packages, and Products Containing Same	Foley & Lardner LLP; Foster Murphy Altman & Nickel PC; Kilpatrick Townsend & Sullivan LLP	Arista Networks; Arris; AsusTek; Avago Technologies; Broadcom; Comcast; HTC; Netgear; Pace; Technicolor	Respondents' Opening Brief Regarding Remedy, Public Interest, and Bonding at 27, Certain Semiconductor Devices, Semiconductor Device Packages, and Products Containing Same, Inv. No. 337-TA-1010 (USITC Oct. 13, 2017)	Yes
Certain Semiconductor Devices, Semiconductor Device Packages, and Products Containing Same	Covington & Burling LLP	Tessera	Tessera Complainants' Reply Submission on Remedy, Bonding, and the Public Interest at 3, Certain Semiconductor Devices, Semiconductor Device Packages, and Products Containing Same, Inv. No. 337-TA-1010 (USITC Oct. 23, 2017)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Silicon-on-Insulator Wafers	Adduci Mastriani & Schaumberg LLP	Soitec	Letter from V. James Adduci, II, Adduci Mastriani & Schaumberg LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 1 (Sept. 27, 2016)	No
Certain Wi-Fi Enabled Electronic Devices and Components Thereof	Covington & Burling LLP	Hisense	Letter from Sturgis M. Sobin, Covington & Burling LLP, to Hon. Rhonda K. Schmidlein, U.S. International Trade Commission 3 (Sept. 13, 2017)	Yes
Certain Wireless Communication Devices and Systems, Components Thereof, and Products Containing Same	Covington & Burling LLP	Hewlett-Packard	Letter from Sturgis M. Sobin, Covington & Burling LLP, to Hon. James Holbein, U.S. International Trade Commission 2 (May 19, 2011)	Yes
Certain Wireless Communication Devices, Portable Music, and Data Processing Devices, Computers and Components Thereof	Weil, Gotshal & Manges LLP	Apple	Apple Inc.'s Response to Motorola's Corrected Verified Complaint and Notice of Investigation at 37, Certain Wireless Communication Devices, Portable Music and Data Processing Devices, Computers and Components Thereof, Inv. No. 337-TA-745 (Remand) (USITC Nov. 30, 2010)	Yes
Certain Wireless Communications Equipment and Articles Therein	Wilmer Cutler Pickering Hale & Dorr LLP	Apple	Letter from Michael D. Esch, WilmerHale, to the Hon. Lisa R. Barton, U.S. International Trade Commission 2-3 (Jan. 10, 2013)	Yes
Certain Wireless Consumer Electronic Devices And Components Thereof	DLA Piper LLP	Samsung	Letter from Andrew P. Valentine, DLA Piper LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 1-2 (Aug. 7, 2012)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Wireless Consumer Electronic Devices And Components Thereof	K&L Gates LLP	Amazon	Letter from Michael J. Abernathy, K&L Gates LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 4 (Aug. 7, 2012)	No
Certain Wireless Consumer Electronic Devices And Components Thereof	K&L Gates LLP	Acer	Letter from Harold H. David, K&L Gates LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 3 (Aug. 7, 2012)	No
Certain Wireless Consumer Electronics Devices and Components Thereof	DLA Piper LLP	Patriot Scientific Corporation; Phoenix Digital Solutions; Technology Properties Limited	Letter from Andrew P. Valentine, DLA Piper LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 2 (Aug. 7, 2012)	No
Certain Wireless Consumer Electronics Devices and Components Thereof	K&L Gates LLP	Amazon	Letter from Michael J. Abernathy, K&L Gates LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 4 (Aug. 7, 2012)	No
Certain Wireless Consumer Electronics Devices and Components Thereof	K&L Gates LLP	Acer	Letter from Harold H. Davis, K&L Gates LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 3 (Aug. 7, 2012)	No
Certain Wireless Consumer Electronics Devices and Components Thereof	Shook Hardy & Bacon LLP	Sprint	Third Party Sprint Spectrum, L.P.'s Statement Regarding the Public Interest at 3, Certain Wireless Consumer Electronics Devices and Components Thereof, Inv. No. 337-TA-853 (USITC Dec. 23, 2013)	No
Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof	Covington & Burling LLP	FutureWei; Huawei	Letter from Sturgis M. Sobin, Covington & Burling LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 3 (Jan. 15, 2013)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof	Brinks Gilson & Lione; Sidley Austin LLP	Nokia; ZTE	Nokia Inc., ZTE Corporation, ZTE USA, Inc. and Contingent Respondent Microsoft Mobile OY's Petition for Review of the June 13, 2014 Initial Determination with Respect to FRAND Issues at 2, Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof, Inv. No. 337-TA-868 (USITC June 30, 2014)	Yes
Certain Wireless Mesh Networking Products and Related Components Thereof	McDermott Will & Emery LLP	Analog Devices; Linear Technology	Submission on the Public Interest by Proposed Respondents Analog Devices, Inc. and Linear Technology LLC at 2, Certain Wireless Mesh Networking Products and Related Components Thereof, Inv. No. 337-TA-1131 (USITC Aug. 20, 2018)	Yes
Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof	Sidley Austin LLP	Microsoft	Letter from Brian R. Nester, Sidley Austin LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 4 (July 7, 2014)	Yes
Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof	Latham & Watkins LLP; Wilson Sonsini Goodrich & Rosati PC	InterDigital; IPR Licensing	Summary of Complainant InterDigital's Response to the Respondents' and the Staff's Petitions for Review of the Final Initial Determination at 7, Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof, Inv. No. 337-TA-868 (USITC July 8, 2014)	Yes
Certain Wireless Devices with 3G Capabilities and Components Thereof	Covington & Burling LLP	FutureWei; Huawei	Letter from Sturgis M. Sobin, Covington & Burling LLP, to Hon. Lisa R. Barton, U.S. International Trade Commission 3-4 (Aug. 8, 2013)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Certain Wireless Devices with 3G Capabilities and Components Thereof	Fish & Richardson PC	LG	LG Respondents' Initial Comments Regarding Further Proceedings at 15-16, Certain Wireless Devices with 3G Capabilities and Components Thereof, Inv. No. 337-TA-800 (USITC Nov. 12, 2013)	Yes
Certain Wireless Devices with 3G Capabilities and Components Thereof	Brinks Hofer Gilson & Lione	ZTE	Respondents ZTE Corp. and ZTE (USA) Inc.'s Public Interest Statement at 2, Certain Wireless Devices with 3G Capabilities and Components Thereof, Inv. No. 337-TA-800 (USITC Aug. 8, 2013)	Yes
Certain Wireless Standard Compliant Electronic Devices, Including Communication Devices and Tablet Computers	Wilmer Cutler Pickering Hale & Dorr LLP	Apple	Public Interest Statement of Proposed Respondent Apple Inc. at 2, Certain Wireless Standard Compliant Electronic Devices, Including Communication Devices and Tablet Computers, Inv. No. 337-TA-953 (USITC Mar. 12, 2015)	Yes
ChriMar Sys. Inc. v. Cisco Sys. Inc.	McDermott Will & Emery LLP	Hewlett-Packard	HP's Answer, Affirmative Defenses, and First Amended Counterclaims ¶ 16, at 17, ChriMar Sys. Inc. v. Cisco Sys. Inc., No. 4:13-cv-01300 (N.D. Cal. Dec. 1, 2014)	Yes
ChriMar Sys. Inc. v. Cisco Sys. Inc.	Kirkland & Ellis LLP	Cisco; Linksys	Cisco Systems, Inc. and Linksys LLC's Answer, Affirmative Defenses, and Second Amended Counterclaims ¶ 17, at 18-19, ChriMar Sys. Inc. v. Cisco Sys. Inc., No. 4:13-cv-01300 (N.D. Cal. Dec. 1, 2014)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Chrimar Sys., Inc. v. Alcatel-Lucent USA Inc.	Potter Minton; Williams Morgan PC	Alcatel-Lucent	Defendants Alcatel-Lucent USA Inc. and Alcatel-Lucent Holdings, Inc.'s Answer, Counterclaims, & Defenses to Complaint (DKT. No 1) ¶ 33, at 34, ChriMar Sys., Inc. v. Alcatel-Lucent USA Inc., No. 6:15-cv-00163 (E.D. Tex. June 24, 2015)	Yes
Chrimar Sys., Inc. v. AMX	McDermott Will & Emery LLP; Potter Minton	AMX	Defendant AMX's Amended Answer to First Amended Complaint, Defenses, and Counterclaims ¶ 31, at 30-31, ChriMar Sys., Inc. v. AMX, No. 6:15-cv-00163 (E.D. Tex. Dec. 23, 2015)	Yes
ChriMar Sys., Inc. v. Cisco Sys., Inc.	McDermott Will & Emery LLP; Morris James LLP	Hewlett-Packard	Answer, Affirmative Defenses, and Counterclaims of Defendant Hewlett-Packard Company ¶ 13, at 19-20, ChriMar Sys., Inc. v. Cisco Sys., Inc., No. 1:11-cv-01050 (D. Del. Dec. 26, 2012)	Yes
ChriMar Sys., Inc. v. Cisco Sys., Inc.	Kirkland & Ellis LLP; Morris Nichols Arsht & Tunnell LLP	Cisco; Linksys	First Amended Counterclaims of Defendant Cisco Systems, Inc. and Cisco Consumer Products LLC F/K/A/ Cisco Linksys-LLC ¶ 14, at 4, ChriMar Sys., Inc. v. Cisco Sys., Inc., No. 1:11-cv-01050 (D. Del. Jan. 3, 2013)	Yes
ChriMar Sys., Inc. v. Cisco Sys., Inc.	McDermott Will & Emery LLP; Morris James LLP	Extreme Networks	Answer, Affirmative Defenses, and Counterclaims of Defendant Extreme Networks, Inc. ¶ 13, at 19, ChriMar Sys., Inc. v. Cisco Sys., Inc., No. 1:11-cv-01050 (D. Del. Jan. 2, 2013)	Yes
Cisco Sys., Inc. v. ChriMar Sys. Inc.	Kerr Russell; Kirkland & Ellis LLP	Cisco	Complaint and Jury Demand ¶ 40, at 21, Cisco Sys., Inc. v. ChriMar Sys. Inc., No. 2:15-cv-12565 (E.D. Mich. July 20, 2015)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Cisco Sys., Inc. v. ChriMar Sys. Inc.	Kerr Russell; Kirkland & Ellis LLP	Cisco; Linksys	Complaint and Jury Demand ¶ 29, at 12, Cisco Sys., Inc. v. ChriMar Sys. Inc., No. 2:14-cv-10290 (E.D. Mich. Jan. 22, 2014)	Yes
Cisco Sys., Inc. v. ChriMar Sys. Inc.	Kerr Russell; Kirkland & Ellis LLP	Cisco	Complaint and Jury Demand ¶ 34, at 19, Cisco Sys., Inc. v. ChriMar Sys. Inc., No. 2:17-cv-13770 (E.D. Mich. Nov. 20, 2017)	Yes
Cisco Sys., Inc. v. Spherix Inc.	Kirkland & Ellis LLP; Morris Nichols Arsht & Tunnell LLP	Cisco	Complaint ¶ 30, at 7, Cisco Sys., Inc. v. Spherix Inc., No. 1:15-cv-00559 (D. Del. June 30, 2015)	Yes
Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc.	Duane Morris LLP; Kirkland & Ellis LLP	Cisco	Brief of Defendant-Apellant Cisco Systems, Inc. at 70, Commonwealth Scientific and Indus. Research Org. v. Cisco Sys., Inc., No. 15-1066 (Fed. Cir. Jan. 21, 2015)	Yes
Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc.	Cravath Swaine & Moore LLP	Qualcomm	Brief of Amicus Curiae Qualcomm Incorporated in Support of Affirmance at 31, Commonwealth Scientific and Indus. Research Org. v. Cisco Sys., Inc., No. 15-1066 (Fed. Cir. Apr. 13, 2015)	Yes
DNA Genotek Inc. v. Ancestry.com DNA, LLC	Morrison & Foerster LLP; Shaw Keller LLP	DNA Genotek	Plaintiff DNA Genotek Inc.'s Opposition to Ancestry.com DNA, LLC's Motion to Dismiss at 16, DNA Genotek Inc. v. Ancestry.com DNA, LLC, No. 1:15-cv-0355 (D. Del. Sept. 3, 2015)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Dr. Michael Jaffe v. Samsung Elecs. Co., Ltd.	Bancroft PLLC	Business Software Alliance; Chamber of Commerce; National Association of Manufacturers; Semiconductor Industry Association	Brief for the Semiconductor Industry Association, Chamber of Commerce of the United States of America, National Association of Manufacturers, and Business Software Alliance as Amici Curiae in Support of Appellees at 19, Dr. Michael Jaffe v. Samsung Elecs. Co., Ltd., No. 12-1802 (4th Cir. Nov. 29, 2012)	No
Ericsson Inc. v. D-Link Corp.	Alston & Bird LLP; The Dacus Firm PC; Foley & Lardner LLP; Freitas & Weinberg LLP; Kecker, Van Nest & Peters LLP; Kirkland & Ellis LLP; O'Melveny & Myers LLP; Parker, Bunt & Ainsworth PC; Potter Minton; Reed Smith LLP; Yarbrough & Wilcox PLLC	Acer; Belkin; D-Link; Dell; Gateway; Intel; Toshiba	Defendants' Proposed Findings of Fact and Conclusions of Law with Citation to Authority for Issues Tried to the Bench ¶ 22, at 11, Ericsson Inc. v. D-Link Corp., No. 6:10-cv-00473 (E.D. Tex. May 9, 2013)	Yes
Ericsson Inc. v. Samsung Elecs. Co., Ltd.	Fish & Richardson PC; Kirkland & Ellis LLP; Potter Minton	Samsung	Samsung's Third Amended Answer, Affirmative Defenses and Counterclaims to Ericsson's First Amended Complaint for Patent Infringement at 1-2, Ericsson Inc. v. Samsung Elecs. Co., Ltd., No. 6:12-cv-00894 (E.D. Tex. Nov. 5, 2013)	Yes
Ericsson Inc. v. TCL Commc'ns Tech. Holdings Ltd.	Findlay Craft PC; Sheppard Mullin Richter & Hampton LLP	TCL	Defendants' Answer, Affirmative Defenses, and Counterclaims to Ericsson's Complaint ¶ 184, at 35, Ericsson Inc. v. TCL Commc'ns Tech. Holdings Ltd., No. 2:15-cv-02370 (E.D. Tex. Aug. 15, 2014)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Ericsson, Inc. v. D-Link Sys., Inc.	King & Spalding LLP	Nokia	Brief of Amici Curiae Nokia Corporation and Nokia USA Inc. in Support of Appellees at 6, Ericsson, Inc. v. D-Link Sys., Inc., No. 13-1625 (Fed. Cir. Feb. 27, 2014)	Yes
Ericsson, Inc. v. D-Link Sys., Inc.	Bingham McCutchen LLP	Dolby Laboratories	Corrected Brief of Amicus Curiae Dolby Laboratories, Inc. in Support of Plaintiff-Appellee at 13-14, Ericsson, Inc. v. D-Link Sys., Inc., No. 13-1625 (Fed. Cir. Feb. 28, 2014)	Yes
Ericsson, Inc. v. D-Link Sys., Inc.	Bracewell & Giuliani LLP; Lowenstein Sandler LLP	Aruba Networks; Cisco; Hewlett-Packard; Ruckus; Safeway; SAS Institute	Brief of Amici Curiae Cisco Systems, Inc., Aruba Networks, Inc., Hewlett-Packard Company, Ruckus Wireless, Inc., Safeway, Inc., and SAS Institute Inc. in Support of Appellants and in Support of Reversal with Respect to Damages at 16, Ericsson Inc. v. D-Link Sys., Inc., No. 13-1625 (Fed. Cir. Dec. 23, 2013)	Yes
Ericsson, Inc. v. D-Link Sys., Inc.	Dorsey & Whitney LLP	Institute of Electrical and Electronics Engineers	Brief of Amicus Curiae the Institute of Electrical and Electronics Engineers, Incorporated in Support of No Party at 16, Ericsson Inc. v. D-Link Sys., Inc., No. 13-1625 (Fed. Cir. Dec. 20, 2013)	Yes
Ericsson, Inc. v. D-Link Sys., Inc.	McKool Smith PC	Ericsson	Corrected Non-Confidential Brief for Plaintiffs-Appellees, Ericsson Inc. and Telefonaktiebolaget LM Ericsson at 68, Ericsson Inc. v. D-Link Sys., Inc., No. 13-1625 (Fed. Cir. Feb. 20, 2014)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Ericsson, Inc. v. D-Link Sys., Inc.	Foley & Lardner LLP; Keker, Van Nest & Peters LLP; Kirkland & Ellis LLP; Reed Smith LLP; Wilmer Cutler Pickering Hale & Dorr LLP	Intel; Toshiba	Non-Confidential Brief for Intervenor-Appellant Intel and Defendants-Appellants Acer, Gateway, Netgear, D-Link and Toshiba at 74, Ericsson Inc. v D-Link Sys., Inc., No. 13-1625 (Fed. Cir. Dec. 16, 2013)	Yes
Federal Trade Comm'n v. Qualcomm Inc.	Sidley Austin LLP	Association for Competitive Technology	Class Action Complaint ¶ 38, at 8, Federal Trade Comm'n v. Qualcomm Inc., No. 5:17-cv-00220 (N.D. Cal. Jan. 17, 2017)	Yes
Fujitsu Ltd. v. Tellabs Operations, Inc.	Sidley Austin LLP	Tellabs	Tellabs Operations, Inc.'s, Tellabs, Inc.'s, and Tellabs North America, Inc.'s Motion for Judgement as a Matter of Law at 4, Fujitsu Ltd. v. Tellabs Operations, Inc., No. 1:09-cv-04530 (N.D. Ill. July 21, 2014)	Yes
Funai Elec. Co., Ltd. v. LSI Corp.	BakerHostetler	Funai Electric	Complaint ¶ 22, at 5, Funai Elec. Co., Ltd. v. LSI Corp., No. 5:16-cv-01210 (N.D. Cal. Mar. 11, 2016)	Yes
Genband US LLC v. Metaswitch Networks Ltd.	Mann Tindel Thompson; Quinn Emanuel Urquhart & Sullivan LLP	Metaswitch Networks	Metaswitch Networks Ltd. and Metaswitch Networks Corp. Answer and Affirmative Defenses to Genband US LLC's First Amended Complaint; First Amended Counterclaims ¶ 10, at 21, Genband US LLC v. Metaswitch Networks Ltd., No. 2:14-cv-00033 (E.D. Tex. May 27, 2014)	Yes
GIC Private Ltd. v. Qualcomm Inc.	Kirby McInerney LLP	GIC Private Limited	Complaint ¶ 41, at 21, GIC Private Ltd. v. Qualcomm Inc., No. 3:18-cv-00463 (S.D. Cal. Mar. 02, 2018)	Yes
Haier Am. Trading, LLC v. Samsung Elecs. Co., Ltd.	Harris Beach PLLC	Haier	Complaint ¶ 35, at 10, Haier Am. Trading, LLC v. Samsung Elecs. Co., Ltd., No. 1:17-cv-00921 (N.D.N.Y. Aug. 21, 2017)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Halo Elecs., Inc. v Pulse Elecs., Inc.	Step toe & Johnson LLP	Licensing Executives Society	Brief of Amicus Curiae Licensing Executives Society (U.S.A. and Canada), Inc. in Support of No Party at 20–21, Halo Elecs., Inc. v Pulse Elecs., Inc., No. 14-1513 (U.S. Dec. 16, 2015)	No
Hewlett-Packard Co. v ChriMar Sys., Inc.	Kerr Russell; McDermott Will & Emery LLP; Paul Hastings LLP	Aruba Networks; Hewlett-Packard	Hewlett-Packard Co. and Aruba Networks, Inc.'s Complaint and Demand for Jury Trial ¶ 50, at 21–22, Hewlett-Packard Co. v ChriMar Sys., Inc., No. 2:15-cv-12569 (E.D. Mich. July 20, 2015)	Yes
Hewlett-Packard Co. v ChriMar Sys., Inc.	Kerr Russell; McDermott Will & Emery LLP	Hewlett-Packard	Complaint and Demand for Jury Trial ¶ 33, at 13, Hewlett-Packard Co. v ChriMar Sys., Inc., No. 2:14-cv-10292 (E.D. Mich. Jan. 22, 2014)	Yes
Hewlett-Packard Enterprise Co. v ChriMar Sys. Inc.	Kerr Russell; McDermott Will & Emery LLP	Aruba Networks; Hewlett-Packard	Complaint and Jury Demand ¶ 36, at 19–20, Hewlett-Packard Enterprise Co. v ChriMar Sys. Inc., No. 2:17-cv-13784 (E.D. Mich. Nov. 21, 2017)	Yes
HTC Corp. v Ericsson	Wilson Sonsini Goodrich & Rosati PC	HTC	Complaint ¶ 4, at 2, HTC Corp. v Ericsson, No. 6:18-cv-00243 (E.D. Tex. Apr. 6, 2017).	Yes
HTC Corp. v Nokia Corp.	Wilson Sonsini Goodrich & Rosati PC	HTC	Complaint ¶ 3, at 2–3, HTC Corp. v Nokia Corp., No. 2:16-cv-01984 (W.D. Wash. Dec. 29, 2016)	Yes
HTC Corp. v Telefonaktiebolaget LM Ericsson	Wilson Sonsini Goodrich & Rosati PC	HTC	Complaint ¶ 4, at 2, HTC Corp. v Telefonaktiebolaget LM Ericsson, No. 2:17-cv-00534 (W.D. Wash. Apr. 6, 2017)	Yes
HTC Corp. v Telefonaktiebolaget LM Ericsson	Perkins Coie LLP	HTC	HTC Motion to Compel 45 Production and Rule 30(b)(6) Testimony from Qualcomm, No. 3:18-cv-02427 (S.D. Cal. Oct. 3, 2018)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Huawei Techs. Co., Ltd. v. Samsung Elecs. Co., Ltd.	Quinn Emanuel Urquhart & Sullivan LLP; Sidley Austin LLP	Huawei; Samsung	Joint Case Management Conference Statement at 6, Huawei Techs. Co., Ltd. v. Samsung Elecs. Co., Ltd., No. 3:16-cv-02787 (N.D. Cal. Sept. 6, 2016)	Yes
Huawei Techs., Co., Ltd. v. Samsung Elecs. Co. Ltd.	Quinn Emanuel Urquhart & Sullivan LLP	Samsung	Samsung Answer to Huawei Complaint for Breach of Contract, Declaratory Judgment, and Patent Infringement and Samsung Counterclaims ¶ 417, at 100, Huawei Techs., Co., Ltd. v. Samsung Elecs. Co. Ltd., No. 3:16-cv-02787 (N.D. Cal. Aug. 22, 2016)	Yes
<i>In re</i> Innovatio IP Ventures, LLC	Kirkland & Ellis LLP	Cisco; Motorola	The Suppliers' Opposition to Innovatio's Motion to Dismiss at 32–33, <i>In re</i> Innovatio IP Ventures, LLC, No. 1:11-cv-09308 (N.D. Ill. Dec. 14, 2012)	Yes
<i>In re</i> Intellectual Ventures I LLC	Feinberg Day Alberti & Thompson LLP; Freitas & Weinberg LLP; Funk & Bolton PA; Loeff Cabraser Heimann and Bernstein LLP	Intellectual Ventures	Petition for a Writ of Mandamus at 122, <i>In re</i> Intellectual Ventures I LLC, No. 16-113 (Fed. Cir. Feb. 10, 2016)	No
<i>In re</i> Optical Disk Drive Prods. Antitrust Litig.	Ropes & Gray LLP	LG	Defendants Hitachi-LG Data Storage, Inc. and Hitachi-LG Data Storage Korea, Inc.'s Answer to Indirect Purchaser Plaintiffs' Corrected Second Amended Class Action Complaint ¶ 210, at 56, <i>In re</i> Optical Disk Drive Prods. Antitrust Litig., No. 3:10-md-02143 (N.D. Cal. June 4, 2012)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
<i>In re</i> Processed Egg Prods. Antitrust Litig.	Pepper Hamilton LLP	Cal-Maine Foods; Daybreak Foods; Hillandale Farms; Land O'Lakes; Michael Foods; Midwest Poultry Services; Moark; National Food Corp.; Norco Ranch; Nucal Foods; Ohio Fresh Eggs; R.W. Saunder; Rose Acre Farms; Sparboe Farms; United Egg Producers; United States Egg Marketers; Weaver Brothers	Defendants' Statement of Law Submitted Pursuant to Case Management Order No. 19 at 112 n. 47, <i>In re</i> Processed Egg Prods. Antitrust Litig., No. 2:08-md-02002 (E.D. Pa. Oct. 5, 2012)	No
Intellectual Ventures I LLC v. Capital One Financial Corp.	Kirkland & Ellis LLP; Kramon & Graham PA; Latham & Watkins LLP; Troutman Sanders LLP	Capital One	The Capital One Defendants' Third Amended Answer, Defenses, and Counterclaims to Original Complaint ¶ 202, at 70, Intellectual Ventures I LLC v. Capital One Fin. Corp., No. 8:14-cv-00111 (D. MD. Sept. 18, 2014)	No
Intellectual Ventures I LLC v. Capital One Fin. Corp.	Kirkland & Ellis LLP; Kramon & Graham PA; Latham & Watkins LLP; Troutman Sanders LLP	Capital One	Cross-Appellants' Motion to Dismiss the Cross-Appeal at 70 Intellectual Ventures I LLC v. Capital One Financial Corp., No. 14-1506 (Fed. Cir. Sept. 18, 2014)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Intellectual Ventures I LLC v. Cricket Commc'ns	Gibson Dunn & Crutcher LLP; Morris Nichols Arsht & Tunnell LLP	Cricket	Answer and Defenses to First Amended Complaint ¶ 47, at 8–9, Intellectual Ventures I LLC v. Cricket Commc'ns, Inc., No. 1:13-cv-01669 (D. Del. Oct. 27, 2014)	Yes
Intellectual Ventures I LLC v. T-Mobile USA, Inc.	Keker, Van Nest & Peters LLP; Morris Nichols Arsht & Tunnell LLP	T-Mobile	Defendants T-Mobile USA, Inc. and T-Mobile US, Inc.'s Answer to First Amended Complaint ¶ 58, at 11, Intellectual Ventures I LLC v. T-Mobile USA, Inc., No. 1:13-cv-01671 (D. Del. Nov. 3, 2014)	Yes
Intellectual Ventures II LLC v. AT&T Mobility LLC	Gibson Dunn & Crutcher LLP; Morris Nichols Arsht & Tunnell LLP	AT&T	Answer and Defenses to Complaint ¶ 73, at 12–13, Intellectual Ventures II LLC v. AT&T Mobility LLC, No. 1:14-cv-01229 (D. Del. Oct. 27 2014)	Yes
Intellectual Ventures II LLC v. Cricket Commc'ns, Inc.	Gibson Dunn & Crutcher LLP; Morris Nichols Arsht & Tunnell LLP	Cricket	Answer and Defenses to Complaint ¶ 67, at 10–11, Intellectual Ventures II LLC v. Cricket Commc'ns, Inc., No. 1:14-cv-01230 (D. Del. Oct. 27, 2014)	Yes
Intellectual Ventures II LLC v. T-Mobile USA, Inc.	Keker, Van Nest & Peters LLP; Morris Nichols Arsht & Tunnell LLP	T-Mobile	T-Mobile USA, Inc. and T-Mobile US, Inc.'s Answer to Complaint ¶ 77, at 13, Intellectual Ventures II LLC v. T-Mobile USA, Inc., No. 1:14-cv-01232 (D. Del. Nov. 3, 2014)	Yes
InterDigital Commc'ns Inc. v. Huawei Techs. Co., Ltd.	Covington & Burling LLP; Young Conaway Stargatt & Taylor LLP	FutureWei; Huawei	Answer and Counterclaims ¶ 43, at 21, InterDigital Commc'ns Inc. v. Huawei Techs. Co., Ltd., No. 1:13-cv-00008 (D. Del. Jan. 24, 2013)	Yes
InterDigital Commc'ns Inc. v. Huawei Techs. Co., Ltd.	Covington & Burling LLP; Young Conaway Stargatt & Taylor LLP	FutureWei; Huawei	Reply in Further Support of Motion for Partial Lift of Mandatory Stay, and Response to Plaintiffs' Motion for Discretionary Stay at 8, InterDigital Commc'ns LLC v. Huawei Techs. Co., Ltd., No. 1:11-cv-00654 (D. Del. Dec. 30, 2011)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
InterDigital Commc'ns Inc. v. Nokia Corp.	Alston & Bird LLP; Morris Nichols Arsht & Tunnell LLP	Nokia	Nokia Corporation and Nokia Inc.'s Answering Brief in Opposition to Plaintiffs' Motion to Dismiss Amended FRAND Counterclaims of Nokia, Huawei, and ZTE at 7, InterDigital Commc'ns Inc. v. Nokia Corp., No. 1:13-cv-00010 (D. Del. Oct. 9, 2013)	Yes
InterDigital Commc'ns Inc. v. ZTE Corp.	Brinks Gilson & Lione; Richards, Layton & Finger PA;	ZTE	ZTE (USA) Inc.'s Amended Answer, Affirmative Defenses, and Counterclaims to Plaintiffs' Amended Complaint ¶ 11, at 40, InterDigital Commc'ns Inc. v. ZTE Corp., No. 1:13-cv-00009 (D. Del. Aug. 7, 2013)	Yes
InterDigital Tech. Corp. v. Pegatron Corp.	Weil, Gotshal & Manges LLP	Pegatron	Pegatron's Answer, Affirmative Defenses and Counterclaims ¶ 57, at 24, InterDigital Tech. Corp. v. Pegatron Corp., No. 5:15-cv-02584 (N.D. Cal. Aug. 3, 2015)	Yes
Koninklijke KPN N.V. v. Samsung Elecs. Co., Ltd.	Baker Botts LLP; Potter Minton; Susman Godfrey LLP; Ward & Smith PA	KPN; Samsung	Joint Proposed Jury Instructions, at 75-76, Koninklijke KPN N.V. v. Samsung Elecs. Co., Ltd., No 2:14-cv-01165 (E.D. Tex. Aug. 2, 2016)	Yes
Lotes Co., Ltd. v. Hon Hai Precision Indus. Co., Ltd.	The Gikkas Law Firm; Hunton & Williams LLP	Lotes	Brief for Plaintiff-Appellant at 3, Lotes Co., Ltd. v. Hon Hai Precision Indus. Co., Ltd., No. 13-2280 (2d Cir. Aug. 26, 2013)	Yes
Lotes Co., Ltd. v. Hon Hai Precision Indus. Co., Ltd.	Morgan, Lewis & Bockius LLP	Foxconn; Hon Hai	Defendants' Reply in Support of Defendants' Motion to Dismiss Plaintiff's First Amended Complaint at 5, Lotes Co., Ltd. v. Hon Hai Precision Indus. Co. Ltd., No. 1:12-cv-07465 (S.D.N.Y. Mar. 11, 2013)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Lotes Co., Ltd. v. Hon Hai Precision Indus. Co., Ltd.	Colvin Hudnell LLP; The Gikkas Law Firm	Lotes	First Amended Complaint ¶ 28, at 12, Lotes Co., Ltd. v. Hon Hai Precision Indus. Co., Ltd., No. 1:12-cv-07465 (S.D.N.Y. Dec. 21, 2012)	Yes
Microsoft Corp. v. Motorola Inc.	Harrigan Leyh Farmer & Thomsen LLP (Microsoft)	Microsoft	Microsoft's Reply in Support of its Motion for Summary Judgement of Breach of Contract at 7, Microsoft Corp. v. Motorola Inc., No. 2:10-cv-01823 (W.D. Wash. Apr. 20, 2012)	Yes
Microsoft Corp. v. Motorola, Inc.	Harrigan Leyh Farmer & Thomsen LLP; Sidley Austin LLP	Microsoft	Brief of Plaintiff-Appellee at 55, Microsoft Corp. v. Motorola, Inc., No. 12-35352 (9th Cir. June 27, 2012)	Yes
Microsoft Corp. v. Motorola, Inc.	Bingham McCutchen LLP	Qualcomm	Brief of Amicus Curiae Qualcomm Incorporated in Support of Neither Party at 6, Microsoft Corp. v. Motorola, Inc., No. 14-35393 (9th Cir. Sept. 22, 2014)	Yes
Microsoft Corp. v. Motorola, Inc.	Quinn Emanuel Urquhart & Sullivan LLP	General Instrument; Motorola	Opening Brief of Defendants-Appellants at 40, Microsoft Corp. v. Motorola, Inc., No. 14-35393 (9th Cir. Sept. 15, 2014)	Yes
Microsoft Corp. v. Motorola, Inc.	Harrigan Leyh Farmer & Thomsen LLP; Sidley Austin LLP	Microsoft	Brief of Plaintiff-Appellee at 51, Microsoft Corp. v. Motorola, Inc., No. 14-35393 (9th Cir. Nov. 14, 2014)	Yes
Microsoft Corp. v. Motorola, Inc.	Orrick Herrington & Sutcliffe LLP	Apple	Brief of Apple Inc. as Amicus Curiae in Support of Microsoft at 2-3, Microsoft Corp. v. Motorola, Inc., No. 14-35393 (9th Cir. Nov. 21, 2014)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Microsoft Corp. v. Motorola, Inc.	Nixon Peabody LLP; Wilmer Cutler Pickering Hale & Dorr LLP	Aruba Networks; Dell; Hewlett-Packard; Intel; Newegg; Sierra Wireless; Xilinx	Brief of Amici Curiae Intel Corporation, Aruba Networks Inc., Dell Inc., Hewlett-Packard Company, Newegg Inc., SAS Institute Inc., Sierra Wireless, Inc., Vizio, Inc., and Xilinx, Inc. in Support of Appellee and Affirmance at 7, Microsoft Corp. v. Motorola, Inc., No. 14-35393 (9th Cir. Nov. 21, 2014)	Yes
Microsoft Corp. v. Motorola, Inc.	Knobbe Martens Olson & Bear LLP	T-Mobile	Brief of Amicus Curiae T-Mobile USA, Inc. in Support of Plaintiff-Appellee Microsoft Corp. at 8, Microsoft Corp. v. Motorola, Inc., No. 14-35393 (9th Cir. Nov. 21, 2014)	Yes
Microsoft Mobile, Inc. v. InterDigital, Inc.	Smith, Katzenstein & Jenkins LLP; Wilson Sonsini Goodrich & Rosati PC	InterDigital	Opening Brief in Support of Defendants' Motion to Dismiss and Motion to Strike at 1, Microsoft Mobile, Inc. v. InterDigital, Inc., No. 1:15-cv-00723 (D. Del. Nov. 4, 2015)	Yes
Microsoft Mobile, Inc. v. InterDigital, Inc.	Drinker Biddle & Reath LLP; Sidley Austin LLP	Microsoft	Complaint ¶ 30, at 9, Microsoft Mobile, Inc. v. InterDigital, Inc., No. 1:15-cv-00723 (D. Del. Aug. 20, 2015)	Yes
Momenta Pharm., Inc. v. Amphastar Pharm., Inc.	King & Spalding LLP; Rose, Chinitz & Rose; Wilson Sonsini Goodrich & Rosati PC	Amphastar Pharmaceuticals; International Medication Systems	Memorandum of Law in Support of Defendants' Motion to Exclude Expert Testimony of Andrew Updegrove at 2, Momenta Pharm., Inc. v. Amphastar Pharm., Inc., No. 1:11-cv-11681 (D. Mass. June 19, 2017)	No
Motorola Mobility LLC v. Int'l Trade Comm'n	Ropes & Gray LLP	Motorola	Non-Confidential Opening Brief of Motorola Mobility LLC at 291-292, Motorola Mobility LLC v. Int'l Trade Comm'n, No. 13-1518 (Fed. Cir. Oct. 31, 2013)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Motorola Mobility LLC v. Int'l Trade Comm'n	Quinn Emanuel Urquhart & Sullivan LLP	Motorola	Opening Brief and Addendum of Appellant Motorola Mobility LLC at 146, <i>Motorola Mobility LLC v. Int'l Trade Comm'n</i> , No. 12-1666 (Fed. Cir. Feb. 6, 2013)	Yes
Motorola, Inc. v. Microsoft Corp	Alston & Bird LLP	Nokia	Motion for Leave to File of Amici Curiae Nokia Corporation and Nokia USA Inc. at 3, <i>Motorola, Inc. v. Microsoft Corp.</i> , No. 14-35393 (9th Cir. Sept. 22, 2014)	Yes
MUSC Foundation for Research Dev. v. Astrazeneca Pharm. LP	McKool Smith PC; Motley Rice LLC	Charleston Medical Therapeutics; MUSC Foundation for Research Development	MUSC Foundation for Research Development and Charleston Medical Therapeutics, Inc.'s Daubert Motion to Exclude Portions of the Rebuttal Expert Report and Proposed Testimony of Laura B. Stamm at 10-11, <i>MUSC Foundation for Research Dev. v. Astrazeneca Pharm. LP</i> , No. 2:13-cv-03438 (D.S.C. July 10, 2015)	No
Netlist, Inc. v. SK hynix Inc.	Sidley Austin LLP	SK hynix	Defendant SK hynix Inc.'s Counterclaims ¶ 19, at 5, <i>Netlist, Inc. v. SK hynix Inc.</i> , No. 8:16-cv-01605 (C.D. Cal. Nov. 7, 2016)	Yes
Netscape Commc'ns Corp. v. ValueClick, Inc.	Bryan Cave LLP; Cochran & Owen LLC	Commission Junction; FastClick; MediaPlex; Mezimedia; ValueClick; Web Clients	Memorandum in Support of Defendants' Motion for Summary Judgment at 27, <i>Netscape Commc'ns Corp. v. ValueClick, Inc.</i> , No. 1:09-cv-00225 (E.D. Va. Sept. 4, 2009)	Yes
Nokia Corp. v. Apple Inc.	Alston & Bird LLP; Morris Nichols Arsht & Tunnell LLP	Nokia	Nokia Corporation's and Nokia Inc.'s Opening Brief in Support of Their Motion to Dismiss at 13, <i>Nokia Corp. v. Apple Inc.</i> , No. 1:09-cv-00791 (D. Del. Mar. 11, 2010)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Nokia Inc. v. Int'l Trade Comm'n	Covington & Burling LLP	Samsung	Brief for Samsung Electronics Co. Ltd. as Amicus Curiae Supporting Petitioners at 19–20, Nokia Inc. v. Int'l Trade Comm'n, No. 12-1352 (U.S. June 2013)	No
Nokia Inc. v. Int'l Trade Comm'n	King & Spalding LLP	Amazon; Hewlett-Packard; Red Hat	Brief of Hewlett-Packard Co., Amazon.com, Inc., and Red Hat, Inc. as Amici Curiae in Support of Petitioners at 13, Nokia Inc. v. Int'l Trade Comm'n, No. 12-1352 (U.S. June 13, 2013)	No
Nokia Inc. v. Int'l Trade Comm'n	Kellogg Hansen Todd Evans & Figel PLLC	Dell; Ford	Brief of Dell Inc. and Ford Motor Company as Amici Curiae in Support of Petition for a Writ of Certiorari at 20–21, Nokia Inc. v. Int'l Trade Comm'n, No. 12-1352 (U.S. June 13, 2013)	No
Nokia Techs. OY v. Apple Inc.	Gillam & Smith LLP; Wilmer Cutler Pickering Hale & Dorr LLP	Apple	Apple Inc.'s Answer, Defenses, and Counterclaims to Plaintiffs' Complaint ¶ 72, at 46, Nokia Techs. OY v. Apple Inc., No. 2:16-cv-01440 (E.D. Tex. Feb. 28, 2017)	Yes
NorthMobile-Tech LLC v. Simon Prop. Grp., Inc.	Michael Best & Friedrich LLP; Solheim Billing & Grimmer SC	NorthMobile-Tech	NorthMobileTech, LLC's Memorandum in Support of Motion in Limine No 1: To Exclude Use of Derogatory Characterization of Plaintiff as a Patent Troll at 5, NorthMobile-Tech LLC v. Simon Prop. Grp., Inc., No. 3:11-cv-00287 (W.D. Wis. July 20, 2012)	No

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Polaris Innovations Ltd. v. Kingston Tech. Co., Inc.	Vinson & Elkins LLP	Kingston Technology	Kingston Technology Company, Inc.'s First Amended Answer, Affirmative Defenses, and Counterclaims to Plaintiff's Complaint for Patent Infringement ¶ 16, at 25, Polaris Innovations Ltd. v. Kingston Tech. Co., Inc., No. 8:16-cv-00300 (C.D. Cal. May 23, 2016)	Yes
Qualcomm Inc. v. Philips Elecs. North Am. Corp.	Finnegan Henderson Farabow Garrett & Dunner LLP	Philips	Declaration of Joseph Sarles in Support of Qualcomm Incorporated's Motion to Compel Third Party Compliance with Subpoena Pursuant to Federal Rule of Civil Procedure 45 ¶ 33, at 11, Qualcomm Inc. v. Philips Elecs. North Am. Corp., No. 1:18-mc-91021 (D. Mass. Jan. 17, 2018)	Yes
Realtek Semiconductor Corp. v. LSI Corp.	Kilpatrick Townsend & Stockton LLP	Agere Systems; LSI	Brief of Appellants at 4, Realtek Semiconductor Corp. v. LSI Corp., No. 13-16070 (9th Cir. Aug. 29, 2013)	Yes
Realtek Semiconductor Corp. v. LSI Corp.	Reed Smith LLP	Realtek	Answer Brief of Appellee Realtek Semiconductor Corporation at 1, Realtek Semiconductor Corp. v. LSI Corp., No. 13-16070 (9th Cir. Oct. 28, 2013)	Yes
Realtek Semiconductor Corp. v. LSI Corp.	Wilmer Cutler Pickering Hale & Dorr LLP	Aruba Networks; Dell; Intel; Kaspersky Lab; Newegg; SAS Institute; Symmetry; Xilinx	Motion for Leave to File Brief for Amici Curiae Intel Corporation, Aruba Networks Inc., Dell, Inc., Kaspersky Lab, Inc., Limelight Networks, Inc., Newegg Inc., SAS Institute Inc., Symmetry LLC, and Xilinx, Inc. In Support of Plaintiff-Appellee and Affirmance at 3, Realtek Semiconductor Corp. v. LSI Corp., No. 14-16319 (9th Cir. Apr. 10, 2015)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Realtek Semiconductor Corp. v. LSI Corp.	Kilpatrick Townsend & Stockton LLP; Reed Smith LLP	Agere Systems; LSI; Realtek	Joint Proposed Jury Instructions and Objections at 21, Realtek Semiconductor Co. v. LSI Co., No. 3:12-cv-03451 (N.D. Cal. Sept. 26, 2013)	Yes
Realtek Semiconductor Corp. v. LSI Corp.	Reed Smith LLP	Realtek	Plaintiff Realtek Semiconductor Corporation's Opposition to Defendants LSI Corporation and Agere Systems LLC's Motion to Dismiss at 2, Realtek Semiconductor Corp. v. LSI Corp., No. 3:12-cv-03451 (N.D. Cal. Oct. 5, 2012)	Yes
Rembrandt Wireless Techs., LP v. Samsung Elecs. Co. Ltd.	Ahmad Zavitsanos Anaipakos Alavi & Mensing PC; Heim Payne & Chorush LLP	Rembrandt Wireless Technologies	Plaintiff Rembrandt's Omnibus Motion In Limine ¶ 16, at 10, Rembrandt Wireless Techs., LP v. Samsung Elecs. Co. Ltd., No. 2:13-cv-00213 (E.D. Tex. Dec. 31, 2014)	Yes
Rockwell Automation, Inc. v. 3S-Smart Software Sols., GmbH	The Mazingo Firm PC; Skiermont Derby LLP; Sutherland Asbill & Brennan LLP	3S-Smart Software Solutions GmbH	Answer and Counterclaims to Complaint ¶ 130, at 54, Rockwell Automation, Inc. v. 3S-Smart Software Sols., GmbH, No. 2:16-cv-00869 (E.D. Tex. Aug. 22, 2016)	Yes
Saint Lawrence Commc'n LLC v. Apple Inc.	Ahmad Zavitsanos Anaipakos Alavi & Mensing PC; Latham & Watkins LLP; Gillam & Smith LLP; Ward, Smith & Hill PLLC	Apple; Saint Lawrence Communications	Final Jury Instructions at 39, Saint Lawrence Commc'n LLC v. Apple Inc., No. 2:16-cv-00082 (E.D. Tex. Jan. 12, 2018)	Yes
Samsung Elecs. Co., Ltd. v. Int'l Trade Comm'n	Wilmer Cutler Pickering Hale & Dorr LLP	Apple	Non-Confidential Brief for Intervenor Apple Inc. at 11, Samsung Elecs. Co., Ltd. v. Int'l Trade Comm'n, No. 13-1519 (Fed. Cir. Jan. 27, 2014)	Yes
Samsung Elecs. Co., Ltd. v. Int'l Trade Comm'n	Quinn Emanuel Urquhart & Sullivan LLP	Samsung	Appellants' Reply Brief at 29, Samsung Elecs. Co., Ltd. v. Int'l Trade Comm'n, No. 13-1519 (Fed. Cir. Feb. 18, 2014)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Sanofi-Aventis v. Apotex Inc.	Cravath Swaine & Moore LLP; Fitzpatrick Cella Harper & Scinto	Bristol-Myers Squibb; Sanofi	Sanofi's Memorandum of Law in Opposition to Apotex's Motion for Leave to File a Supplemental Answer, Affirmative Defenses and Counterclaims at 16–17, Sanofi-Aventis v. Apotex Inc., No. 1:02-cv-02255 (S.D.N.Y. June 11, 2009)	No
SCA Hygiene Prods. Aktiebolag v. First Quality Baby Prods., LLC	Klarquist Sparkman LLP	Garmin; Limelight Networks; LinkedIn; Mentor Graphics; Newegg; SAP America; SAS Institute; Symmetry; Xilinx	Brief of Amici Curiae Garmin International, Inc., Limelight Networks, Inc., LinkedIn Corp., Mentor Graphics Corporation, Newegg, Inc., SAP America, Inc., SAS Institute Inc., Symmetry LLC, and Xilinx, Inc. on Rehearing En Banc Supporting Defendants-Appellees at 12–13, SCA Hygiene Prods. Aktiebolag v. First Quality Baby Prods., LLC, No. 13-1564 (Fed. Cir. Apr. 21, 2015)	No
SCA Hygiene Prods. Aktiebolag v. First Quality Baby Prods., LLC	Kellogg Hansen Todd Evans & Figel PLLC; Quinn Emanuel Urquhart & Sullivan LLP	CTIA; Dell; Google; Hewlett-Packard; Intel; Marvell; Xerox	En Banc Brief of Dell Inc.; CTIA—The Wireless Association; Google Inc.; Hewlett-Packard Company; Intel Corporation; Marvell Semiconductor Inc.; and Xerox Corporation as Amici Curiae in Support of Defendants-Appellees at 5, SCA Hygiene Prods. Aktiebolag v. First Quality Baby Prods., LLC, No. 13-1564 (Fed. Cir. Apr. 23, 2015)	No
SD3, LLC v. Black & Decker (U.S.) Inc.	Constantine Cannon LLP	American Antitrust Institute; National Consumers League	Brief of Amicus Curiae American Antitrust Institute and National Consumers League in Support of Appellants at 20 n.9, SD3, LLC v. Black & Decker (U.S.) Inc., No. 14-1746 (4th Cir. Nov. 17, 2014)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Sony Corp. v. Fujifilm Holdings Corp.	Quinn Emanuel Urquhart & Sullivan LLP	Sony	Complaint ¶ 51, at 16–17, Sony Corp. v. Fujifilm Holdings Corp., No. 1:16-cv-05988 (S.D.N.Y. July 27, 2016)	Yes
Spherix Inc. v. Cisco Sys., Inc.	Kirkland & Ellis LLP; Morris Nichols Arsht & Tunnell LLP	Cisco	Cisco Systems, Inc.'s First Amended Answer and Counterclaims to Plaintiffs Spherix Incorporated and NNPT, LLC's First Amended Complaint ¶ 51, at 55–56, Spherix Inc. v. Cisco Sys., Inc., No. 1:14-cv-00393 (D. Del. May 19, 2015)	Yes
Sycamore IP Holdings LLC v. ABB, Inc.	Locke Lord LLP	Xtera	Answer and Counterclaim ¶ 10, at 8, Sycamore IP Holdings LLC v. ABB, Inc., No. 2:15-cv-00238 (E.D. Tex. May 15, 2015)	Yes
Synchronoss Techs., Inc. v. Funambol, Inc.	Durie Tangri LLP; Schnader Harrison Segal & Lewis LLP	Funambol	Defendant Funambol, Inc.'s Answer and Affirmative Defenses to Synchronoss' Complaint for Patent Infringement ¶ 96, at 34, Synchronoss Techs., Inc. v. Funambol, Inc., No. 4:16-cv-02026 (D.N.J. June 12, 2015)	Yes
TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson	Crowell & Moring LLP; McKool Smith PC; Sheppard Mullin Richter & Hampton LLP	TCL; Ericsson	Joint Case Management Conference Report Pursuant to Fed. R. Civ. P. 26(f) at 9–10, TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, No. 8:14-cv-00341 (C.D. Cal. Jan. 20, 2015)	Yes
TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson	Sheppard Mullin Richter & Hampton LLP	TCL	Complaint ¶ 84, at 23, TCL Commc'n Tech. Holdings, Ltd. v. Telefonaktiebolaget LM Ericsson, No. 8:14-cv-00341 (C.D. Cal. Mar. 5, 2014)	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
TCL Commc'n Tech. Holdings Ltd. v. Telefonaktiebolaget LM Ericsson	Alston & Bird LLP	Nokia	Brief of Amicus Curiae Nokia Technologies Oy in Support of Appellants Telefonaktiebolaget LM Ericsson and Ericsson Inc. at 7, TCL Commc'n Tech. Holdings Ltd. v. Telefonaktiebolaget LM Ericsson, No. 18-1363 (June 18, 2018)	Yes
TCL Commc'n Tech. Holdings Ltd. v. Telefonaktiebolaget LM Ericsson	Orrick Herrington & Sutcliffe LLP	Panasonic	Corrected Brief of Panasonic Corp. as Amicus Curiae in Support of Neither Party at 7-8, TCL Commc'n Tech. Holdings Ltd. v. Telefonaktiebolaget LM Ericsson, No. 18-1363 (June 27, 2018)	Yes
TCL Commc'n Tech. Holdings Ltd. v. Telefonaktiebolaget LM Ericsson	McKool Smith PC; MoloLamken LLP	Ericsson	Corrected Non-Confidential Brief for Appellants Ericsson Inc. and Telefonaktiebolaget LM Ericsson, TCL Commc'n Tech. Holdings Ltd. v. Telefonaktiebolaget LM Ericsson, No. 18-1363 (June 20, 2018)	Yes
TQ Delta, LLC v. ZyXEL Commc'ns, Inc.	Farnan LLP; McAndrews, Held & Malloy Ltd	TQ Delta	Plaintiff TQ Delta, LLC's Opening Brief in Support of its Motion to Dismiss the Counterclaims of Defendant ZyXEL Communications, Inc. at 14, TQ Delta, LLC v. ZyXEL Commc'ns, Inc., No. 1:13-cv-02013 (D. Del. Feb. 24, 2014)	Yes
TruePosition, Inc. v. Andrew Corp.	Kirkland & Ellis; Young Conaway Stargatt & Taylor LLP	Andrew Corp.	Andrew Corporation's Answering Brief in Opposition to TruePosition's Motion for Permanent Injunctive Relief at 15-16, TruePosition, Inc. v. Andrew Corp., No. 1:05-cv-00747 (D. Del. Nov. 15, 2007)	Yes
U-Blox AG v. Koninklijke Philips N.V.	Sheppard Mullin Richter & Hampton LLP	U-Blox AG	Complaint ¶ 82, at 22, U-Blox AG v. Koninklijke Philips N.V., No. 3:18-cv-01627 (S.D. Cal. July 18, 2018).	Yes

Case Name	Filing Law Firm(s)	Client(s)	Document Citation	SEP Related Case?
Wi-LAN, Inc. v. LG Elecs., Inc.	Dinsmore & Shohl LLP; Greenberg Traurig LLP	LG	Defendants LG Electronics Inc., LG Electronics U.S.A., Inc., and LG Electronics Mobilecomm U.S.A., Inc.'s Second Amended Answer to Complaint, Affirmative Defenses, and Counterclaims ¶ 287, at 90–91, Wi-LAN, Inc. v. LG Elecs., Inc., No. 3:17-cv-00358 (S.D. Cal. Jan. 9, 2018)	Yes
Zenith Elecs. LLC v. Sceptre, Inc.	Manatt, Phelps & Phillips LLP; Proskauer Rose LLP	Panasonic; Philips; Sceptre; Zenith Electronics	Joint Rule 16(b)/26(f) Report at 3, Zenith Elecs. LLC v. Sceptre, Inc., No. 2:14-cv-05150 (C.D. Cal. Nov. 14, 2014)	Yes
Zenith Elecs. LLC v. Sceptre, Inc.	Manatt, Phelps & Phillips LLP	Sceptre	Sceptre, Inc.'s Answer, Affirmative Defenses, and Counterclaims ¶ 25, at 19, Zenith Elecs. LLC v. Sceptre, Inc., No. 2:14-cv-5150 (C.D. Cal. Sept. 8, 2014)	Yes
ZTE Corp. v. Vringo, Inc.	Morris James LLP; Pillsbury Winthrop Shaw Pittman LLP	ZTE	Complaint ¶ 13, at 4, ZTE Corp. v. Vringo, Inc., No. 1:15-cv-00986 (D. Del. Feb. 5, 2015)	Yes

Source: Bloomberg Law.

Appendix 4. Court Orders Referencing Patent Holdup

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Apple Inc. v. Qualcomm Inc.	District Judge Gonzalo P. Curiel	Boies, Schiller & Flexner LLP (Apple); Cravath Swain & Moore LLP (Qualcomm); Fish & Richardson PC (Apple); Gibson Dunn & Crutcher LLP (Compal; FIH; Hon Hai; Pegatron; Wistron); Jones Day (Qualcomm); K&L Gates LLP (Wistron); Norton Rose Fulbright US LLP (Qualcomm); Quinn Emanuel Urquhart & Sullivan LLP (Qualcomm); Wiggin and Dana (Qualcomm)	Order Denying Anti-Suit Injunction at 5, Apple Inc. v. Qualcomm Inc., No. 3:17-cv-00108 (S.D. Cal. Sept. 7, 2017)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Apple Inc. v. Samsung Elecs. Co., Ltd.	District Judge Lucy H. Koh	Alston & Bird LLP (Nokia); Arnold & Porter LLP (IDC Research); Bridges & Mavrakakis LLP (Apple); Cannata O'Toole Fickes & Almazan LLP (Reuters); Carr & Ferrell LLP (HTC; S3G Graphics); Cooley LLP (Apple); Cravath Swaine & Moore LLP (Qualcomm); Crone Hawxhurst LLP (Samsung); Crowell & Moring LLP (Samsung); DLA Piper LLP (Samsung); Finnegan Henderson Farabow Garrett & Dunner LLP (Philips); Foley & Lardner LLP (Toshiba); Freeborn & Peters LLP (Samsung); Goldman Ismail Tomaselli Brennan & Baum LLP (Apple); Gordon & Rees LLP (Samsung); Irell & Manella LLP (Research in Motion); King & Spalding LLP (Dolby Laboratories; IBM); Mauriel Kapouytian Woods LLP (Apple); Mayer Brown LLP (Samsung); McKool Smith PC (Ericsson; Rovi); Morgan Franich Fredkin Siamas & Kays LLP (Qualcomm); Morrison & Foerster LLP (Apple); Newman Du Wors LLP (Microsoft); Nolan Barton Bradford & Olmos LLP (Shin Nishibori); O'Melveny & Myers LLP (Samsung); Perkins Coie LLP (Intel; Sony); Pierce Bainbridge Beck Price & Hecht LLP (Samsung); Pillsbury Winthrop Shaw Pittman LLP (Samsung); Procopio Cory Hargreaves & Savitch LLP (Cellco); Quinn Emanuel Urquhart & Sullivan LLP (Google; Samsung); Reed Smith LLP (Siemens); Reese LLP (Hoai Dang); Sheppard Mullin Richter & Hampton LLP (Samsung); Shook Hardy & Bacon LLP (Sprint); Sidley Austin LLP (T-Mobile); Singer Bea LLP (Samsung); Squire Patton Boggs (Samsung); Steptoe & Johnson LLP (IBM; Samsung); Taylor & Patchen LLP (Apple); Troutman Sanders LLP (Motorola); Valerian Law (Reuters); Wilmer Cutler Pickering Hale & Dorr LLP (Apple); Wilson Sonsini Goodrich & Rosati PC (InterDigital); Winston & Strawn LLP (Motorola)	Order Denying Motion for Summary Judgment at 40, Apple Inc. v. Samsung Elecs. Co., Ltd., No. 5:11-cv-01846 (N.D. Cal. Apr. 5, 2012)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Apple, Inc. v. Motorola Mobility, Inc.	District Judge Barbara B. Crabb	Cetra Law Firm LLC (Apple); Covington & Burling LLP (Apple); Godrey & Kahn SC (Apple); Quinn Emanuel Urquhart & Sullivan LLP (Motorola); Reed Smith LLP (Motorola); Tensegrity Law Group LLP (Apple); Weil, Gotshal & Manges LLP (Apple)	Opinion and Order at 43-44, Apple, Inc. v. Motorola Mobility, Inc., No. 3:11-cv-00178 (W.D. Wis. Oct. 29, 2012)	Yes
Broadcom Corp. v. Qualcomm Inc.	Circuit Judge Maryanne Barry	Berger & Montague (American Antitrust Institute; Consumer Federation of America); Cleary Gottlieb Steen & Hamilton LLP (Broadcom); Cravath Swaine & Moore LLP (Qualcomm); Drinker Biddle & Reath LLP (Institute of Electrical and Electronics Engineers; Oasis Open; The Open Group; PCI Industrial Computer Manufacturers); McCarter & English (Qualcomm); Nicoll Davis & Spinella (Institute of Electrical and Electronics Engineers); Stone & Magnanini (Broadcom)	Broadcom Corp. v. Qualcomm Inc., No. 06-4292, at 17 (3d Cir. Sept. 4, 2007)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Certain 3G Mobile Handsets and Components Thereof	ALJ Theodore R. Essex	Alston & Bird LLP (Nokia); Finnegan Henderson Farabow Garrett & Dunner LLP (InterDigital); Latham & Watkins LLP (InterDigital); Quinn Emanuel Urquhart & Sullivan LLP (Nokia); Sidley Austin LLP (Nokia); Weil, Gotshal & Manges LLP (InterDigital); Wilson Sonsini Goodrich & Rosati PC (InterDigital)	Order 49: Initial Determination Granting in Part Motion of Nokia Corporation, Nokia Inc., and Microsoft Mobile OY to Substitute Parties and Amend Notice of Investigation, and Motion of Microsoft Mobile OY to Intervene for the Limited Purpose of Filing the Motion to Substitute Parties and Amend the Notice of Investigation at 6, Certain 3G Mobile Handsets and Components Thereof, Inv. No. 337-TA-613 (Remand) (USITC June 26, 2014) (Initial Determination)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof	Secretary Lisa R. Barton	Alston & Bird LLP (Intellisync; Nokia); Desmarais LLP (Intellisync; Nokia); Finnegan Henderson Farabow Garrett & Dunner (Exedea; HTC); McDermott, Will & Emery (Exedea; HTC); Paul Hastings LLP (HTC); Winston & Strawn LLP (Exedea; HTC)	Notice of Commission Determination to Review in Part a Final Initial Determination Finding a Violation of Section 337; Schedule for Briefing on the Issues Under Review and on Remedy, the Public Interest, and Bonding at 4, Certain Electronic Devices, Including Mobile Phones and Tablet Computers, and Components Thereof, Inv. No. 337-TA-847 (USITC Dec. 11, 2013)	Yes
Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof	Secretary Donald S. Clark	Adduci Mastriani & Schaumberg LLP (Microsoft); Harrigan Leyh Farmer & Thomsen LLP (Microsoft); Kilpatrick Townsend & Stockton LLP (General Instrument; Motorola); Quinn Emanuel Urquhart & Sullivan LLP (General Instrument; Motorola); Ropes & Gray LLP (General Instrument; Motorola); Sidley Austin LLP (Microsoft); Steptoe & Johnson LLP (General Instrument; Motorola); Summit Law Group (General Instrument; Motorola)	Third Party United States Federal Trade Commission's Statement on the Public Interest at 2, Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof, Inv. No. 337-TA-752 (USITC June 6, 2012)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Certain Mobile Electronic Devices, Including Wireless Communication Devices, Portable Music and Data Processing Devices, and Tablet Computers	Lisa A. Murray	Adduci, Mastriani & Schaumberg LLP (Apple); Cooley LLP (Apple); Quinn Emanuel Urquhart & Sullivan LLP (Samsung); Steptoe & Johnson LLP (Samsung); Wilmer Cutler Pickering Hale & Dorr LLP (Apple)	Commission Opinion at 66, Certain Mobile Electronic Devices, Including Wireless Communication Devices, Portable Music and Data Processing Devices, and Tablet Computers, Inv. No. 337-TA-794 (USITC July 5, 2013)	Yes
Certain Network Devices, Related Software and Components Thereof (I)	Secretary Lisa R. Barton	Fish & Richardson PC (Arista Networks); Kecker, Van Nest & Peters LLP (Arista Networks); Kirkland & Ellis LLP (Cisco)	Notice of the Commission's Determination to Review In-Part A Final Initial Determination Finding a Violation of Section 337; Request for Written Submissions at 4-5, Certain Network Devices, Related Software and Components Thereof (I), Inv. No. 337-TA-944 (Enforcement) (USITC Apr. 11, 2016)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Certain Semiconductor Chips and Products Containing Same	Daniel L. Girdwood	Adduci Mastriani & Schaumberg LLP (Garmin); Finnegan Henderson Farabow Garrett & Dunner LLP (Rambus); Fish & Richardson PC (AsusTek; Biostar; EliteGroup Computer Systems; EVGA; Galaxy Microsystems; GBT; Gigabyte Technology; Gracom Technology; Hewlett-Packard; Jaton Technology; MSi; Palit Microsystems; Pine Technology; Sparkle Computer; ZOTAC); Kilpatrick Townsend & Stockton LLP (LSI; Seagate Technology); Jones Day (Freescale Semiconductor); K&L Gates (STMicroelectronics); Morrison & Foerster LLP (Hitachi); Quinn Emanuel Urquhart & Sullivan LLP (Audio Partnership; Broadcom; Cisco; MediaTek; Motorola; NVIDIA; Oppo); Schwabe, Williamson & Wyatt (PCI-SIG)	Response to the Commission Investigative Staff to Third Party PCI-SIG's Amicus Curiae Brief Regarding Respondent Broadcom's Motion to Terminate at 2, Certain Semiconductor Chips and Products Containing Same, Inv. No. 337-TA-753 (USITC) June 27, 2011	Yes
Certain Wireless Communications Base Stations and Components Thereof	ALJ E. James Gildea	Finnegan Henderson Farabow Garrett & Dunner LLP (Ericsson); Sterne Kessler Goldstein & Fox (Adaptix); Winston & Strawn LLP (Ericsson)	Order No. 27: Granting Respondents' Motion In Limine to Strike Opinions in Dr. Teece's Witness Statement That Are Beyond the Scope of His Expert Report at 6, Certain Wireless Communications Base Stations and Components Thereof, Inv. No. 337-TA-871 (USITC) Nov. 21, 2013	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Certain Wireless Consumer Electronic Devices And Components Thereof	ALJ E. James Gildea	Adduci, Mastriani & Schaumberg (Barnes & Noble; Garmin; Sierra Wireless; ZTE); Agility IP Law (Patriot Scientific; Phoenix Digital Solutions; Technology Properties Limited); Brinks Gilson & Lione (ZTE); Cooley LLP (Amazon; Barnes & Noble; HTC; Huawei; Nintendo); DLA Piper LLP (Barnes & Noble; Samsung); Fish & Richardson PC (Acer; Amazon; Barnes & Noble; Garmin; HTC; Huawei; LG; Nintendo; Novatel Wireless; Samsung; ZTE); K&L Gates LLP (Acer; Amazon; Barnes & Noble; HTC; Huawei; Kyocera; LG; Nintendo); Morrison & Foerster LLP (Kyocera); Novatel Wireless; Samsung; ZTE); Paul Weiss Rifkind Wharton and Garrison LLP (Garmin); Quinn Emanuel Urquhart & Sullivan LLP (Barnes & Noble; Garmin; HTC; Huawei; LG; Nintendo; Novatel Wireless; Samsung; ZTE); Steptoe & Johnson LLP (Huawei)	Initial Determination on Violation of Section 337 and Recommended Determination on Remedy and Bond at 323, Certain Wireless Consumer Electronics Devices and Components Thereof, Inv. No. 337-TA-853 (USITC July 24, 2012) (Initial Determination)	No
Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof	ALJ Theodore R. Essex	Alston & Bird LLP (Huawei; Microsoft; Nokia; Samsung; ZTE); Brinks Gilson & Lione (FutureWei; Huawei; Microsoft; Nokia; Samsung; ZTE); Covington & Burling LLP (FutureWei; Huawei; Nokia; Samsung); Fish & Richardson PC (Samsung); Latham & Watkins LLP (InterDigital; IPR Licensing); McDermott, Will & Emery LLP (ZTE); Pepper Hamilton (InterDigital; IPR Licensing); Ropes & Gray LLP (Huawei; Nokia; Samsung; ZTE); Sidley Austin LLP (Microsoft; Nokia; ZTE); Williams & Connolly LLP (Nokia; Samsung); Wilson Sonsini Goodrich & Rosati PC (InterDigital; IPR Licensing)	Initial Determination on Violation of Section 337 and Recommended Determination on Remedy and Bond at 123, Certain Wireless Devices with 3G and/or 4G Capabilities and Components Thereof, Inv. No. 337-TA-868 (USITC June 26, 2014) (Initial Determination)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Certain Wireless Standard Compliant Electronic Devices, Including Communication Devices and Tablet Computers	ALJ Dee Lord	Fish & Richardson PC (Apple); Hogan Lovells LLP (Apple); McKool Smith PC (Ericsson); Wilmer Cutler Pickering Hale & Dorr LLP (Apple); Winston & Strawn LLP (Ericsson)	Order No. 33: Granting-in-Part and Denying-in-Part Complainants' Motion to Compel at 5, Certain Wireless Standard Compliant Electronic Devices, Including Communication Devices and Tablet Computers, Inv. No. 337-TA-953 (USITC Nov. 10, 2015)	Yes
Ericsson, Inc. v. D-Link Sys., Inc.	Circuit Judge Kathleen M. O'Malley	Alston & Bird LLP (Dell); Boies, Schiller & Flexner LLP (MediaTek); Dorsey & Whitney LLP (Institute of Electrical and Electronics Engineers); Consovoy McCarthy Park PLLC (Dolby Laboratories); Cravath Swaine & Moore LLP (Qualcomm); Foley & Lardner LLP (Toshiba); Kecker, Van Nest & Peters LLP (Acer; D-Link; Gateway; Netgear); King & Spalding LLP (Nokia); Kirkland & Ellis LLP (Intel); Lowenstein Sandler LLP (Aruba Networks; Cisco; Ruckus Wireless; Safeway; SAS Institute); Mayer Brown LLP (Marvell); McKool Smith PC (Ericsson; Wi-Fi One); Morgan, Lewis & Brockius LLP (Dolby Laboratories); Perkins Coie LLP (Broadcom); Reed Smith LLP (Acer; D-Link; Gateway; Netgear); Shelton IP Law PC (Hewlett-Packard); Wilmer Cutler Pickering Hale & Dorr LLP (Intel)	Ericsson, Inc. v. D-Link Sys., Inc., No. 13-1625, at 7-8 (Fed. Cir. Dec. 4, 2014)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Golden Bridge Tech. v. Apple Inc.	Mag. Judge Paul S. Grewal	Akin Gump Strauss Hauer & Feld LLP (Lenovo); Computer Law Group LLP (Golden Bridge); Connolly Bove Lodge & Hutz LLP (ZTE); Cooley LLP (Apple); Covington & Burling LLP (Hewlett-Packard); Farella Braun & Martel LLP (Dell); Fish and Richardson PC (LG); Gordon & Rees LLP (Pantech); HC Park and Associates (Pantech); Hennigan Dorman LLP (Golden Bridge); Irell & Manella LLP (Research in Motion); Kaufman Dolowich & Voluck LLP (ZTE); Kilpatrick Townsend and Stockton LLP (Motorola); Klarquist Sparkman LLP (Amazon); Mayer Brown LLP (HTC); McGuire Woods LLP (Sony); McKool Smith PC (Golden Bridge); Nixon Peabody LLP (Sierra Wireless); Norton Rose Fulbright US LLP (Apple); Olavi Dunne LLP (Barnes & Noble); O'Melveny & Myers LLP (Samsung); Perkins Coie LLP (Intel); Quinn Emanuel Urquhart & Sullivan LLP (Barnes & Noble); Sheppard Mullin Richter & Hampton LLP (HTC); Stroock & Stroock & Lavan LLP (Sony); The Tailieu Law Firm LLP (Motorola); Vinson & Elkins LLP (Lenovo)	Order Granting Defendant's Motion to Exclude Opinions and Testimony of Karl J. Schulze at 9, Golden Bridge Tech. v. Apple Inc., No. 5:12-cv-04882 (N.D. Cal. May 18, 2014)	Yes
Honeywell Int'l Inc. v. United States	Judge Susan G. Braden	King & Spalding LLP (L-3 Communications); Latham & Watkins LLP (Honeywell); Squire Patton Boggs (Honeywell); Venable LLP (Lockheed Martin)	Honeywell Int'l Inc. v. United States, No. 1:02-cv-01909, at 52 (Fed. Cl. Dec. 5, 2012) (Braden, J.)	Yes
Huawei Techs. Co. Ltd. v. T-Mobile US, Inc.	Mag. Judge Roy S. Payne	Alston & Bird LLP (Nokia); The Dacus Firm PC (Nokia); Duane Morris LLP (Cisco); Fish & Richardson PC (Huawei); Gibson Dunn & Crutcher LLP (Ericsson; Nokia; T-Mobile); Haynes & Boone LLP (Ericsson); Mann Tindel & Thompson (Huawei); McKool Smith PC (T-Mobile); Paul Hastings LLP (T-Mobile); Ogletree Deakins Nash Smoak & Stewart PC (Nokia); Potter Minton (T-Mobile); Wilmer Cutler Pickering Hale & Dorr LLP (T-Mobile)	Order on Motions In Limine at 6, Huawei Techs. Co. Ltd. v. T-Mobile US, Inc., No. 2:16-cv-00052 (E.D. Tex. Sep. 29, 2017)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Huawei Techs., Co., Ltd. v. Samsung Elecs. Co., Ltd.	District Judge William H. Orrick	Alston and Bird LLP (Nokia); Crone Hawxhurst LLP (Samsung); Perkins Coie LLP (T-Mobile); Quinn Emanuel Urquhart & Sullivan LLP (Samsung); Sidley Austin LLP (Huawei); Singer Bea LLP (Samsung)	Order on Motions for Summary Judgement at 75, Huawei Techs., Co., Ltd. v. Samsung Elecs. Co., Ltd., No. 3:16-cv-02787 (N.D. Cal. Sept. 25, 2018)	Yes
Hynix Semiconductor Inc. v. Rambus Inc.	District Judge Ronald M. Whyte	Agility IP Law (SK hynix); Akin Gump Strauss Hauer & Feld (Rambus); Beck Bismonte & Finley LLP (SK hynix); Dewey & LeBoeuf LLP (Rambus); Freitas & Weinberg LLP (SK hynix); Greenberg Traurig LLP (Rambus); Kilpatrick Townsend & Stockton LLP (SK hynix); Littler Mendelson PC (SK hynix); McKool Smith PC (Rambus); Munger, Tolles & Olson LLP (Rambus); O'Melveny & Myers LLP (SK hynix); Orrick Herrington & Sutcliffe LLP (SK hynix; Nanya Technology); Paul Hastings LLP (Rambus); Quinn Emanuel Urquhart & Sullivan LLP (SK hynix); Skadden Arps (Rambus); Sidley Austin LLP (Rambus); TechKnowledge Law Group LLP (Nanya Technology); Tensegrity Law Group LLP (SK hynix); Weil, Gotshal & Manges LLP (SK hynix); Walker Stevens Cannon Yang LLP (Rambus); White & Case LLP (Rambus); Wilmer Cutler Pickering Hale & Dorr LLP (Rambus)	Order Granting in Part and Denying in Part Rambus' Motion to Strike Jury Demands at 20-21, Hynix Semiconductor Inc. v. Rambus Inc., No. 5:05-cv-00334 (N.D. Cal. Nov. 4, 2007)	Yes
InterDigital Commc's Inc. v. ZTE Corp.	District Judge Richard G. Andrews	Heyman Enerio Gattuso & Hirzel LLP (InterDigital); McCarter & English (InterDigital); Morris Nichols Arshat & Tunnell LLP (Nokia); Smith, Katzenstein & Jenkins LLP (InterDigital); Wilson Sonsini Goodrich & Rosati PC (InterDigital)	InterDigital Commc's, Inc. v. ZTE Corp., No. 1:13-cv-00010, at 1 (D. Del. May 28, 2014) (Andrews, J.)	Yes
InterDigital Commc's, Inc. v. ZTE Corp.	District Judge Richard G. Andrews	Heyman Enerio Gattuso & Hirzel LLP (InterDigital); McCarter & English (InterDigital); Morris Nichols Arshat & Tunnell LLP (Nokia); Smith, Katzenstein & Jenkins LLP (InterDigital); Wilson Sonsini Goodrich & Rosati PC (InterDigital)	InterDigital Commc's, Inc. v. ZTE Corp., No. 1:13-cv-00009, at 1 (D. Del. May 28, 2014) (Andrews, J.)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Jesse Meyer v. Qualcomm Inc.	District Judge William Q. Hayes	Cooley LLP (Qualcomm); Cravath Swaine & Moore LLP (Qualcomm); Dillon & Gerardi (Qualcomm); DLA Piper LLP (Qualcomm)	Jesse Meyer v. Qualcomm Inc., No. 3:08-cv-00655, at 3 (S.D. Cal. Mar. 3, 2009) (Hayes, J.)	Yes
Lotes Co., Ltd. v. Hon Hai Precision Indus. Co. Ltd.	District Judge Shira A. Scheindlin	Colvin Hudnell LLP (Lotes); Dan Johnson Law Group (Foxconn; Hon Hai); The Gikkas Law Firm (Lotes); Kramer Levin Naftalis & Frankel LLP (Lotes); Morgan, Lewis & Bockius LLP (Foxconn; Hon Hai); Rimon PC (Lotes)	Lotes Co., Ltd. v. Hon Hai Precision Indus. Co., Ltd., No. 1:12-cv-07465, at 3 (S.D.N.Y. May 14, 2013) (Scheindlin, J.)	Yes
Merdad Valikhani v. Qualcomm Inc.	District Judge William Q. Hayes	Cooley LLP (Qualcomm); Cravath, Swaine & Moore LLP (Qualcomm); DLA Piper LLP (Qualcomm)	Merdad Valikhani v. Qualcomm Inc., No. 3:08-cv-00786, at 2 (S.D. Cal. Aug. 21, 2008) (Hayes, J.)	Yes
Microsoft Corp. v. Motorola, Inc.	Circuit Judge Marsha S. Berzon	Harrigan Leyh Farmer & Thomsen LLP (Microsoft); Quinn Emanuel Urquhart & Sullivan LLP (Motorola); Ropes & Gray LLP (Motorola); Sidley Austin LLP (Microsoft); Summit Law Group (Motorola)	Microsoft Corp. v. Motorola, Inc., No. 12-35352, at 3 (9th Cir. Sept. 11, 2012) (Berzon, J.)	Yes
Microsoft Corp. v. Motorola, Inc.	Circuit Judge Marsha S. Berzon	Alston & Bird LLP (Nokia); Harrigan Leyh Farmer & Thomsen LLP (Microsoft); Knobbe Martens Olson & Bear LLP (T-Mobile); Morgan, Lewis & Bockius LLP (Qualcomm); Nixon Peabody LLP (Sierra Wireless); Orrick Herrington & Sutcliffe LLP (Apple); Quinn Emanuel Urquhart & Sullivan LLP (General Instrument; Motorola); Sidley Austin LLP (Microsoft); Summit Law Group (General Instrument; Motorola); Wilmer Cutler Pickering Hale & Dorr LLP (Aruba Networks; Dell; Hewlett-Packard; Intel; Newegg; SAS Institute; Vizio; Xilinx); Yarmuth Wilsdon PLLC (General Instrument; Motorola)	Microsoft Corp. v. Motorola, Inc., No. 14-35393, at 9 (9th Cir. July 30, 2015) (Berzon, J.)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Microsoft Mobile Inc. v. InterDigital, Inc.	District Judge Richard G. Andrews	Drinker Biddle & Reath LLP (Microsoft); Smith, Katzenstein & Jenkins LLP (InterDigital); Wilson Sonsini Goodrich & Rosati PC (InterDigital)	Memorandum Order at 2, Microsoft Mobile Inc. v. InterDigital, Inc., No. 1:15-cv-00723, at 2 (D. Del. Apr. 13, 2016)	Yes
Network-1 Techs., Inc. v. Alcatel-Lucent USA, Inc.	Mag. Judge K. Nicole Mitchell	Bartlit Beck Herman Palenchar & Scott LLP (Hewlett-Packard); Blank Rome LLP (Polycom); Capshaw DeRieux LLP (Transition Networks); Crowell & Moring LLP (Avaya); The Davis Firm PC (Polycom); Dickstein Shapiro LLP (NEC); Dovel & Luner (Network-1); The Dacus Firm PC (Avaya; Dell); Dunlap Bennett & Ludwig PLLC (Avaya); Findlay Craft PC (Alcatel-Lucent); Finnegan Henderson Farabow Garrett & Dunner (Axis Communications; Sony); Fisch Sigler LLP (Juniper Networks); Gillam & Smith LLP (Juniper Networks; Sony); Haltom & Doan (Hewlett-Packard); Haynes & Boone LLP (Samsung); The Heartfield Law Firm (Hewlett-Packard); K&L Gates LLP (Dell); King & Spalding LLP (Alcatel-Lucent); Mayer Brown LLP (Motorola); McDermott Will & Emery LLP (Hewlett-Packard); Merchant & Gould (Transition Networks); Morrison & Foerster LLP (Huawei); Nelson Bumgardner Albritton PC (Network-1); Potter Minton (Huawei; Motorola); Schiff Hardin LLP (NEC); Sidley Austin LLP (Dell); Simpson Thacher & Bartlett (Hewlett-Packard); Vasquez Benisek & Lindgren LLP (Garrettcom); Ward, Smith & Hill PLLC (Network-1); Wilmer Cutler Pickering Hale & Dorr LLP (Alcatel-Lucent); Wilson Robertson & Cornelius PC (Hewlett-Packard); Wilson Sonsini Goodrich & Rosati PC (Allied Telesis); Winston & Strawn LLP (Dell); Wong Cabello Lutsch Rutherford & Brucculeri LLP (Polycom); Yarbrough & Wilcox PLLC (Axis Communications)	Network-1 Techs., Inc. v. Alcatel-Lucent USA, Inc., No. 6:11-cv-00492 at 7 (E.D. Tex. Sep. 9, 2017)	Yes

Case Name	Issuer of Order	Law Firms and Firms in the Case	Document Citation	SEP Related Case?
Optis Wireless Tech., LLC v. Huawei Techs. Co. Ltd.	District Judge Rodney Gilstrap	Covington & Burling LLP (Huawei); Gray Reed & McGraw LLP (Optis Wireless Technology); McKool Smith PC (Optis Wireless Technology); Sidley Austin LLP (Huawei); Siebman Forrest Burg & Smith LLP (Huawei)	Final Jury Instructions at 24, Optis Wireless Tech., LLC v. Huawei Techs. Co. Ltd., No. 2:17-cv-00123 (E.D. Tex. Aug. 25, 2018)	Yes
Qualcomm Inc. v. Broadcom Corp.	Circuit Judge Sharon Prost	Bier Legal (Qualcomm); Bingham McCutchen LLP (Qualcomm); Covington & Burling LLP (Qualcomm); Cravath Swaine & Moore LLP (Qualcomm); Day Casebeer Madrid and Batchelder (Qualcomm); Dillon & Gerardi (Qualcomm); DLA Piper LLP (Qualcomm); Foley & Lardner LLP (Qualcomm); Goodwin Procter LLP (Qualcomm); Jones Day (Qualcomm); McAndrews Held & Malloy Ltd (Broadcom); McKenna Long & Aldridge LLP (Broadcom); Wilmer Cutler Pickering Hale & Dorr LLP (Broadcom)	Qualcomm Inc. v. Broadcom Corp., No. 3:05-cv-01958 at 6 (Fed. Cir. Dec. 1, 2008) (Prost, J.)	Yes

Source: Bloomberg Law.