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Who Should Own the Benefits of Standardization and the Value It Creates?

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INTRODUCTION

Standardization creates enormous benefits for all those it affects, and in doing so it creates enormous economic value. The value is enjoyed in varying shares by the public, standards-implementing device manufacturers, service providers, and the owners of patents on the technology implemented in standards. How should this value be allocated among these stakeholders? Some suggest that the free market should make this determination in a reign of *laissez-faire*—in what Hobbes describes as the “war of all against all.” But that is too simple. The free market may well be unable to resolve this conundrum.

Any resolution requires all sorts of state intervention and coercion—contract enforcement in courts, patent infringement litigation remedies, and government and private antitrust litigation backed up by judicial enforcement. Moreover, as US courts have recognized, market failure is inevitable and may therefore lead to unjustified wealth transfers. For standardization necessarily creates potentially harmful monopoly power unless some private or public means modulate the monopoly power to some degree.

In the last several years, this issue has become the focus of increasing controversy, and therefore of increasing public policy concern. This controversy has been marked by: patent infringement litigation, largely over the determination of reasonable royalties for standard-essential patents (SEPs); a 2015 update of the Patent Policy of the Institute of Electrical and Electronics Engineers (IEEE), a major US standard-setting organization (SSO); a business review of that Patent Policy update at the Antitrust Division, concluding with a


3. A standard-essential patent (SEP) is a patent that is necessarily infringed when a standard-compliant device is manufactured or a standard-compliant service is performed. A SEP covers technology embodied in a standard or that the standard implements. Standards typically incorporate patented technology of many SEPs. Since each SEP is essential to making a standard-compliant product, at least in principle, each is a sine qua non for compliance. There are patents designated as SEPs, however, that cover only optional features or certain types of implementations of standards. Therefore, some standard-compliant products implement the technology of only some of the designated SEPs for a given standard. See, e.g., Ericsson, 773 F.3d at 1232 (referring to IEEE 802.11 standard); Microsoft Corp. v. Motorola, Inc., No. C10-1823JLR, 2013 U.S. Dist. LEXIS 60233, at *160 (W.D. Wash. Apr. 25, 2013) ("[D]espite the fact that Motorola argues that these 13 patents are 'essential' to the 802.11 Standard . . . . Microsoft [standard-compliant] products do not use these patents in any way . . . . ?), aff’d on other grounds, 795 F.3d 1024 (9th Cir. 2015).


5. Renata B. Hesse, Response to Institute of Electrical and Electronics Engineers, Incorporated, U.S. DEPT JUSTICE (Feb. 2, 2015) [hereinafter DOJ
determination that the policy did not appear to violate the antitrust laws; opposition and resistance to the 2015 policy update from major US and European owners of SEPs covering technology used in standards that cell phones implement; national regulatory agencies’ trade regulation enforcement actions in Korea, China, Japan, and Taiwan against a dominant US cell phone SEP owner and cell phone telecommunications chip seller (Qualcomm, Incorporated) for allegedly abusive exploitation of its SEP ownership; and January 2017 lawsuits that the US Federal Trade Commission


10. See Taiwan Fines Qualcomm $774 Million for Antitrust Violations, REUTERS (Oct. 11, 2017, 8:31 AM), http://www.reuters.com/article/us-taiwan-fines-qualcomm-774-million-for-antitrust-violations-idUSKBN1CG1RF; see also Trefis Team, EU Charges on Qualcomm Less Serious Than the Charges in Taiwan, South Korea and China, FORBES (Dec. 11, 2015, 8:34 AM), https://www.forbes.com/sites/greatspeculations/2015/12/11/eu-charges-on-qualcomm-less-serious-than-the-charges-in-taiwan-south-korea-and-china/#5e5dd8075b0 (explaining that the EU charges are less serious because they might not affect Qualcomm’s licensing business); Lisa Wang, Qualcomm Defends Licensing Fees, TAIPEI TIMES (June 24, 2016), http://www.taipeitimes.com/News/biz/archives/2016/06/24/2003649305.
(FTC)\textsuperscript{11} and then Apple, Incorporated,\textsuperscript{12} brought against Qualcomm, again for alleged SEP abuse.

A principal issue in this cascade of controversy has been how an obligation to exact only fair, reasonable, and nondiscriminatory (FRAND) royalties\textsuperscript{13} for the use of a SEP
should be understood—in particular, whether the proper royalty base for a percentage-of-sales royalty should be the price of the smallest saleable patent-practicing unit of a standard-compliant product (such as a chip or chipset used to encode and decode signals for cell phone use), or should be the price of the standard-compliant downstream device (such as a cell phone incorporating

\[ v. \text{United States}, 332 \text{ U.S.} 392 (1947); \text{and} \ \text{Hartford-Empire Co. v. United States}, 323 \text{ U.S.} 386 (1945). \text{In recent years, the term FRAND, favored in Europe, has tended to supersede RAND. The term FRAND has been used to refer to RAND and FRAND collectively.} \]

Judge Posner has observed that "the word 'fair' adds nothing to 'reasonable' and 'nondiscriminatory.'” See Apple, Inc. v. Motorola, Inc., 869 F. Supp. 2d 901, 912 (N.D. Ill. 2012), modified on other grounds, 757 F.3d 1286 (Fed. Cir. 2014).

The ICC used similar terminology first, perhaps, in regulating railroad rates. See S. Pac. Co. v. Campbell, 230 U.S. 537, 547 (1913) (“[C]ertain freight rates maintained by the Southern Pacific Company between Portland and other places on its lines in Oregon were unreasonable, excessive, and discriminatory, and the commission required the company, in lieu of the rates thus disapproved, to put into effect the 'just and reasonable and non-discriminatory charges' set forth in the order.”). Contemporaneously, in United States v. Terminal R.R. Ass’n of St. Louis, 224 U.S. 383, 411 (1912), in which a combination of railroads monopolized access to all means of crossing the Mississippi River at St. Louis, the Court ordered that other railroads should be allowed access to the essential facility on “such just and reasonable terms as shall place such applying company upon a plane of equality in respect of benefits and burdens with the present proprietary companies.” Still earlier, the term “reasonable royalty” was used in several patent cases (without reference to non-discrimination) to provide an appropriate measure of compensation for the unauthorized governmental use of the patent. See, e.g., McKeever v. United States, 14 Ct. Cl. 396, 425, 430–31 (Ct. Cl. 1878) (finding that “25 cents a box was a fair and reasonable royalty for the right to manufacture and use the article in question,” but because another patentee’s invention contributed 5 cents per box to its manufacture and use, the court apportioned 20 cents per box to the plaintiff as monetary relief); Hubbell v. United States, 5 Ct. Cl. 1, 31 (Ct. Cl. 1869).

Finally, regulation of utilities generally operates under a standard that the regulatory agency is to set rates that are “just, reasonable, and non-discriminatory.” See, e.g., Miss. Power & Light Co. v. Mississippi ex rel. Moore, 487 U.S. 354, 363, 360 n.6 (1988); Morgan v. United States, 298 U.S. 468, 474 (1936) (explaining that 7 U.S.C. § 211 directs Secretary of Agriculture to prescribe “just, reasonable, and non-discriminatory” rates for stockyard services); Qwest Corp. v. FCC, 689 F.3d 1214 (10th Cir. 2012) (explaining that FCC properly held that regulatory requirements remained necessary for continued assurance of “just, reasonable, and non-discriminatory” terms of service); District of Columbia v. Potomac Elec. Power Co., 402 A.2d 430, 436 (D.C. 1979) (citing D.C. CODE §§ 43-301 through 43-401 (1973)) (explaining that the D.C. Public Service Commission has “unqualified authority to fix and maintain 'reasonable, just and non-discriminatory' rates for electric service.”); Mass. Bonding & Ins. Co. v. Comm’r of Ins., 107 N.E.2d 807, 809 (Mass. 1952) (“'A'dequate, just, reasonable and non-discriminatory . . . charges’ . . . ’. . . ’).
such a chip or chipset); and to what extent an individual SEP royalty should be limited to a share of a sum of SEP royalties that in total add up to only a reasonable royalty, where the individual royalty shares are apportioned relatively to their respective technology contributions to the standard. The resolution of these issues ultimately depends on how it is properly decided who “owns” or should capture the economic values that standardization creates. Or, since it is inevitable that different stakeholders will capture varying shares of these economic values, the question becomes whether and how the relative shares (or the otherwise unseized, contestable part of the total) should be allocated under our legal system.

Part I of this Article describes the benefits and value that standardization creates for the public, industry, and SEP owners. Standardization enables product interoperability, which causes network effects that result in increased benefits as more persons use the standardized products that interoperate with one another in a network. But standardization can also create monopoly power that, if unchecked by appropriate private or public mechanisms, may have harmful effects. Standardization has led to contests over who should capture the added economic value that standardization creates—owners of patents on technology embodied in standards, implementers of standards, or the general consumer public. The smartphone litigation described above paradigmatically illustrates such contests.

Part II of the Article describes the technological background of smartphone standardization. Part III describes cell phone industry structure and Qualcomm’s position as a dominant patent owner and telecommunications chip seller. Part IV describes the marketing practices that the FTC and Apple complain of in their suits against Qualcomm. These largely involve allegedly abusive royalty terms in the licensing and sale of telecommunications chips essential for the manufacture of standard-compliant smartphones.

Part V addresses the current case law governing FRAND patent royalties, particularly as to patents essential to standard-compliance. In large part, the cases have involved cellular technology, and were decided in the last few years by the Federal Circuit. Part VI describes the IEEE’s efforts to establish for its standardization programs a patent licensing regime (the 2015 Patent Policy update) that reflects the case law discussed in Part
V, and the massive resistance that the IEEE's efforts met from some major cell phone technology patent owners. Part VI of the Article also discusses, in light of the case law that Part V describes, two current disputes unsettling the implementation of the IEEE's policy.

Part VII addresses in further detail patent owners’ policy arguments that, contrary to the recent Federal Circuit decisions, they are entitled to capture the monetary value standardization creates. Part VII then addresses the difficulties that trying to decide who is so entitled raises, and possible assumptions that must be made (or rejected) in carrying out any such determination. Finally, this part explores a utilitarian theory that suggests that the general public—for example, the smartphone buyer public (80 to 95 percent of Americans, in various age groups)—is the most entitled candidate for ownership of the value of standardization.

The Article concludes that it is problematic that the general consumer public could succeed in capturing that monetary value. The fallout from the current Qualcomm litigation, however, might trigger events that would bring about such a result.
I. THE BENEFITS, VALUE, AND RISKS OF STANDARDIZATION

A. PUBLIC AND USER BENEFITS

Standardization\(^{14}\) has enormous direct benefits for the public because it enables interoperability,\(^{15}\) which contributes to network effects\(^{16}\) that benefit users of standard-implementing products.\(^{17}\) Interoperability promotes demand for products and

14. Standardization is the development and adoption of uniform criteria or specifications for manufacturing, processing, or using products or services. The criteria or specifications may be functional, permitting those implementing the standard to do so with whatever equipment or process they choose in order to satisfy the standard’s functional requirements; or they may be design or prescriptive standards, which require implementers to use particular equipment or processes. See generally Statement of Daniel D. Castro, Senior Analyst, Information Technology and Innovation Foundation, The Importance of Functional Standards to Promote Innovation in Voting System Technology, U.S. Election Assistance Commission Roundtable Discussion (Austin, TX, Dec. 11, 2007), http://www.itif.org/files/VVSGstatement.pdf; WIKIPEDIA, Technical standard, https://en.wikipedia.org/wiki/Technical_standard (last updated Aug. 24, 2017). Standards may be de facto or de jure. A de facto standard is one established by an individual firm or private organization, such as the Betamax videotape standard or the Adobe pdf standard. Such a standard may clear the market of alternative standards and their technology, because of widespread adoption of the first standard. A de jure standard is one adopted by a standard-setting organization (SSO) through a consensus process, such as the IEEE 802.11 wireless standard, which much of the case law and material in this Article concerns.

15. An illustrative example of interoperability that bears directly on the issues addressed in this Article is provided in J. Gregory Sidak, The Value of a Standard Versus the Value of Standardization, 68 BAYLOR L. REV. 59, 61 (2016). A cell phone compliant to the IEEE 802.11 standard, made by Foxconn, sold by Apple, and operating on AT&T’s network can connect to a base station, made by Ericsson and operated by Verizon, and send a text message to a phone sold by Samsung operating on Sprint’s network, through a base station made by Alcatel-Lucent and operated by T-Mobile.

16. See generally Arun Sundararajan, Network Effects, @DIGITALARUN, http://oz.stern.nyu.edu/io/network.html (last visited Oct. 3, 2017) (explaining that a network effect is the effect that additional users of a good or service have on the value of that product to other users, and that the value to each user increases as the number of users increases).

17. The benefits users get from the interoperability of such a network is proportional to the number of possible interactions among users. The number of possible interconnections that the interoperability of the network makes possible—for
services that the standard concerns, because of network effects. The increased demand benefits implementing manufacturers, resulting in increased sales and creating economies of scale that lower manufacturing costs, to the benefit of the manufacturers and (to the extent they are passed on) to the benefit of consumers as well. Product interoperability ensures that products from a variety of suppliers will work together efficiently, thus reducing costs for consumers and producers, making products more valuable, and promoting innovation both in and around the standard; in addition, standardization can increase competition among technologies for inclusion in standards, indirectly benefiting consumers through increased functionality or lower prices (and sometimes both). It also benefits the public by increasing the number of alternative sellers available to consumers of standardized products. These benefits often interrelate and promote one another synergistically.

B. SEP HOLDER BENEFITS

SEP holders also benefit from standardization in several ways. Increased sales resulting from standardization correlate with increased royalty payments on the relevant patents. The benefit is not limited to the patent royalties that SEP owners gain from the incorporation of their technology into a particular standard. If they make and sell a product (for example, a chipset) that implementers of the standard need, they gain from increased sales volume and, more important, they gain from the first-mover and head-start advantages they derive from the adoption of their technology, with which they are already

example, the number of persons that a telephone system subscriber can call or be called by—is a measure of the value of subscribing to the network. The aggregate number of possible interactions, say possible telephone calls between two people in a network of \( n \) nodes, say \( n \) telephones, is approximately proportional to \( n^2 \). See infra Appendix A.

18. DOJ Response to IEEE, supra note 5, at 3.
19. See Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024, 1030 (9th Cir. 2015) (explaining that standardization “increases competition by lowering barriers to entry and adds value to manufacturers’ products by encouraging production by other manufacturers of devices compatible with them.”); Apple, Inc. v. Motorola Mobility, Inc., No. 11-cv-178-bbc, 2011 WL 7324582, at *1 (W.D. Wis. June 7, 2011) (“Standards lower costs by increasing product manufacturing volume and they increase price competition by eliminating ‘switching costs’ for consumers who desire to switch from products manufactured by one firm to those manufactured by another.”).
familiar. No wonder then that patent owners vie to have their technology anointed by standardization, engaging in competitive bidding even to the point of offering free use of patented technology to implementers to win selection.

20. See Fernando Suarez & Gianvito Lanzolla, The Half-Truth of First-Mover Advantage, HARV. BUS. REV. (Apr. 2005), https://hbr.org/2005/04/the-half-truth-of-first-mover-advantage ("Business executives from every kind of company maintain, almost without exception, that early entry into a new industry or product category gives any firm an almost insuperable head start."); see also W. Brian Arthur, Competing Technologies, Increasing Returns, and Lock-in by Historical Events, 99 ECON. J. 116, 116 (1989), http://www.economia.ufpr.br/Eventos/Downloads/Minicurso2b.pdf ([A] technology that by chance gains an early lead in adoption may eventually 'corner the market' of potential adopters, with the other technologies becoming locked out."); Sundararajan, supra note 16, at 2 ("Theories of competition in network industries emphasize the path dependence of outcomes, and suggest that early leads are important, intrinsically inferior products will frequently dominate superior products, and influencing customer expectations plays a crucial role in 'winning' in a network market."). A further advantage to a patent owner that has its patented technology incorporated into a standard may be obtaining “external” benefits from its participation. For example, Microsoft may have gained collateral benefits beyond any negligible royalties it received from its H.264 SEPs, because making more video content available to computer users because of computer manufacturers' adoption of the standard fostered “the success of its Windows operating system, which is more valuable as more video content is available.” Norman V. Siebrasse & Thomas F. Cotter, Judicially Determined FRAND Royalties, in THE CAMBRIDGE HANDBOOK OF TECHNICAL STANDARDIZATION LAW 378–79 (Jorge L. Contreras ed., 2017).

21. See J.S. Greenfield, Comment to IEEE Patent Policy Change Would Undermine Property Rights and Innovation, TRUTH ON MKT. (Feb. 5, 2015, 10:11 AM), https://truthonthemarket.com/2015/02/04/ieee-patent-policy-change-would-undermine-property-rights-and-innovation/ ("Participants in standards efforts routinely lobby to have their particular approach adopted into a standard. If their approach is adopted, they potentially stand to profit immensely from royalties on any patents they hold or are pursuing. If a competing approach is adopted, they don’t stand to profit, and will likely instead face paying significant royalties to others, including direct competitors. That is, these participants frequently participate in large degree to try to influence the design choices made, for their own benefit.").

22. One illuminative example is an early 2000s contest between Intersil, the proprietor of Complementary Code Keying-Orthogonal Frequency Division Multiplexing (CCK-OFDM) technology, and Texas Instruments (TI), the proprietor of Packet Binary Convolutional Code (PBCC) technology, over having IEEE Standard 802.11g based on their mutually incompatible respective technologies. The IEEE working group was divided 60–40 over which technology it preferred to adopt for the standard, since each had different advantages. Steven J. Vaughan-Nichols, What Is PBCC Anyway?, WI-FI PLANET.COM (Oct. 8, 2002), http://www.wi-fiplanet.com/columns/Article.php/1478441/What-is-PBCC-Anyway.htm. The 60–40 split was in Intersil’s favor,
Consider, for example, the once-heated rivalry between two cell phone technologies—WiMAX (IEEE 802.16) championed by Intel, and LTE championed by Qualcomm—and the similar rivalry over videotape standardization between VHS championed by Matsushita-JVC and Betamax championed by Sony. Such “standards wars” can result in the winning technology clearing the market of rival technologies. Standardization thus also has exclusionary potential, for technologies defeated in standards wars may vanish from the market.

but TI then offered its technology on a royalty-free basis, if it was made “the sole mandatory implementation for the IEEE 802.11g standard.” Chris Heegard, Texas Instruments IEEE 802.11g Royalty-Free Intellectual Property Statement, TEX. INSTRUMENTS (Jan. 2001), https://mentor.ieee.org/802.11/dcn/01/11-01-0023-01-0000-texas-instruments-ip-statement-for-802-11-tgg.ppt. Intersil then made a similar royalty-free offer, without the requirement of being the sole mandatory implementation. Letter from Larry Ciaccia, Vice-President, Intersil Corp., to IEEE (July 1, 2002), http://standards.ieee.org/about/sasb/patcom/loa-802_11g-intersil-01Jul2002.pdf. After both contestants had competitively bid themselves down to zero, the 802.11g working group allowed both technologies to be used as alternative optional implementations, as a compromise to allow both firms to market their respective devices—which was the firms’ main concern. See Jim Zyren, IEEE 802.11g to Benefit WLANs, EE TIMES (June 28, 2002, 10:17 AM), http://www.eetimes.com/document.asp?doc_id=1200918.


market, and so may firms relying on commercially exploiting that technology.

C. Effect of Standardization on SEP Value

Courts have recognized that a great economic value of standardization—to the owner of a SEP for a technology “anointed” as standard—is that the SEP owner acquires monopoly power as a result of the adoption of the standard. Those who seek to make and sell products implementing the standard have no choice but to use the anointed technology and thus to practice (and infringe) the relevant SEP. Owning a SEP is like owning a toll booth on the only bridge across the Mississippi River. Others have implied that this practice makes the SEP owner a potential equivalent to a holdup artist.  

25. For example, if LTE is predominantly adopted for 4G (as it was) then WiMAX (IEEE 802.16) fades into obscurity. The spread of VHS videotape format excluded Betamax from the market. In high-definition DVD, Blu-ray excluded HD DVD. Alternating current excluded direct current in power distribution. See generally Shapiro & Varian, supra note 23. “Competitions between incompatible standards have a ‘winner-take-all’ quality . . . .” Mark A. Lemley & David McGowan, Legal Implications of Network Economic Effects, 86 Calif. L. Rev. 479, 515 (1998).

26. In one case, a firm’s patented cellular technology was the core of its business, so that when other firms allegedly successfully conspired to exclude it from a standard (4G LTE), the effect on its business was disastrous because inclusion of the technology in the standard was “vital to . . . commercial success.” See TruePosition, Inc. v. LM Ericsson Tel. Co., No. 11-4574, 2012 WL 3584626, at *1 (E.D. Pa. Aug. 21, 2012) (denying motion to dismiss) (“Inclusion in the 3GPP 4G LTE standard is vital to the commercial success of TruePosition’s UTDOA positioning technology.”). TruePosition, Inc. v. LM Ericsson Tel. Co., 844 F. Supp. 2d 571, 576 (E.D. Pa. 2012) (“TruePosition further alleges that ‘inclusion in the 3GPP standard is vital to commercial success. Exclusion from the standard guarantees commercial failure and, in most cases, absolute foreclosure from the market.’”). Similar exclusionary impacts injured the plaintiffs in the Hydrolevel and Radiant Burners cases. Hydrolevel, 456 U.S. at 562; Radiant Burners, 364 U.S. at 658.

27. As Judge Posner explained: “once a patent becomes essential to a standard, the patentee’s bargaining power surges because a prospective licensee has no alternative to licensing the patent; he is at the patentee’s mercy.” Apple, Inc. v. Motorola, Inc., 869 F. Supp. 2d 901, 913 (N.D. Ill. 2012), modified on other grounds, 757 F.3d 1286 (Fed. Cir. 2014).


29. Judge Posner continued: “The 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.” Apple, Inc., 869 F. Supp. 2d
Consequently, “the development of standards creates an opportunity for companies to engage in anti-competitive behavior”\(^{30}\) since “SEP holders obtain substantial leverage over . . . product developers, who have little choice but to incorporate SEP technologies into their products.”\(^{31}\) They are a captive market. That standard-development leverage permits SEP holders “to demand more for a license than the patented technology, had it not been adopted by the SSO, would be worth,” unless a FRAND obligation prevents that.\(^{32}\)

In other words, the value of a patent before it is incorporated into a standard (its \textit{ex-ante} value) reflects only the merits of the patented technology. The \textit{ex-ante} value of a patent is not as great a value as the patent acquires upon its anointment as a SEP (its \textit{ex-post} value). This increase in value occurs regardless of

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at 913; see also Mark A. Lemley & David McGowan, \textit{Could Java Change Everything? The Competitive Propriety of a Proprietary Standard}, \textit{43 ANTITRUST BULL.} 715, 760 (1998) (“The general danger of allowing a private party to own intellectual property rights in an open standard is that the private party may at some point . . . set[] an unreasonable price . . . . If the standard has been widely adopted in a network market, this form of ‘intellectual property ambush’ can impose a significant cost on users of the standard.”).

30. Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024, 1030–31 (9th Cir. 2015).

31. \textit{Id.} at 1031.

32. \textit{Id.; see also} Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1209 (Fed. Cir. 2014) (“Patent hold-up exists when the holder of a SEP demands excessive royalties after companies are locked into using a standard.”); Broadcom Corp. v. Qualcomm Inc., 501 F.3d 297, 314 (3d Cir. 2007) (“[A SEP’s] value becomes significantly enhanced, however, after the patent is incorporated in a standard. Firms may become locked in to a standard requiring the use of a competitor’s patented technology. The patent holder’s [patent rights], if unconstrained, may permit it to demand supracompetitive royalties. It is in such circumstances that measures such as FRAND commitments become important safeguards against monopoly power.”); Research in Motion Ltd. v. Motorola, Inc., 644 F. Supp. 2d 788, 795–96 (N.D. Tex. 2008) (“This court finds the reasoning in \textit{Broadcom} persuasive and joins the Third Circuit in concluding that these FRAND commitments are intended as a ‘bulwark’ against the unlawful accumulation of monopoly power that antitrust laws are designed to prevent. Thus, Motorola’s efforts to side-step this bulwark, as alleged in this case, are harmful not only to RIM but to competition in general. . . . Both the Third Circuit, in \textit{Broadcom}, and the Supreme Court, in \textit{Allied Tube}, have stated that standards, without the proper safeguards, are inherently anticompetitive. It follows that when an entity side-steps these safeguards in an effort to return the standard to its natural anti-competitive state, anti-competitive effects are inevitable. Motorola’s breach of the [FRAND] commitments to IEEE and ETSI, as a result, is harmful to competition.”).
whether a patented technology is incorporated into the standard because it is superior to all other patented or unpatented technologies and thus providing a unique functionality or, instead, because its selection and incorporation is merely an arbitrary design choice among several approximately equally satisfactory technologies providing the same functionality. 33 The difference between ex-ante and ex-post values is sometimes referred to as the surplus value that standardization creates by its anointment of a patent as a SEP. 34 The surplus is an increase in value resulting, primarily, from the combined action of network effect (interoperability) and exclusionary effect.

D. SUNK-COST HOLDUP

Standardization creates another value in the sense that it is something that can be monetized (cashed in on). As will be apparent, it is not a legitimate value, and it has no overt defenders—this is sunk-cost holdup value. 35 A user of technology may become subject to sunk-cost holdup if the user has incurred sunk costs in implementing the relevant technology, thereby

33. See, e.g., J.S. Greenfield, supra note 21 (“There are two classes of standard essential patents: those that would be essential to any possible standard, regardless of design choices, and those that are essential to a particular standard, on the basis of design choices made in creating the standard. Most SEPs fall into the latter category.”); see also supra note 22 (discussing the TI–Intersil contest over 802.11g, in which IEEE working group found each technology approximately equally satisfactory).


35. For extensive discussions of sunk-cost holdup, see Norman V. Siebrasse & Thomas F. Cotter, The Value of the Standard, 101 MINN. L. REV. 1159 (2017); Siebrasse & Cotter, supra note 20. As they point out, sunk-cost holdup should be distinguished from appropriation of the value of network effects, with which the present Article is largely concerned. The Value of the Standard, supra, at 1168, specifically points out that “network value appropriation is not a concern that should be addressed in assessing FRAND royalties, and it is a mistake to conflate this phenomenon with sunk costs holdup.” Siebrasse and Cotter do argue, however, that SEP owners should be allowed to capture a portion of the value of network effects, in order to provide adequate incentives to SEP owners. This Article is concerned largely with network value appropriation, and addresses their argument in Part VII, text infra notes 439–86.
becoming vulnerable to substantial switching expenses if it must change the technology it uses. The company may then be “ambushed” by a SEP holder demanding high royalties. This ambush may be the result of deceptive practices during the standardization process (i.e., the ambusher withholds the existence of a patent, so that the SSO unwittingly incorporates patented technology into the standard) or a patent application covering relevant technology may issue (as a so-called submarine patent) only after the standard has been adopted—or both. It might occur also as the result of reneging on a FRAND commitment, or a SEP owner might change its mind as to


37. In Rambus Inc. v. FTC both occurred. Rambus participated in a memory chip standardization process of the Joint Electron Device Engineering Council (JEDEC). Rambus did not disclose its pending patent applications involving the technology incorporated into the standard, and amended the coverage of the patent applications on the basis of the working group’s closed-door deliberations during the standard-setting process. After the patents issued, Rambus extracted high royalties from users of the standard. The FTC found a violation of FTC Act § 5, but the D.C. Circuit reversed because “there was insufficient evidence that JEDEC would have standardized other technologies had it known the full scope of Rambus’s intellectual property.” Rambus Inc. v. FTC, 522 F.3d 456, 462 (D.C. Cir. 2008).

Earlier ambush cases were Wang Laboratories, Inc. v. Mitsubishi Electronics America, Inc., 103 F.3d 1571 (Fed. Cir. 1997), and Dell Computer Corp., 121 F.T.C. 616 (1996). In Wang, the patent owner Wang deceived an implementer and an SSO into believing that it had no patents and had no intentions to assert patents, but it had patent applications that became patents, and it subsequently asserted them. Wang, 103 F.3d at 1575–76. This entire course of conduct was found to establish an implied license under which Wang consented to the use of the inventions, royalty free. Id. at 1581–82. In Dell, Dell told the SSO that it had no patent rights but, after the SSO included the patented technology in the standard, Dell asserted the patent. Dell, 121 F.T.C. at 627–28. Dell settled with the FTC on the basis that the undisclosed patents would not be enforced against implementers. Id. at 620. Since then, litigation has focused less on ambush of this type than on attempts to charge high royalties despite a RAND commitment.

38. See discussion of the N-Data case, text infra notes 225–39, in which the patent owner reneged on a RAND commitment in an effort to hold up users of what had become a major computer industry standard. In another case, Broadcom Corp. v. Qualcomm Inc., 501 F.3d 297 (3d Cir. 2007), the SEP owner allegedly deceived the SSO by fraudulently inducing it to incorporate its WCDMA technology into the UMTS standard, by making a FRAND commitment that it never intended to honor, and then using its SEPs to hold up implementers. The Third Circuit held that such conduct “is actionable
appropriate royalties upon later events or upon its acquisition of additional patents that come within the scope of a RAND commitment.\textsuperscript{39} This type of conduct no longer appears to be sufficiently prevalent to be a significant problem, because SSOs have become more conscious of the risk of ambush, and therefore have become more vigilant, as is illustrated by the IEEE 2015 Patent Policy update and several years of comment by federal agencies, discussed subsequently in Part VI of this Article.\textsuperscript{40}

This Article is not concerned with sunk-cost holdup issues, but rather primarily with patents, the technology of which SSOs knowingly incorporate into standards as SEPs, without SEP owner deceit, and that the SSOs and SEP owners make subject to RAND commitments. The controverted issue is who, when determining RAND compensation, is entitled to the surplus value that standardization creates, and to what extent that surplus should be reckoned an element to be included in a reasonable royalty. In that context, sunk-cost holdup is not a significant issue, because there is a RAND commitment and

\textsuperscript{39} Something of this sort may have occurred in the \textit{CSIRO} case, \textit{Commonwealth Scientific \& Industrial Research Organisation v. Cisco Systems, Inc. (CSIRO)}, 809 F.3d 1295 (Fed. Cir. 2015), in which the SEP holder was initially willing to make a RAND commitment but changed its position with later iterations of the standard, after the SEP holder reorganized its licensing arrangements, and then started demanding higher royalties.

\textsuperscript{40} Moreover, the IEEE added a provision to its by-laws providing that RAND commitments pass with patent assignments and firms must so notify assignees. See IEEE-SA Bylaws \S 6.2, http://standards.ieee.org/develop/policies/bylaws/sect6-7.html ("An Accepted Letter of Assurance is intended to be binding upon any and all assignees and transferees of any Essential Patent Claim covered by such LOA. The Submitter agrees (a) to provide notice of an Accepted Letter of Assurance either through a Statement of Encumbrance or by binding its assignee or transferee to the terms of such Letter of Assurance; and (b) to require its assignee or transferee to (i) agree to similarly provide such notice and (ii) to bind its assignees or transferees to agree to provide such notice . . . ").
there is no ambush, for such openly declared SEPs, unless the term “ambush” is to be used, as this Article does not do, to characterize any royalty demand deemed excessive by those called upon to pay it. Furthermore, in the standard-setting context, often no sunk costs occur before a standard is adopted that uses one or another alternative technology. While a standard is being developed, many potential implementers adopt a “wait and see” attitude, in order not to become unfortunate “early Betamax adopters.” For example, it is well known that this occurred with the IEEE 802.11g standard, hampering equipment sales while potential implementers waited to see which contending technology would prevail.41

Thus, not all holdup is sunk-cost holdup, based on ambush and exploitation of sunk costs and lock-in, followed by a threat to impose switching costs unless implementers pay ransom. The practices in the Qualcomm cases,42 for example, have been continuing for years. The CDMA technology involved in those cases has been in use since the 1990s.43 Some of the practices now challenged in the present litigation were aired publicly over a decade ago in the Broadcom-Qualcomm litigation.44 Any smartphone industry investments made in the last decade or more were made with knowledge of these practices, so there were no ambushes; any sunk costs were sunk knowingly.

41. See Joe McGarvey, 802.11g: Ready or Not?, EE TIMES (July 3, 2002) (“Carney says that at least one wireless LAN equipment company had been burned in the past for using chipsets that were based on a pre-final version of the standard. Last-minute changes to the specification, he says, instantly rendered supposed standard-based equipment incompatible with the final specification. ‘It’s irresponsible for companies at such an early stage in the process to announce the development of chipsets so that OEMs can develop products in advance of the standards,’ adds Carney.”); see also supra note 22.

42. Supra notes 7–12.


44. See Broadcom Corp. v. Qualcomm Inc., 05-3350 (MLC), 2006 U.S. Dist. LEXIS 62090, at *4 (D.N.J. Aug. 31, 2006) (citation omitted) (“Broadcom asserts that (1) Qualcomm used its power over CDMA technology to obtain and protect monopoly power in the CDMA chipset markets, and (2) this monopoly is due to exclusionary and anticompetitive conduct, and not business acumen. For example, Broadcom alleges that Qualcomm (1) has threatened cell phone manufacturers with the loss of certain benefits if they purchase chipsets from a Qualcomm competitor, (2) reduces royalty rates when a company obtaining a patent license from Qualcomm agrees to purchase Qualcomm chipsets exclusively . . . ”), rev’d on other grounds, 501 F.3d 297 (3d Cir. 2007).
That fact does not, of course, immunize monopolistic conduct, if any. Monopolistic conduct is not benign or legitimated simply because those affected by it knew that the monopolist was engaging in the conduct. There is no doctrine of *volenti non fit injuria* or voluntary assumption of the risk defense to antitrust charges. Moreover, the non-sunk-cost holdup that this Article concerns is not necessarily the product of any specific intent to monopolize. The controversies between SEP holders and SEP users discussed here may be the result of honest differences of opinion—what is RAND is often something in the eye of the beholder. Nonetheless, in recent litigation SEP owners and SEP implementers have respectively entertained concepts of RAND that were orders of magnitude apart.\textsuperscript{45} The royalty differences in most of these cases are not related to sunk-cost holdup; they could just as well occur in the absence of sunk costs, for example, in the case of a new entrant without any sunk costs. They may simply reflect very different ideas of how to determine a proper reasonable royalty—in particular, which values, such as network effect value and other values that standardization creates that raise the *ex-ante* value of a SEP to its *ex-post* value, should be included in determining a reasonable royalty.

All of this has important policy implications and raises controversial questions. One fundamental, and currently highly disputed, question may be phrased: Who should “own” (or capture) the benefits of standardization (particularly of interoperability)? Should standardization be considered a quasi-public good like the use of streets, and streetlights? Does calling it *property* further the analysis? To what extent should limits be placed on the conduct of actors who seek to make individual profits from standardization? Who should get the financial benefit from standardization, or if it is to be divided among actors, how should the value of standardization be shared among the actors?

\textsuperscript{45} For a tabulation of vastly different plaintiff’s and defendant’s respective conceptions of RAND royalties in recent patent infringement litigation, see Richard H. Stern, *Justice Department Agrees IEEE’s New RAND Policy Isn’t Price Fixing*, 35 IEEE Micro 80 (Mar. 2015), http://doi.ieeecomputersociety.org/10.1109/MM.2015.34.
More specifically, to focus on a hotly disputed current example in the important US cell phone industry, who should (or who is “entitled” to) capture the benefit from the adoption of standards implemented in cell phones, such as the IEEE 802.11 Wi-Fi standard? Device manufacturers—cell phone and chipset implementers? Cellular network service companies? SEP owners? The general consumer public? That issue underlies the remainder of this Article.

II. THE TECHNOLOGICAL BACKGROUND OF THE CELL PHONE WARS

A. THE SUCCESSIVE GENERATIONS OF STANDARDIZATION

Cell phone networks, such as those of Verizon, AT&T, T-Mobile, and Sprint, rely on standard technological protocols that permit signals from one company’s network to travel over another company’s network. The establishment of these standards also permits equipment manufacturers to develop phones that can operate over the various different networks by using the same standard protocol. This facilitates development of and investment in infrastructure and technology.

There have been four “generations” (with “families” within them) of standardization in the cell phone industry, so far:

a. First-generation (“1G”) standards, introduced in the early 1980s, supported analog transmission of voice calls. This

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46. See supra notes 2–12 and accompanying text.
47. A cell phone or cellular phone is a small, battery-operated, portable telephone that sends and receives wireless radio signals via a network. The network uses so-called cellular network technology—a system of radio transmitters, in which each transmitter covers a small geographical area (cell) and switches the calls from one area to another to reach the call destination. A smartphone is a cell phone that also has many computer functions, such as the capability to take and display photos, play videos, receive, view, and send e-mail, and surf the Internet. By the end of 2016, 95% of Americans owned cell phones, and 77% owned smartphones. Mobile Fact Sheet, PEW RES. CTR. (Jan. 12, 2017), http://www.pewinternet.org/fact-sheet/mobile/. Among Americans aged 18 to 44, smartphone ownership runs from 96% to 98%. Millennials Are Top Smartphone Users, NIelsen (Nov. 15, 2016), http://www.nielsen.com/us/en/insights/news/2016/millennials-are-top-smartphone-users.html.
48. See FTC Complaint, supra note 11, at 6.
49. Id.
technology was “characterized by significant capacity limitations, poor data transfer, and low security.”

b. Second-generation (“2G”) standards, “first deployed in the early 1990s, supported digital transmission of voice calls.” The leading 2G standards families are the Global System for Mobile communications (“GSM”) and second-generation Code Division Multiple Access (“2G-CDMA”). “In the United States, AT&T and T-Mobile still operate legacy GSM networks, while Verizon and Sprint still operate legacy 2G-CDMA networks.” 2G technology provided improved voice and data capacity, supported limited additional functions such as text and multimedia messages, and offered greater privacy and security at lower prices. Most cellular telephones today use (at a minimum) 2G technology and standards, with GSM being the most widely used 2G technology, but both 2G technology and standards are used almost only for legacy purposes. 2G technology and standards are being phased out.

c. Third-generation (“3G”) standards, first deployed in the late 1990s and early 2000s, supported higher data-transmission speeds. The leading 3G standards families are the Universal Mobile Telecommunications System (“UMTS”) and third-generation CDMA (“3G-CDMA”). UMTS allowed GSM-network operators to transition economically to a 3G standard. 3G-CDMA did the same for 2G-CDMA-network operators. UMTS used “Wideband Code Division Multiple Access” (“WCDMA”) technology, allowing increased data speed and capacity. 3G technology continues in use today, usually

50. Apple Complaint, supra note 12.
51. FTC Complaint, supra note 11, at 6.
52. Id.
53. Id.
55. Id.
56. See FTC Complaint supra note 11, at 6 (“In the United States, AT&T and T-Mobile operate legacy GSM networks, while Verizon and Sprint operate legacy 2G-CDMA networks.”).
57. See, e.g., id. (“UMTS allowed GSM-network operators to transition economically to a 3G standard.”).
59. FTC Complaint, supra note 11, at 644.
60. Id.
61. Apple Complaint, supra note 12, at 15.
combined for purposes of backward compatibility, in more advanced later-technology devices.\textsuperscript{62} 

d. “Fourth-generation (‘4G’) standards, first deployed in late 2009 and the early 2010s, support substantially higher data-transmission speeds than 3G standards can support.”\textsuperscript{63} 4G is an upgrade to 3G/UTMS/WCDMA. The leading 4G standard is Long-Term Evolution (“LTE”).\textsuperscript{64} “Most major network operators worldwide have deployed LTE.”\textsuperscript{65} There have been successive categories of LTE standards; a recent advanced LTE release, designated Category 12, supports data download speeds of 600 Mbps.\textsuperscript{66} An even more advanced form of LTE is Gigabit LTE (LTE Category 16), which promises peak speeds of 1 gigabit per second (1000 Mbps).\textsuperscript{67} A Samsung Galaxy S8 smartphone claims to deliver Gigabit LTE, but the actual delivered speed is significantly less.\textsuperscript{68}

A fifth generation (“5G”) of cell phone technology, proposed to be deployed in the early 2020s, will, initially, support peak download speeds of up to 20 gigabits per second (20,000 Mbps).\textsuperscript{69} There is no 5G standard at this time,\textsuperscript{70} no 5G network, and no

\begin{itemize}
\item \textsuperscript{62} Id. at 14–15.
\item \textsuperscript{63} FTC Complaint, supra note 11, at 6.
\item \textsuperscript{64} Id.
\item \textsuperscript{65} Id.
\item \textsuperscript{66} Tim Schiesser, Explainer: What Is Gigabit LTE?, TECHSPOT (Feb. 9, 2017), https://www.techspot.com/guides/1328-gigabit-lte-explained/. 1 Mbps is 1,000,000 bits of data per second. A bit of data is a 1 or 0 in a string of 1s and 0s in a binary-coded number. See Gottschalk v. Benson, 409 U.S. 63, 66–67 (1972).
\item \textsuperscript{67} See Schiesser, supra note 66 (describing “updates to LTE technologies and specifications, aimed at improving peak speeds among other things.”). One gigabit is 1000 Megabits.
\item \textsuperscript{68} See Mike Wuerthele, It Doesn’t Matter that Apple’s ‘iPhone 8’ May Not Support 4G Gigabit LTE or 5G, APPLEINSIDER (June 12, 2017), http://appleinsider.com/articles/17/06/12/it-doesnt-matter-that-apples-iphone-8-may-not-support-4g-gigabit-lte-or-5g (discussing the pressure from telecommunications carriers to implement 5G technology, even though there are no standards for the technology yet); Schiesser, supra notes 66–67 (showing that rated downlink speed is less than 1 Gbps).
\item \textsuperscript{69} See generally What Is 5G? Everything You Need to Know – A Definition, SDXCENTRAL, https://www.sdxcentral.com/5g/definitions/what-is-5g/ (last visited Oct. 5, 2017).
\item \textsuperscript{70} See id. The International Telecommunication Union (ITU) has, since 2012, sponsored development of a 5G International Mobile Telecommunication system by 2020 (“IMT-2020”). See ITU Towards “IMT for 2020 and Beyond,”
commercial 5G cell phone. Qualcomm has announced a 5G chipset, the Snapdragon X50, claimed to operate at up to 5 gigabits per second (5000 Mbps) download speed, and intended to launch for sampling late in 2017 for design of cell phones that will appear in 2019.\textsuperscript{71} Intel then announced that it too will launch a 5G modem chipset (baseband processor chip and transceiver chip), designated Goldridge, to compete with Snapdragon. Goldridge is to launch for sampling in late 2017 shortly followed by production, and to support speeds of over 5 gigabits per second.\textsuperscript{72} Verizon has announced that it will conduct field tests of a consumer 5G network covering several thousand customer fixed-wireless (non-mobile) locations, during the first half of 2017,\textsuperscript{73} using Samsung equipment, including “Samsung’s pre-commercial 5G solution” including a 5G chipset.\textsuperscript{74}


Several SSOs have developed telecommunication standards implemented in cell phones. The most significant of these SSOs are the IEEE in the US, the European Telecommunication Standards Institute (“ETSI”), the Telecommunications Industry Association (“TIA”) in the US, and the Alliance for Telecommunications Industry Solutions (“ATIS”) in the US. Each of them has required each party that participates in the standards development process to commit to license its SEPs on FRAND terms to firms that implement the standard. Their practice is to permit firms simply to declare which of their patents are SEPs, and they do not have a mechanism for verifying the essentiality of any patent to the technology embodied in a standard.

75. Some of these standards, such as UMTS and LTE, are implemented only in cell phones. Others, such as IEEE 802.11 (Wi-Fi), are implemented in cell phones and also many other devices, such as set-top boxes, laptop computers, healthcare monitors, credit card machines, and burglar alarms. Much of the litigation and case law concerning cellular technology has involved IEEE 802.11, which “is the most widely used and universally accepted wireless communications standard for ordinary consumer and business use.” Microsoft Corp. v. Motorola, Inc., No. C10-1823JLR, 2013 U.S. Dist. LEXIS 60233, at *144–45 (W.D. Wash. Apr. 25, 2013), aff’d on other grounds, 795 F.3d 1024 (9th Cir. 2015).


77. ETSI was responsible for GSM, and (in cooperation with ATIS) for UMTS and LTE. See Mobile Communications, EUR. TELECOMM. STANDARDS INST., http://www.etsi.org/technologies-clusters/technologies/mobile (last visited Oct. 6, 2017).

78. TIA was responsible for CDMA. See Karissa Todd, The Titans of Wireless, WIRELESS REV. (June 1, 1999) (explaining that John Marinho was instrumental in the development of CDMA through his work on the TIA Standards Committee).

79. IEEE in principle allows patent owners to decline to offer reasonable royalty licenses, but “considers” that in determining whether to approve a draft standard. DOJ Response to IEEE, supra note 5, at 4 nn.13–14 and accompanying text.

80. This practice is common among SSOs, but is not universal. The MPEG standards patent pool uses technical experts to determine whether patents that their owners declare essential are in fact essential to MPEG-compliance. See MPEG-2 FAQ, MPEGLA, http://www.mpegla.com/main/programs/M2/Pages/FAQ.aspx (last visited Oct. 6, 2017); see also Dan Rayburn, HEVC Advance Patent Pool Creates Confusion, Lacks Transparency, STREAMING MEDIA (July/Aug. 2015), http://www.streamingmedia.com/Articles/Editorial/Featured-
B. BASEBAND PROCESSORS

Baseband processors (also not wholly accurately called modems) are chipsets built into cell phones to permit the phones to communicate with a cellular network. The baseband processors accomplish this by performing such electronic signal-processing functions as signal generation, modulation, and decoding.81 For interoperability purposes, a cell phone may need to contain a baseband processor that complies with multiple standards. For example, a baseband processor that complies only with UMTS and LTE standards cannot communicate with a legacy 2G-CDMA network, such as Verizon’s or Sprint’s. To be used on a network deploying LTE, a cell phone must ordinarily contain a multi-mode baseband processor that complies with

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81. More specifically, the chipset typically comprises two semiconductor chips. One is a signal-processing chip (modem or baseband processor chip), for imposing information on, or extracting information from, a radio-frequency (RF) signal. The other chip is a transceiver with antenna, for sending and receiving RF signals. The Intersil PRISM 3 chipset is illustrative. See R. SZWEDE, SILICON GERMANIUM MATERIALS & DEVICES: A MARKET & TECHNOLOGY OVERVIEW TO 2006 217 (2002).

both LTE and the older 2G and 3G standards. There are two principal reasons for this:

- “First, LTE network infrastructure generally supports data, rather than voice, traffic. Therefore, to transmit voice calls, a baseband processor must comply with 2G and 3G standards.”

- “Second, because the process of upgrading and replacing network infrastructure takes years, a baseband processor must comply with 2G and 3G standards [as well as LTE] to communicate with the network in those areas where [network] operator has not yet replaced or upgraded infrastructure equipment.”

The cell phone market has become segmented into several tiers or submarkets, which tend to use different standards and baseband processors. Smartphones, which offer such additional functionality besides telephone service as cameras, high-resolution touch-screen displays, powerful applications and graphics processors, and enhanced memory and storage, are premium-tier devices using premium baseband processors. The premium-tier Apple iPhones and Samsung Galaxy-S smartphone lines incorporate processors compliant with the CDMA and LTE standards. Non-premium cell phones may use baseband processors that comply with CDMA standards but not

82. FTC Complaint, supra note 11, at 7.
83. Id.
LTE, or if they use LTE they may use less expensive, lower speed LTE baseband processors.86

Original equipment manufacturers (OEMs) of cell phones (also termed handset manufacturers) “typically require baseband processors with advanced LTE functionality for premium-tier [cell phones].”87 The most recent premium-tier smartphones, such as iPhones and Galaxy-S models, permit very high-speed data transmission and download, as provided by LTE Category 12 (600 Mbps). “For an OEM designing and manufacturing a premium-tier [device], a baseband processor that only supports earlier LTE features is not a reasonable substitute for a baseband processor that supports advanced LTE standards and features.”88

III. QUALCOMM AND CELL PHONE INDUSTRY MARKET STRUCTURE

Qualcomm has participated extensively in cellular standard-setting processes through IEEE, ETSI, TIA, and ATIS.89 These SSOs required FRAND commitments from those participating in the process, and Qualcomm committed to these and other SSOs that it would license its SEPs covering 2G, 3G, and 4G technologies on FRAND terms.90 The US courts have held that FRAND commitments are legally binding third-party beneficiary contracts enforceable in favor of firms that implement the standard to which the commitment relates.91

Qualcomm was a leading developer and proponent of 2G-CDMA standards and held a correspondingly high share of all patents declared essential to compliance with 2G-CDMA standards.92 Qualcomm also participated in 3G-standard

86. FTC Complaint, supra note 11, at 8.
87. Id. at 10.
88. Id. at 10.
89. Id. at 13.
90. Id. at 14; Apple Complaint, supra note 12, at 13.
91. See, e.g., Microsoft Corp. v. Motorola, Inc., 696 F.3d 872, 884–85 (9th Cir. 2012); Realtek Semiconductor Corp. v. LSI Corp., 946 F. Supp. 2d 998, 1006 (N.D. Cal. 2013) (“Defendants’ [sic] are contractually obligated under their Letters of Assurance to the IEEE to license the . . . patents on RAND terms and Realtek is a third-party beneficiary to that contract . . . .”).
92. According to the KFTC, Qualcomm holds approximately 95% of the SEPs on 2G CDMA technology. See KFTC Press Release, supra note 7, at 4.
setting, though its share of all patents declared essential to 3G-UMTS and 3G-CDMA standards is smaller than its share of 2G-CDMA SEPs. Qualcomm participated in 4G standardization, but its share of patents declared essential to LTE standards is relatively low—about the same as the other major 4G participants, such as Nokia, Ericsson, and Samsung.93

In its press release accompanying its December 2016 antimonopoly action against Qualcomm, the KFTC provided a chart showing Qualcomm’s and other SEP owners’ individual shares of the 3G and 4G patents.94

![Graph showing Qualcomm's and other SEP owners' individual shares of 3G and 4G patents.](image)

In addition, Qualcomm has long been the dominant supplier of CDMA baseband processor chipsets, with an approximately 80% or more market share.95 OEMs seeking to sell devices for use on CDMA networks, such as Verizon’s and Sprint’s, must use CDMA chipsets, which means that these OEMs depend on access to Qualcomm’s chipsets. For backward compatibility, CDMA chipsets are required also in devices supporting LTE. Today, Intel is Qualcomm’s only competitor in the market for premium LTE chipsets, and Qualcomm has no competition at all in the market for premium LTE chipsets with CDMA functionality. Qualcomm has consistently been the dominant supplier of premium LTE baseband processors, with an approximately 80% market share.

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93. Id. at 4.
94. Id. at 4.
95. Apple Complaint, supra note 12, at 16. According to the KFTC, between 2013 and 2015, Qualcomm’s market share of LTE chipsets ranged from about 69% to 96%, and its market share of CDMA chipsets ranged from about 83% to 93%. KFTC Press Release, supra note 7, at 4.
or more market share, and OEMs have had limited practical alternatives to Qualcomm for the supply of premium LTE processors.96

IV. QUALCOMM’S CHALLENGED MARKETING PRACTICES

The KFTC, US FTC, and Apple complaints against Qualcomm challenge a number of Qualcomm’s patent exploitation and chipset marketing practices. The practices are interrelated and are said to reinforce one another’s alleged exclusionary and anticompetitive effects.97 Although these lawsuits challenge a number of different practices, this Article primarily concerns those involving the determination of FRAND royalties for SEPs and the relation of that determination to the question of who should capture the benefits and values of standardization. A key issue is whether FRAND royalties should be calculated using as a royalty base the selling price of the smallest saleable patent-practicing unit (such as a baseband processor chipset) or instead the price of the downstream finished product (such as a smartphone).

A. “NO LICENSE, NO CHIPS”

A core element of the charges in all these cases is Qualcomm’s “no license, no chips” policy, which allegedly interacts with other restrictive practices to maintain Qualcomm’s monopoly power and harm competition.98 The “no license, no chips” policy is that Qualcomm will sell its baseband processors to cell phone original equipment manufacturers (OEMs) only if the OEMs also accept a patent license to Qualcomm’s cellular SEPs on Qualcomm’s terms.99

96. Apple Complaint, supra note 12, at 17. Arguably, Qualcomm controls a so-called essential facility in these markets or submarkets, since it is not possible to make premium-tier smartphones without Qualcomm baseband processor chipsets (or infringing Qualcomm SEPs). See text supra notes 82–86. For a discussion of the essential-facilities doctrine and summary of the authorities, see Otter Tail Power Co. v. United States, WIKIPEDIA, https://en.wikipedia.org/wiki/Otter_Tail_Power_Co._v._United_States (last updated Dec. 4, 2017).
97. See, e.g., FTC Complaint, supra note 11, at 2–3; Apple Complaint, supra note 12, at 3.
98. FTC Complaint, supra note 11, at 2–3.
99. Id.
Furthermore, OEMs must agree to pay substantial royalties to Qualcomm on their sales of any cell phones using a baseband processor purchased from any of Qualcomm’s competitors.\(^\text{100}\) The “no license, no chips” policy operates to require SEP royalties to be determined on the price of the cell phones containing baseband processors rather than the price of the baseband processors themselves, which aids Qualcomm to capture more of the value of standardization dependent on use of Qualcomm chipsets and SEPs in the manufacture of standard-compliant products. A less neutral characterization of the practice is that it enables Qualcomm to charge royalties far in excess of (and in violation of) its FRAND obligations.

The FTC insists that the “no license, no chips” policy is “anomalous” among chip makers and other suppliers of components of semiconductor and cellular-equipment.\(^\text{101}\) Other component suppliers simply rely on component sales, rather than requiring separate royalty-bearing patent licenses. “When a supplier sells a component, such as a baseband processor, to an OEM, that sale, under the doctrine of patent exhaustion, ordinarily terminates any right of the supplier under patent law to control any further use or sale of the component.”\(^\text{102}\) OEMs buy cell phone components from hundreds of suppliers. Among these suppliers, “Qualcomm is unique in requiring an OEM, as a condition of sale, to secure a separate patent license requiring royalty payments,” the FTC says, for cell phones “that use a competitor’s components.”\(^\text{103}\)

\(^{100}\). Id.

\(^{101}\). FTC Complaint, supra note 11, at 15–16.

\(^{102}\). Id. at 15; see also Impression Prods., Inc. v. Lexmark Int’l, Inc., 137 S. Ct. 1523, 1531 (2017) (internal quotations omitted) (“When a patentee chooses to sell an item, that product is no longer within the limits of the monopoly and instead becomes the private, individual property of the purchaser, with the rights and benefits that come along with ownership.”); Quanta Comput., Inc. v. LG Elecs., Inc., 553 U.S. 617, 625 (2008) (“The longstanding doctrine of patent exhaustion provides that the initial authorized sale of a patented item terminates all patent rights to that item.”). The practice is not only “anomalous,” but it is contrary to patent policy. See Impression, 137 S. Ct. at 1532 (internal quotations omitted) (“Congress enacted and has repeatedly revised the Patent Act against the backdrop of the hostility toward restraints on alienation. That enmity is reflected in the exhaustion doctrine. . . . [These restrictive] conditions have been ‘hateful to the law from Lord Coke’s day to ours’ and are ‘obnoxious to the public interest.’”).

\(^{103}\). FTC Complaint, supra note 11, at 15.
This practice is also anomalous among licensors of SEPs, the FTC maintains.\textsuperscript{104}

Ordinarily, if a SEP holder and a potential licensee cannot agree on license terms or agree to submit those terms to binding arbitration, the SEP holder initiates a patent-infringement suit in which a court resolves issues of patent validity and infringement and, if the court deems a patent valid and infringed, determines and awards reasonable royalties.\textsuperscript{105}

These court-determined royalties are typically far less than SEP holders demand. The FTC points, as an example, to a 2013 case in which a SEP holder demanded royalties for its SEPs of between $6 and $8 per product, and the court ultimately determined that the FRAND rate for the SEPs was $0.04 per product.\textsuperscript{106} But the cost of patent litigation is so high that OEMs will often find it uneconomical to challenge Qualcomm’s unFRANDly royalty demands in litigation.\textsuperscript{107}

The OEMs’ willingness to submit to Qualcomm’s demands is also affected by the fact that they pass their royalties on to customers. The FTC maintains that Qualcomm’s royalties do not comply with the firm’s FRAND obligations. Rather, they are “disproportionately high relative to the value contributed by its patented inventions, and often are several times higher than the royalties of other SEP licensors that have made similar technical contributions.”\textsuperscript{108} But because of the “no license, no chips” policy, OEMs lack “the ability and incentive to challenge Qualcomm’s royalty demands in court,”\textsuperscript{109} for this policy has the effect of “dramatically increasing OEMs’ costs of going to court.”\textsuperscript{110} Qualcomm will cut off litigating OEMs’ access to Qualcomm’s baseband processor chipsets. “Given the dominant position that Qualcomm has had in the supply of CDMA and premium LTE processors, an OEM unable to purchase such processors from Qualcomm would be severely hampered in efforts to design and sell critically important premium-tier phones and phones for use

\begin{footnotes}
\footnote{104. \textit{Id.} at 16.}
\footnote{105. \textit{Id.}}
\footnote{107. FTC Complaint, \textit{supra} note 11, at 16–17.}
\footnote{108. \textit{Id.} at 17.}
\footnote{109. \textit{Id.}}
\footnote{110. \textit{Id.} at 18.}
\end{footnotes}
on CDMA networks."\textsuperscript{111} To the extent that backward compatibility with CDMA equipment is commercially necessary, as it appears to be at present, Qualcomm’s SEPs create a near-absolute roadblock.\textsuperscript{112}

The FTC explains that two factors combine to cause this result. First, because of Qualcomm’s dominance, few alternative sources of such baseband processors exist.\textsuperscript{113} Second, once an OEM designs a cell phone with a Qualcomm baseband processor, “the OEM is effectively ‘locked in’ to that processor, and remains so over the commercial life” of the cell phone.\textsuperscript{114} To use another baseband processor with equivalent functionality, even if another manufacturer made one, the OEM would need to design a different cell phone, at great cost.\textsuperscript{115}

Therefore, OEMs have acceded to Qualcomm’s unFRANDly demands. They have done so even though Qualcomm sets royalties that are disproportionately high relative to the value contributed by its patented inventions, and several times higher than the royalties of other SEP licensors that have made similar technical contributions to the standards. Moreover, Qualcomm bases its royalties on the total cost of the cell phone, including cameras, high-resolution touch-screen displays, memory, and other elements besides cellular connectivity—all of these being elements not contributed by Qualcomm’s technology.\textsuperscript{116} In effect, OEMs must pay Qualcomm a premium “to avoid disruption of processor supply.”\textsuperscript{117}

The FTC describes this conduct as Qualcomm’s imposition of a “tax” on cell phone manufacturers that is necessarily passed on to consumers, whether the OEMs use baseband processors from Qualcomm or its competitors.\textsuperscript{118} Moreover, by increasing to OEMs the cost of using competitive baseband processors, Qualcomm “weakens the competitive constraint on Qualcomm’s own all-in baseband processor price,” and the tax bolsters and

\textsuperscript{111} Id.
\textsuperscript{112} See supra notes 82–83, 85–86 and accompanying text. But see supra note 84.
\textsuperscript{113} FTC Complaint, supra note 11, at 10.
\textsuperscript{114} Id. at 18.
\textsuperscript{115} Id.
\textsuperscript{116} Id. at 17–19.
\textsuperscript{117} Id. at 19.
\textsuperscript{118} Id.
entrenches Qualcomm’s monopoly position because “the tax diminishes OEMs’ demand for [competitors’] processors and reduces competitors’ sales and margins.”119 This is said also to harm technological innovation because the tax “diminish[es] competitors’ abilities and incentives to invest and innovate.”120

Apple makes similar allegations. According to Apple, Qualcomm has established a “business model” for itself under which it mulcts chipmakers and cell phone manufacturers with exorbitant patent royalties based on the innovations of others, such as the mulcted chipmakers, cell phone manufacturers (OEMs), and Apple:

Qualcomm is not entitled to collect royalties based on the contribution of others to the cell phone standard, or unrelated innovation by companies that utilize the standard—but this is precisely the business model that Qualcomm has established and that it protects through monopoly power and unlawful licenses. In order to purchase Qualcomm chips or obtain access to patents pledged to a cellular standard, Qualcomm demands that third parties pay Qualcomm a royalty much greater than the value of Qualcomm’s contribution to the standard—a value based on the entire price of the innovative products that only incidentally incorporate the standard.121

For example, Apple says it invented “a revolutionary new security feature … touch ID, which enables breakthrough technologies like Apple Pay,” but Qualcomm insists on royalties for these and other Apple innovations that Qualcomm had nothing to do with, and the royalty payments to Qualcomm then go up with each additional Apple smartphone innovation.122 “When Apple spends billions redefining the concept of a smartphone camera, Qualcomm’s royalty payments go up. Even when Apple sells an iPhone with added memory—256GB123 instead of 128GB—Qualcomm collects a larger royalty just because of that added memory.”124 Apple accuses Qualcomm of a nasty, greedy, and unreasonable attitude: “Because of its monopoly power . . . and an abusive licensing model, Qualcomm believes it is entitled to collect its ‘tribute’ on every such

119. Id. at 20.
120. Id.
121. Apple Complaint, supra note 12, at 1.
122. Id. at 1–2.
123. 1 GB (gigabyte) equals 1000 MB (megabytes). Information storage is measured in bytes. A byte is 8 bits (a bit is a 1 or 0, i.e., “on” or “off”). 1 MB = 1,000,000 bytes. See text supra note 66.
“improvement” in cellular technology and product functionality. That is to say, Qualcomm is misappropriating a large part of the value of standardization and innovation that Apple says or implies should belong to Apple.

Apple provides an illustrative example of the operation of Qualcomm’s business model. Baseband processors (chipsets) sell for $10 to $20. Contract manufacturers pay Qualcomm an “exorbitant” royalty, which is allegedly passed on in full to Apple. On top of that Apple must pay Qualcomm another, much larger patent royalty on the selling price of the smartphone. Because the smartphone includes, besides the Qualcomm chipsets, memory chips, touchscreen, power supply, apps, and other features or components that have nothing to do with Qualcomm’s SEPs, the royalty is greatly magnified. A 16 GB iPhone sells for approximately $400 (20 to 40 times the price of a chipset) and a 256 GB iPhone sells for approximately $970 (about 50 to 100 times the chipset price), while even a Walmart 16GB Kyocera device sells for almost $100 (5 to 10 times the chipset price). Apple states that the non-FRAND percentage royalty that Qualcomm demands on the selling price of products incorporating chipsets (i.e., for smartphones) is only slightly lower than the percentage royalty that Qualcomm demands for chipsets. Yet because the downstream selling price of a smartphone is much greater than the price of a SEP-implementing chipset, an x% of sales royalty on a downstream smartphone is a large multiple (in dollars and cents) of the same x% royalty on the sales price of the chipset contained in that smartphone.

125. Id. at 2.
126. Apple Complaint, supra note 12, at 22. In October 2017, one seller (DHgate.com) offered Qualcomm MDM9625M OBA baseband CPU ICs for iPhone 6/6-Plus 4G LTE chip modems for $15 to $17 per unit, at https://m.dhgate.com/search.do?key=%22iphone+6%22+baseband+ic&cid=&tag=&scht=. The same seller offered Qualcomm MDM9615M OVV Baseband CPU ICs for iPhone 5/5G chips for $9 to $10 per unit, at https://m.dhgate.com/hot-product/hot-iphone-baseband-ic.html. A high-volume purchaser such as Samsung or Foxconn might purchase at a lower unit price.
127. Id. at 22.
128. Id. at 37.
129. Id. at 37–38. Financial information is redacted from the Apple Complaint, but one industry commentator estimates that Apple paid Qualcomm $20 in patent royalties and $20 for the baseband processor chipset, or $40 per
Apple asserts that Qualcomm uses its monopoly power to impose its “no license, no chips” policy. Because Qualcomm has monopoly power over CDMA-compliant chipsets (over 95% of the SEPs and over 80% of product sales), it is the only seller of premium-tier (top line) LTE chipsets (which contain both LTE and CDMA technology).131 Apple is therefore obliged to use Qualcomm chipsets for its premium-tier smartphones. Qualcomm then uses the monopoly power, Apple insists, to engage in “double dipping.”132 By this, Apple means that Qualcomm, first, charges a monopoly patent royalty on the chipsets it sells the OEM contract manufacturers of Apple smartphones and then charges Apple a second patent royalty on the sales price of Apple’s smartphones that contain the chipsets,133 contrary to the US legal doctrine of patent exhaustion.134

After Apple filed its complaint in January 2017, the Supreme Court handed down its May 30, 2017, opinion in the Impression Products case,135 reaffirming the “well-settled line of precedent” against post-sale restrictions on patented


131. See Apple Complaint, supra note 12, at 16–17. Apple distinguishes between premium-tier LTE chipsets and other LTE chipsets. According to the KFTC, Qualcomm has 16% of all LTE chipset SEPs, and approximately 50% of all LTE chipset sales (total of premium and non-premium tiers). See KFTC Press Release, supra note 7, at 3–4. Apple does not assert that Qualcomm has monopoly power over non-premium LTE chipsets, which other firms such as Intel sell. See generally Apple Complaint, supra note 12; Amended Apple Complaint, supra note 12.


133. Id. at 22.

134. See Quanta Comput., Inc. v. LG Elecs., Inc., 553 U.S. 617, 628 (2008) (“The longstanding doctrine of patent exhaustion provides that the initial authorized sale of a patented item terminates all patent rights to that item.”); see also Impression Prods., Inc. v. Lexmark Int’l, Inc., 137 S. Ct. 1523, 1537 (2017) ("the right to exclude just ensures that the patentee receives one reward"); Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 360 (1961) (concurring opinion of Black, J.) (“One royalty to one patentee for one sale is enough under our patent law as written.”).

135. Impression Prods., 137 S. Ct. 1523.
products,\textsuperscript{136} and thus bolstering the FTC’s and Apple’s cases on this point. This led Apple to file an amended complaint in which it amplified these allegations and redoubled its protests against Qualcomm’s “double dipping,” asserting, “[t]his is precisely the kind of double-dipping, extra-reward system that the Court’s decision in \textit{Lexmark} forbids.”\textsuperscript{137} Apple added that this practice “amounts to a scheme of extortion that allows Qualcomm unfairly to maintain and entrench its existing monopoly.”\textsuperscript{138}

\textbf{B. REFUSAL TO LICENSE COMPETITORS}

The FTC and Apple, as well as the KFTC, charged that Qualcomm consistently refuses to grant licenses to competing suppliers of baseband processors (such as Intel and Samsung), in defiance of Qualcomm’s FRAND commitments to ETSI, TIA, and ATIS,\textsuperscript{139} but Qualcomm has denied this, in a somewhat equivocal manner.\textsuperscript{140} The seeming contradiction in the parties’ assertions may reflect Qualcomm’s carefully worded denial. The FTC and Apple appear to be saying that Qualcomm demanded such extravagant terms or payments that the royalty would not be FRAND, so that Qualcomm’s only offer was tantamount to a refusal to deal on FRAND terms, while Qualcomm responds that (in its opinion) it did not seek “to obtain agreement to unfair or unreasonable licensing terms.”\textsuperscript{141} According to the KFTC, Qualcomm’s reason for refusing to license competitors was that it determined that if it licensed chipset manufacturers, it would

\textsuperscript{136} Id. at 1533.
\textsuperscript{137} Amended Apple Complaint, \textit{supra} note 12, at 2.
\textsuperscript{138} Id. at 1.
\textsuperscript{139} FTC Complaint, \textit{supra} note 11, at 14; Apple Complaint, \textit{supra} note 12, at 30. According to the KFTC, Samsung, Intel, and VIA Telecom have all requested SEP licenses from Qualcomm, but it refused them, while other companies such as MediaTek were offered only highly restrictive licenses. KFTC Press Release, \textit{supra} note 7, at 6–7.
\textsuperscript{140} See Press Release, Qualcomm, Qualcomm Responds to Complaint from U.S. Federal Trade Commission (Jan. 17, 2017), https://www.qualcomm.com/news/releases/2017/01/17/qualcomm-responds-complaint-us-federal-trade-commission (“Qualcomm has never withheld or threatened to withhold chip supply in order to obtain agreement to unfair or unreasonable licensing terms. The FTC’s allegation to the contrary -- the central thesis of the complaint -- is wrong.”).
\textsuperscript{141} Id.
be “difficult to maintain its model” for receiving royalties from cell phone sellers.\textsuperscript{142}

The FTC explains how this policy of refusing FRAND licenses to chipset manufacturers strengthens Qualcomm’s monopoly position:

Qualcomm’s ability to tax its competitors’ sales via patent license terms with OEMs would be limited if it licensed cellular SEPs to its competitors. Qualcomm’s competitors, unlike its OEM customers, do not depend on Qualcomm for baseband processor supply. As a result, Qualcomm could not use a threatened disruption of baseband processor supply to skew SEP license negotiations with its competitors, and the royalties that would emerge from those negotiations would reflect the royalties that a court would deem reasonable.\textsuperscript{143}

Thus, “Qualcomm’s refusal to license competing manufacturers of baseband processors, in contravention of its FRAND commitments, contributes to its ability to tax its competitors’ sales and maintain its monopoly.” It also “reduces competitors’ abilities to invest and innovate in next-generation technologies,” which adversely impacts technological progress.\textsuperscript{144} The significance of this practice, for the issues addressed in this Article, is that the alleged conduct would tend to aid Qualcomm to capture the economic value of standardization, since making Qualcomm the sole source of standard-compliant chipsets permits Qualcomm to charge

\textsuperscript{142} KFTC Press Release, supra note 7, at 6. Apple is quoted as asserting, “We’ve been trying to reach a licensing agreement with Qualcomm for more than five years but they have refused to negotiate fair terms.” Shaun Nichols, Bullboy Apple Just Blew a $500m Hole in Our Wallet, Cries Qualcomm, REGISTER (Apr. 28, 2017), http://www.theregister.co.uk/2017/04/28/qualcomm_apple_payment/.

\textsuperscript{143} FTC Complaint, supra note 11, at 24.\textsuperscript{144} Another restrictive practice that the FTC complained about is that Qualcomm gave Apple a rebate of billions of dollars on its royalty payments in exchange for Apple’s agreement to buy baseband processors exclusively from Qualcomm. The FTC asserts that these “conditional rebates effectively penalized Apple’s use of any baseband processors supplied by Qualcomm’s competitors.” Id. at 26. This practice allegedly “significantly impeded the development of other baseband processor suppliers into effective competitors to Qualcomm.” Id. at 28. Apple also alleges that Qualcomm gave Apple economic concessions for it not to support WiMAX (IEEE 802.16), a wireless standard competing against LTE, which Qualcomm successfully supported. Apple Complaint, supra note 12, at 27–28. WiMAX was supported by Intel, Cisco, and other implementers. See Corcoran, supra note 23.
noncompetitive prices (including the so-called tax) for chipsets needed to implement the standard.

C. LEGAL THEORIES OF FTC AND APPLE CASES AGAINST QUALCOMM

1. Sherman Act Charges

Both the FTC’s and Apple’s cases against Qualcomm are based primarily on charges that Qualcomm has engaged in abusive practices to maintain and exploit its dominant position in the market for baseband processor chipsets using CDMA technology and also the market for premium-tier LTE baseband processor chipsets, as well as its corresponding SEP ownership position, and that therefore Qualcomm has monopolized those markets in violation of section 2 of the Sherman Act.\(^{145}\)

\(^{145}\) 15 U.S.C. § 2 (2012). See Eastman Kodak Co. v. Image Tech. Servs., Inc., 504 U.S. 451, 483 (1992) (“If Kodak adopted its parts and service policies as part of a scheme of willful acquisition or maintenance of monopoly power, it will have violated § 2. . . . Liability turns, then, on whether ‘valid business reasons’ can explain Kodak’s actions.”); United States v. Grinnell Corp., 384 U.S. 563, 570–71 (1966) (“The offense of monopoly under § 2 of the Sherman Act has two elements: (1) the possession of monopoly power in the relevant market and (2) the willful acquisition or maintenance of that power as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident.”); United States v. Griffith, 334 U.S. 100, 107 (1948) (“The use of monopoly power, however lawfully acquired, to foreclose competition, to gain a competitive advantage, or to destroy a competitor, is unlawful.”); United States v. Microsoft Corp., 253 F.3d 34, 65 (D.C. Cir. 2001) (en banc) (holding that willful maintenance of monopoly power occurs when a monopolist’s conduct “through something other than competition on the merits, has the effect of significantly reducing usage of rivals’ products and hence protecting its own . . . monopoly”). Qualcomm’s alleged refusal to sell baseband processor chipsets also raises an essential-facility issue, see text accompanying supra note 96 and infra note 517, but that may not add anything to the plain monopolization charge as in Kodak, Grinnell, and Griffith. Clearly, the thrust of the FTC’s monopolization case, as pleaded in the complaint, is the willful maintenance of monopoly power—standard § 2 doctrine.

More light on these legal theories is provided in the FTC’s brief in opposition to Qualcomm’s motion to dismiss the FTC’s complaint, and in Intel’s and Samsung’s amicus curiae briefs in support of the FTC in opposition to the motion to dismiss. See FTC’s Opposition to Qualcomm’s Motion to Dismiss, FTC v. Qualcomm, Inc., No. 5:17-cv-00220-LHK-NMC (N.D. Cal. June 15, 2017), https://www.ftc.gov/system/files/documents/cases/0085_2017_05_17_ftc_oppo_t o_motion_to_dismiss_redacted.pdf; Brief for Intel Corp. as Amicus Curiae Supporting Plaintiff, No. 5:17-cv-00220-LHK-NMC (N.D. Cal. June 15, 2017), https://blogs.intel.com/policy/files/2017/05/Intel-Amicus-Brief-FILED.pdf; Brief
Furthermore, the abusive practices allegedly involved Qualcomm’s imposition of licensing and supply contracts in unreasonable restraint of trade, in violation of section 1 of the Sherman Act. The sections 1 and 2 charges are pleaded as violations of section 5 of the FTC Act, for technical reasons, but the antitrust allegations are conventional Sherman Act allegations.

The FTC does not assert the charge of imposing royalties in excess of FRAND as an antitrust violation in itself. Rather it
is only one of several practices (such as the “no license, no chips” policy, refusal to license competitive chip makers in violation of a FRAND commitment, exclusive dealing—including compensation for exclusive dealing, threats to cut off chipset supplies if customers seek judicial scrutiny of Qualcomm’s demands or conduct, and raising competitors’ costs) that allegedly cooperate together and reinforce one another, to maintain Qualcomm’s monopoly power.

2. Unfairness Charge

In addition to the conventional antitrust charges, the FTC makes a pure (or “standalone”) “unfairness” charge under section 5(a) of the FTC Act. The FTC asserts, “Qualcomm’s practices, regardless of whether they constitute monopolization or unreasonable restraints of trade, harm competition and the competitive process and therefore constitute unfair methods of competition in violation of Section 5(a) of the FTC Act.” The Supreme Court has held that the FTC Act prohibits not only actual violations of the antitrust laws (such as the violations of sections 1 and 2 described above) but “incipient” antitrust violations and conduct that violates their “spirit.” Furthermore, the Supreme Court said, in the Sperry & Hutchinson case:

Thus, legislative and judicial authorities alike convince us that the Federal Trade Commission does not arrogate excessive power to itself if, in measuring a practice against the elusive but congressionally mandated standard of fairness, it, like a court of equity, considers public values beyond simply those enshrined in the letter or encompassed in the spirit of the antitrust laws.

In so ruling, the Supreme Court quoted with approval from a report of the FTC on what standards should be used in considering whether a practice that is not in violation of the antitrust laws is nonetheless unfair:

149. The “no license, no chips” policy allegedly raises rivals’ costs, which is recognized as possibly violative of § 2. See McWane, Inc. v. FTC, 783 F.3d 814, 832 (11th Cir. 2015) (holding that “exclusive dealing arrangements” can harm competition “by raising . . . rivals’ costs”); Forsyth v. Humana, Inc., 114 F.3d 1467, 1478 (9th Cir. 1997).
151. FTC Complaint, supra note 11, at 31.
153. Id. at 244.
(1) whether the practice, without necessarily having been previously considered unlawful, offends public policy as it has been established by statutes, the common law, or otherwise—whether, in other words, it is within at least the penumbra of some common-law, statutory, or other established concept of unfairness; (2) whether it is immoral, unethical, oppressive, or unscrupulous; (3) whether it causes substantial injury to consumers (or competitors or other businessmen).\textsuperscript{154}

Subsequently, Congress put a further, restrictive gloss on the unfairness doctrine. In 1994 it enacted section 5(n) of the FTC Act, which requires that the FTC may declare an act or practice unfair only if it “causes or is likely to cause substantial injury to consumers which is not reasonably avoidable by consumers themselves and not outweighed by countervailing benefits to consumers or to competition.”\textsuperscript{155} In this case, even the further requirements of section 5(n) would seem to be satisfied, because consumers cannot avoid the impact of increased cell phone prices allegedly resulting from the challenged practices, and the alleged abusive practices would not provide countervailing benefits, or any benefits to anyone but the defendant.\textsuperscript{156}

Lower courts have also held that the FTC’s use of section 5 outside the antitrust-related area is limited to business conduct not “normally acceptable.” In the \textit{du Pont} case, the Second Circuit held that when the FTC challenges a business practice that “does not violate the antitrust or other laws and is not collusive, coercive, predatory or exclusionary in character, standards for determining whether it is ‘unfair’ within the meaning of § 5 must be formulated to discriminate between normally acceptable business behavior and conduct that is unreasonable or unacceptable.”\textsuperscript{157}

\textsuperscript{154} \textit{Id.} at 244 n.5 (quoting Statement of Basis and Purpose of Trade Regulation Rule 408, Unfair or Deceptive Advertising and Labeling of Cigarettes in Relation to the Health Hazards of Smoking, 29 Fed. Reg. 8325 (1964)).


\textsuperscript{156} The FTC brief in opposition to Qualcomm’s motion to dismiss simply asserts that the conduct alleged here satisfies these requirements of § 5 because “a dominant firm forcing its customers to deal with rivals on unfavorable terms is coercive and exclusionary,” and because the complaint alleges “an economically sound theory of competitive injury.” FTC’s Opposition to Qualcomm’s Motion to Dismiss, \textit{supra} note 145, at 24.

\textsuperscript{157} E.I. du Pont de Nemours & Co. v. FTC, 729 F.2d 128, 137 (2d Cir. 1984) (setting FTC order aside because it did not satisfy that test).
Although the FTC’s use of section 5 as a supplement to the antitrust charges against Qualcomm therefore seems appropriate here, one Commissioner, Maureen Ohlhausen, dissented from the filing of the case. She pointed out—not quite accurately—that the “core theory of the complaint is that Qualcomm uses its alleged chipset monopoly to force its customers—smartphone manufacturers (OEMs)—to pay unreasonably high royalties to license FRAND-encumbered patents that are essential to practicing CDMA and LTE cellular communications standards.” She also pointed out that the theory of the case requires that Qualcomm charges unreasonably high royalties: “If Qualcomm charges reasonable royalties for its patents, then there is no anticompetitive tax.” Olhausen denied that there was any “robust economic evidence” to support the charge of an antitrust violation. She also rejected the section 5 “unfairness” charge, on principle: “It is no answer to an unsupported Sherman Act theory to bring an amorphous standalone Section 5 claim based on the same conduct.”158

Commissioner Olhausen’s argument that the core of the FTC’s complaint is that Qualcomm charged unreasonably high royalties, period, seems misplaced. If that were so, she might have better argued that this is a garden-variety breach of contract claim (breach of FRAND commitment) dressed up as an antitrust case. But the antitrust complaint is not directed merely at price gouging. Rather, the case is directed at exclusionary practices—such as the “no license, no chips” policy and refusals to license competitors—that have maintained monopoly power and excluded market entry by new competition that might threaten Qualcomm’s monopoly. Qualcomm’s conduct has, because it was effective in maintaining monopoly power, had the usual monopoly effects, however, such as price gouging. But that is one of the effects of the conduct, not the gravamen of the antitrust violation. (Although not the gravamen of a Sherman Act violation, price gouging in violation of a FRAND commitment could be the gravamen of a violation of FTC Act § 5, if dishonest, unethical, or oppressive, with resulting injury to consumers that they could not avoid.)

For some time there were two vacancies at the FTC, so that the Qualcomm complaint was issued in January 2017 on a 2-1 vote. Then a third vacancy occurred, because Chairman Edith Ramirez resigned in February 2017. President Trump has now nominated a new chairman, Joseph Simons, a Republican, to replace resigning Democrat Ramirez, and has also announced two nominations for remaining Democratic and Republican seats. All three nominees await Senate confirmation.

A coalition of conservative groups wrote President Trump a letter urging him “to take immediate steps to terminate the FTC’s midnight complaint against Qualcomm,” because it is “a misuse of antitrust litigation to promote a destructive policy agenda that aims to undercut patent property rights and conservative free market principles.” On the other hand, a coalition of Silicon Valley, information technology, and automotive industry companies wrote a letter to President Trump urging him to allow the FTC suit “to run its course without prejudice or political interference,” because the critically important “standard setting system is vulnerable to abuse” when a SEP holder “commits to license its patents on fair and reasonable terms, but then reneges on its commitments once its

159. Brian Fung, Trump’s Pick for a Top Consumer Watchdog Once Represented Microsoft and MasterCard, WASH. POST (Oct. 19, 2017), http://www.washingtonpost.com/news/the-switch/wp/2017/10/19/trumps-pick-for-a-top-consumer-watchdog-once-represented-microsoft-and-mastercard/?utm_term=.b8f65b661f3. The White House has announced the nomination of Rohit Chopra to the remaining Democratic seat, and news sources have said that Noah Phillips has been or is expected to be nominated to the remaining Republican seat. William MacLeod et al., Trump to Nominate Competition-Focused Simons for FTC Chair, CP-Focused Chopra for Commissioner; Reports of Philips for Additional Seat, AD LAW ACCESS (Oct. 19, 2017), https://www.adlawaccess.com/2017/10/articles/trump-to-nominate-competition-focused-simons-for-ftc-chair-cp-focused-chopra-for-commissioner-reports-of-philips-for-additional-seat/. Democratic Commissioner Terrell McSweeney also continues to serve on the Commission, although her term expired in September, so that Trump will be able to fill her Democratic seat at any time he wishes. The statute requires five commissioners and that no more than three of them can be of the same political party. 15 U.S.C. § 41 (2012).

3. Clayton Act Issue

Curiously, even though the FTC invoked the so-called standalone aspect of section 5 (the “unfairness” doctrine), it did not try to apply a less controversial provision of conventional antitrust law that here is similar in impact. Section 3 of the Clayton Act makes it unlawful to sell goods, “whether patented or unpatented,” or set a price for them “or discount from, or rebate upon, [that] price, on the condition, agreement, or understanding that the . . . purchaser thereof shall not use or deal in the goods . . . of a competitor or competitors of the . . . seller, where the effect . . . may be to substantially lessen competition or tend to create a monopoly.” The Supreme Court has found violations of Clayton Act section 3 in cases where a single firm had a 40% market share or a few sellers using this practice together had an aggregate market share of 65%. It has also been held that section 3 applies when a patent license is granted on the condition that goods be purchased from the

161. Letter from ACT | The App Association et al. to Donald J. Trump, President, United States (Apr. 20, 2017), https://www.scribd.com/embeds/345863368/content?start_page=1&view_mode=scroll&access_key=key-YxhfXdkdb095ehYT8Th&show_recommendations=true. The signatories assert that they “represent a broad cross-section of the United States business community, including automakers and suppliers, application developers, personal computer makers, television manufacturers, telecom product suppliers, chip designers and manufacturers, and other technology developers.” Id. at 1. This coalition of signatories includes Apple, AT&T, Dell, HP, Intel, Microsoft, Oracle, Samsung, and Verizon. Id. at 2.


164. Standard Oil Co. v. United States (Standard Stations), 337 U.S. 293, 295 (1949). In the Standard Stations case, there was a violation of section 3 where the defendant tied up 16% of the gasoline stations in the relevant market with requirements contracts and accounted for 23% of all gasoline sales in the area, while its six leading competitors “employ[ed] similar exclusive dealing arrangements” and foreclosed another 42% of the gasoline market. The seven major companies sold a total of 65% of the gasoline sales and controlled 76% of all stations. Id. at 295, 309 n.12. They “collectively, even though not collusively,” foreclosed the market against competitive entry. Id. at 309. In contrast, 0.77% market foreclosure is insufficient. Tampa Elec. Co. v. Nashville Coal Co., 365 U.S. 320, 333 (1961).
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patentee. In *FTC v. Qualcomm*, Qualcomm has market shares of 80% or more in the relevant markets alleged; its chipset sales to Apple were made subject to a conditional rebate on the condition, agreement, and understanding that Apple would not deal in competitive baseband processors (such as those of Intel); and various anticompetitive and monopolistic effects were alleged. The facts alleged seem to fit the literal words of the Clayton Act. It would seem tactically more advantageous to rely on this statute, if not instead of the others at least in addition to them.

D. RELIEF SOUGHT IN THE QUALCOMM CASES

These suits involve a number of issues, and the remedies the plaintiffs seek go beyond determination of FRAND royalties for cell phone SEPs. But all of these suits are directed, in part, to requiring future cell phone SEP royalties to be determined on the basis of a share of the market price of the smallest saleable patent-practicing unit that the SEPs cover (chipsets)—a share proportioned to the relative contribution of the patented (infringed) technology to the chipset or of the chipset’s patented technology to the whole standard, rather than a royalty based on

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165. *Lord v. Radio Corp. of Am.*, 24 F.2d 565, 567–68 (D. Del.), aff’d, 28 F.2d 257 (3d Cir. 1928). In that case, RCA had patents on radio set circuits using vacuum tubes; it licensed the patents on the circuits and sold the vacuum tubes to radio manufacturers, subject to the condition that the sold tubes would be used only in the licensed radio sets. Id. at 566. The court said that “the practical effect of paragraph 9 [was] to prevent the licensees . . . from using or dealing in tubes other than those sold by the defendant,” and that “the provisions of paragraph 9 [were] quite as effective as express covenants could be, and practically compell[ed] the use of the tubes of the defendant in all receiving sets made by the licensees.” Id. at 568 (citing *Standard Fashion*, 258 U.S. at 355). On appeal, the Third Circuit noted that the “contract or understanding between the defendant and the licensees has actually resulted in the monopoly of the radio tube business by the defendant to the extent of somewhere between 70 per cent and 95 per cent.” Radio Corp. of Am. v. Lord, 28 F.2d 257, 261 (3d Cir. 1928). The fact pattern in *Lord v. RCA* is generally comparable to that alleged in the Qualcomm cases.

a share of the market price of the entire downstream product (cell phones) including value contributed by unpatented (non-infringing) aspects of the upstream and downstream products or contributed by standardization.

A different relief issue is suggested by the recent ruling in the Impression Products case. In that case, the Supreme Court emphasized the importance to patent policy of the exhaustion doctrine—the “well-settled line of precedent” against the extension of patent monopoly power beyond the patentee’s sale of its patented product. Qualcomm’s so-called double dipping and its business model of collecting patent royalties on smartphones containing patented Qualcomm baseband processors that Qualcomm has sold contravene the exhaustion doctrine. The conduct is clearly an unlawful downstream extension of patent rights and thus patent misuse, in that it uses an upstream patent on baseband processors to collect patent royalties on downstream products (smartphones), which are not within the scope of the upstream patents. Under the patent misuse doctrine, a finding of patent misuse makes the misused patents unenforceable against infringers until it is shown that the effects of the misuse have been “purged” and fully dissipated. In addition, patent misuse is an antitrust violation, but only if the other necessary elements of such a violation, such as adverse market impact, are shown to be present in addition to the patent misuse.

For types of patent misuse other than the conduct involved in this case, the Supreme Court has held that patent policy trumps state contract law and preempts its application,

168. Id. at 1527.
169. See Blonder-Tongue Labs., Inc. v. Univ. of Ill. Found., 402 U.S. 313, 343–44 (1971) (holding that it is patent misuse to “attempt[] to broaden the physical or temporal scope of the patent monopoly” or use “the monopoly of the patent to create another monopoly” or attempt “to enlarge the monopoly of the patent by the expedient of attaching conditions to its use.”).
170. B.B. Chemical Co. v. Ellis, 314 U.S. 495, 498 (1942); see also U.S. Gypsum Co. v. National Gypsum Co., 352 U.S. 457, 465 (1957) (“It is now, of course, familiar law that the courts will not aid a patent owner who has misused his patents to recover any of their emoluments accruing during the period of misuse or thereafter until the effect of such misuse have been dissipated, or ‘purged,’ as the conventional saying goes.”).
depriving the patentee of the power to have its unlawfully restrictive contract enforced under federal patent law or state contract law.\textsuperscript{172} It has not yet been decided whether the same policy applies to contractual restrictions contravening the exhaustion doctrine,\textsuperscript{173} but irrespective of whether misuse would deprive a company in Qualcomm’s position of entitlement to breach of contract remedies, it would deprive the company of patent infringement remedies,\textsuperscript{174} and the right to collect unpaid patent royalties.\textsuperscript{175} Qualcomm is now engaged in breach of contract litigation with licensees that are not paying patent royalties under their licenses, a breach of contract which Qualcomm says Apple has instigated.\textsuperscript{176} The licensees have

\textsuperscript{172} See, e.g., Kimble v. Marvel Entm’t, LLC, 135 S. Ct. 2401, 2413–14 (2015) (holding contract was not enforceable, despite state contract law, due to patent policy that patent expiration marks a temporal boundary for exercising patent rights); Lear, Inc. v. Adkins, 395 U.S. 653 (1969) (holding contract was not enforceable, despite state contract law, due to patent policy that the public should be relieved of the burden of invalid patents); Brulotte v. Thys, 379 U.S. 29, 31–32 (1964) (same as Kimble); see also Morey v. Paladini, 187 Cal. 727, 203 P. 760, 762–63 (Cal. 1922) (“Anyone sued upon a contract may set up a defense that it is a violation of an act of Congress, and if it is found to be so, that fact will constitute a good defense to the action.”); \textsc{Restatement (Second) of Contracts} § 178(1) (Am. Law Inst. 1981) (“A promise or other term of an agreement is unenforceable on grounds of public policy if . . . the interest in its enforcement is clearly outweighed in the circumstances by a public policy against the enforcement of such terms.”); id. § 178(3) (“In weighing a public policy against enforcement of a term, account is taken of . . . the strength of that policy as manifested by . . . judicial decisions”).


impleaded Apple into this suit as a third party defendant, because Apple had agreed to indemnify its suppliers.177

There is authority that litigation in attempted furtherance of a monopolistic scheme is actionable under the antitrust laws, despite the First Amendment’s guarantee of the right to petition the government (including courts) for redress of grievances,178 and that a defendant in such a case may be awarded treble its attorney fees and expenses in defending itself, as well as other consequential damages.179 However, the suit must be brought in


178. Octane Fitness, LLC v. ICON Health & Fitness, Inc., 134 S. Ct. 1749, 1757 (2014) (citation omitted) (quoting Prof’l Real Estate Inv’rs, Inc. v. Columbia Pictures Indus., Inc., 508 U.S. 49, 56 (1993)) (“We crafted the Noerr-Pennington doctrine—and carved out only a narrow exception for ‘sham’ litigation—to avoid chilling the exercise of the First Amendment right to petition the government for the redress of grievances (‘Those who petition government for redress are generally immune from antitrust liability’).”).

179. See Transweb, LLC v. 3M Innovative Props. Co., 812 F.3d 1295, 1311 (Fed. Cir. 2016) (holding antitrust treble damages include expense of defending patent infringement lawsuit based on assertion of “fraudulently-obtained patent in pursuit of a monopoly”); Mishawaka v. American Elec. Power Co., 616 F.2d 976, 989 (7th Cir. 1980) (“We also find that the municipalities are entitled to recover, as part of their antitrust damages, the expenses they incurred in litigating before the commission . . . . In the context of this antitrust violation, we do not believe that to allow litigation expenses to the municipalities . . . runs afoul of Noerr-Pennington as claimed by the utility. It was not the utility petitioning for its own lawful purposes. It was the municipalities petitioning to prevent the utility’s allegedly unlawful conduct.”); Kearney & Trecker Corp. v. Cincinnati Milacron, Inc., 562 F.2d 365, 374 (6th Cir. 1977) (“We agree that no barriers should be erected which prevent free access to the courts by one who believes in good faith that his valid patent is being infringed. However, one who has established or is attempting to establish an illegal monopoly by fraud on the Patent Office or misuse of a patent should not be permitted to further this goal by means of an infringement suit. When the antitrust violations are causally connected to the infringement action it is permissible to include the expenses of defending that action in the award of damages.”); Rex Chainbelt, Inc. v. Harco Prods., 512 F.2d 993, 1005 (9th Cir. 1975) (“In those cases which have awarded as part of antitrust treble damages, attorney’s fees incurred in defending patent infringement actions, we see the consistent thread of the patent infringement suit being used with ulterior motives as a predatory means—an aggressive weapon to attain some other anticompetitive end . . . .”); Dairy Foods Inc. v. Dairy Maid Prods. Coop., 297 F.2d 805, 809 (7th Cir. 1961)
bad faith, not for the purpose of defending and vindicating the plaintiff’s legal rights. Typically, there must be a pattern of sham, baseless litigation. Some cases, however, involve a
single very egregious spurious legal claim. The courts have
developed different legal tests for single and multiple ill-
conceived lawsuits.

In the present controversy, Qualcomm has filed a single civil
action naming four Taiwanese defendant suppliers of Apple as
having breached (at the instigation of Apple) four independent
contracts that may impose unlawful restraints of trade or may
be part of an unlawful, monopolistic scheme. It is unclear

“the damages it [plaintiff] could hope to get if it did win, were too small
compared to what it would have to spend on the litigation”).

182 See cases cited supra note 180; Cal. Motor Transp. Co. 404 U.S. at 512–
13. The Court in California Motor Transport referred to several cases of
egregious single-claim litigation, including Walker Process Equipment, Inc. v.
Food Machinery and Chemical Corp., 382 U.S. 172 (1965) (enforcement of a
fraudulently procured patent); Precision Instrument Manufacturing Co. v.
Automotive Maintenance Machinery Co., 324 U.S. 806, 816 (1945) (perjury of
witnesses in a patent infringement case); Continental Ore Co. v. Union Carbide
Corp., 370 U.S. 690, 707 (1962) (conspiracy with a licensing agency to exclude a
competitor); and Kobe, 198 F.2d at 424 (“When the suit was filed the plaintiffs
had no concrete information that the Dempsey pump infringed any of Kobe’s
patents. Drawings or models of it had never been examined by or been in Kobe’s
possession.”).

183 See Hanover 3201 Realty, LLC v. Vill. Supermarkets, Inc., 806 F.3d
162, 179–80 (3d Cir. 2015) (holding that California Motor Transport is a rule
concerning a series of sham petitions, while Professional Real Estate Investors
concerns a single sham petition, and that for California Motor Transport cases
one should consider a win/loss ratio); Waugh Chapel S., LLC v. United Food &
Commercial Workers Union Local 27, 728 F.3d 354, 363–65 (4th Cir. 2013)
(finding sham where one of fourteen proceedings was successful); Primetime 24
USS-POSCO rule to a series of sham claims); USS-POSCO Indus. v. Contra
Costa Cty. Bldg. & Constr. Trades Council, AFL-CIO, 31 F.3d 800, 811 (9th Cir.
1994) (stating that “the question is not whether any one of them has merit—
some may turn out to, just as a matter of chance—but whether they are brought
pursuant to a policy of starting legal proceedings without regard to the merits
and for the purpose of injuring a market rival,” and finding no sham where 15
of 29 lawsuits were successful); see also Kaiser Found. Health Plan, Inc. v.
Abbott Labs., Inc., 552 F.3d 1033, 1046 (9th Cir. 2009) (finding no sham where
defendant “won seven of the seventeen suits” and in each of the ten remaining
cases “had a plausible [albeit unsuccessful] argument on which it could have
prevailed.”); P.R. Tel. Co. v. San Juan Cable Co. LLC, 196 F. Supp. 3d 248,
(D.P.R. 2016); Total Renal Care, Inc. v. W. Nephrology & Metabolic Bone
Disease, P.C., 08-cv-00513-CMA-KMT, 2009 U.S. Dist. LEXIS 80821 (D. Colo.
Aug. 21, 2009); ERBE Electromedizin GMBH v. Canady Tech. LLC, 529 F.
Supp. 2d 577, (W.D. Pa. 2007); In re Fresh Del Monte Pineapple Antitrust Litig.,
04 MD 1628 (RMB) (MHD), 2007 U.S. Dist. LEXIS 1372 (S.D.N.Y. Jan. 4, 2007);
Livingston Downs Racing Ass’n v. Jefferson Downs Corp., 192 F. Supp. 2d 519
(M.D. La. 2001).
whether this is a single claim, subject to a more difficult test for an antitrust claimant to satisfy,\textsuperscript{184} or four claims, subject to a legal test easier for an antitrust claimant to satisfy.\textsuperscript{185} In any case, liability is still speculative: it is not at this time adjudicated that Qualcomm is using the breach of contract suits for monopolistic purposes.\textsuperscript{186} Moreover, if this is considered a single sham claim, and thus subject to the \textit{Professional Real Estate Investors} rule more favorable to patentees, is the patent misuse and unenforceability of imposing post-sale restrictions in violation of the exhaustion doctrine and using that conduct to further a monopolization program sufficiently egregious (and unambiguously unlawful enough) to satisfy the \textit{Professional Real Estate Investors} rule?

\textbf{E. Ruling on Motion to Dismiss FTC Case}

Qualcomm filed a motion to dismiss the FTC’s case, which the court denied on June 26.\textsuperscript{187} Qualcomm argued that the FTC’s complaint did not state a claim for relief, but the court held that it stated a sufficiently plausible Sherman Act case, and thus a violation of section 5 of the FTC Act, making it unnecessary to determine whether the FTC complaint also stated a section 5 standalone claim for relief. The court held that the “FTC has plausibly alleged that Qualcomm’s ‘no license-no chips’ policy is

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\textsuperscript{184} \textit{Hanover}, 806 F.3d at 180 (“Where there is only one alleged sham petition, \textit{Professional Real Estate’s} exacting two-step test properly places a heavy thumb on the scale in favor of the defendant. With only one data point, it is difficult to determine with any precision whether the petition was anticompetitive.”); see also cases cited supra note 182.

\textsuperscript{185} See \textit{California Motor Transp. Co.}, 404 U.S. at 513; Waugh, 728 F.3d at 365 (“[T]he fact that there may be moments of merit within a series of lawsuits is not inconsistent with a campaign of sham litigation.”); \textit{USS-POSCO}, 31 F.3d at 811 (“EVEN a broken clock is right twice a day.”); see also cases cited supra note 183.

\textsuperscript{186} It should be noted that First Amendment/Noerr-Pennington immunity, even if applicable to the breach of contract litigation, would not apply to any underlying antitrust liability for making the contracts. See Amphastar Pharm. Inc. v. Momenta Pharm., Inc., 850 F.3d 52, 57 (1st Cir. 2017) (“The mere existence of a lawsuit does not retroactively immunize prior anti-competitive conduct.”). Moreover, \textit{Noerr-Pennington} is a limitation on finding an antitrust violation, not a ban on awarding consequential damages for an antitrust violation including otherwise privileged petitioning conduct. \textit{Id.}

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anticompetitive conduct in violation of either § 1 or § 2 of the Sherman Act, and thus in violation of § 5 of the FTCA.\textsuperscript{188}

The court also held that “Qualcomm’s voluntary participation in the standards setting process, and Qualcomm’s voluntary commitment to license its SEPs on FRAND terms pursuant to the standards setting process, are the type of voluntary actions that can support an antitrust duty to deal,”\textsuperscript{189} and that Qualcomm’s refusal to license its SEPs on FRAND terms to chip manufacturer competitors such as Intel and Samsung showed “anticompetitive malice.”\textsuperscript{190} The refusal to license competitors allegedly “enables Qualcomm to enact its ‘no license–no chips’ policy and harm its competitors’ sales,” facilitating “Qualcomm’s ability to collect above-FRAND royalties.”\textsuperscript{191} The court therefore found that the FTC had sufficiently alleged that

Qualcomm violated a duty to deal in refusing to license its FRAND-encumbered SEPs to its modem chips [baseband processors] competitors [and] . . . that Qualcomm’s refusal to license its SEPs to its modem chips competitors is independent anticompetitive conduct that violates § 2 of the Sherman Act, and thus violates § 5 of the FTCA.\textsuperscript{192}

Separately, the exclusive dealing “allegations are sufficient to plausibly allege that competitors were excluded from the alleged market by Qualcomm’s agreements with Apple” and that the arrangements “foreclosed a substantial share of the market for premium LTE modem chips,” in violation of the Sherman Act and thus in violation of section 5.\textsuperscript{193}

These rulings are only on a motion to dismiss, in which the plaintiff’s well-pleaded allegations must be assumed to be true.\textsuperscript{194} Nonetheless, the court’s statements indicate its

\textsuperscript{188}  Id. at *68.
\textsuperscript{189}  Id. at *77.
\textsuperscript{190}  Id. at *79–81.
\textsuperscript{191}  Id. at *79–80.
\textsuperscript{192}  Id. at *83–84.
\textsuperscript{193}  Id. at *89–90.
\textsuperscript{194}  Papasan v. Allain, 478 U.S. 265, 283 (1986) (“We are bound for the purposes of this review to take the well-pleaded factual allegations in the complaint as true.”); Call Henry, Inc. v. United States, 855 F.3d 1348, 1354 (Fed. Cir. 2017) (“To survive a motion to dismiss, a complaint must contain sufficient factual allegations that, if true, would ‘state a claim to relief that is plausible on its face.’ The court must accept well-pleaded factual allegations as true and must draw all reasonable inferences in favor of the claimant.”) (internal quotations and citations omitted).
acceptance of the FTC’s legal theories of Sherman Act violation.\textsuperscript{195}

V. HOW COURTS HAVE RULED FRAND ROYALTIES SHOULD BE DETERMINED

In recent years, litigation has increased over FRAND royalty determination for SEPs. As a result, the courts have developed, or at least moved toward, legal principles that the FRAND claims in these pending lawsuits and the 2015 IEEE Patent Policy update embody, or with which they are at least consistent. But the issue remains highly controversial and many SEP holders strongly resist this movement.

A. FRAND COMMITMENTS ARE LEGALLY BINDING CONTRACTS

The first step in the movement to make FRAND commitments a meaningful element in standardization was the recognition that a FRAND commitment was a legally binding contract, enforceable in favor of those implementing the standard incorporating the patented technology. One of the earliest cases was \textit{Ess Technology v. PC-Tel},\textsuperscript{196} in which General DataComm, PC-Tel’s assignor, undertook to grant FRAND licenses on SEPs to implementers of an ITU modem standard. PC-Tel then acquired General and the patents.\textsuperscript{197} Ess Technology and PC-Tel were unable to agree on license terms.\textsuperscript{198} Ess claimed that PC-Tel “started demanding increasingly unreasonable and discriminatory terms for licensing” the SEPs, and Ess brought an action to compel specific performance of the FRAND agreement.\textsuperscript{199} PC-Tel contended that the FRAND agreement was not a valid contract because a FRAND

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\item \textsuperscript{195} See Florian Mueller, \textit{Judge Koh Shows the Way: FRAND Non-Compliance Can Be Established Without Rate-Setting Exercise}, FOSS PATENTS (June 28, 2017), http://www.fosspatents.com/2017/06/judge-koh-shows-way-frand-non.html (“And the federal judge whom Qualcomm needs to persuade at the future bench trial has taken positions on the legal issues in the case that don’t bode well for the San Diego patent holder and chipset maker. . . . [T]he way Judge Koh has expressed her disagreement with Qualcomm’s various legal challenges does go beyond what is strictly needed to deny the motion.”).
\item \textsuperscript{196} \textit{Ess Tech., Inc. v. PC-Tel, Inc.}, No. C–99–20292 RMW, 1999 WL 33520483, at *1 (N.D. Cal. Nov. 4, 1999).
\item \textsuperscript{197} \textit{Id}.
\item \textsuperscript{198} \textit{Id}.
\item \textsuperscript{199} \textit{Id} at *1–2.
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agreement is “too vague to support a claim for specific performance, since it does not provide any express terms of the contract.” The court held, however, that an enforceable contract could exist even if “no terms of the contract are expressly agreed upon.” The court ruled that if the factual circumstances make it possible “to determine what is fair, reasonable and non-discriminatory, [then] under California law it must try to enforce the contract.”

In *Apple v. Motorola*, Motorola had made FRAND commitments to several SSOs for SEPs, but when Motorola and Apple were unable to agree on terms, Motorola sought an exclusion order and a permanent cease and desist order against Apple from the International Trade Commission (ITC). Apple sued Motorola for breach of contract, and Motorola moved to dismiss. Motorola claimed that no enforceable contract existed, because the concept of FRAND is too vague and indefinite to be the basis for a valid contract. Motorola also argued that Apple was neither a party to the Motorola-SSO contracts nor an intended third-party beneficiary of them. The court held that there was a valid bilateral contract between Motorola and the SSOs, in which Motorola received consideration in the form of benefits gained by “participating in the standard development process and influencing the choice of technology for the standards.” The court held that the contract was not too indefinite, and Apple was an intended third-party beneficiary.

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200. *Id.* at *3.
201. *Id.* at *4.
202. *Id.; see also* Broadcom Corp. v. Qualcomm Inc., 501 F.3d 297 (3d Cir. 2007). In that case, the Third Circuit reversed the dismissal of Broadcom’s antitrust case based on allegations that Qualcomm fraudulently deceived SSOs into adopting the UMTS standard by committing to license its technology on FRAND terms and, later, after lock-in occurred, demanding non-FRAND royalties. The court said, “We are unpersuaded by Qualcomm’s argument that antitrust liability cannot turn on so vague a concept as whether licensing terms are ‘reasonable.’ . . . The reasonableness of royalties is an inquiry that courts routinely undertake” in determining damages in patent infringement cases. *Id.* at 315 n.8 (citing *Ess-Technology*).
204. *Id.* at *4.
205. *Id.* at *9.
206. *Id.* at *10.
207. *Id.* at *8, *10.
beneficiary: “[t]he unavailability of essential patents matters only to those who wish to practice the standards, such as Apple. Thus, ‘Apple is a member of a class of beneficiaries intended by the parties to benefit from [the contract].’”\textsuperscript{208} The court therefore denied the motion to dismiss Apple’s breach of contract claims, and required trial to proceed.\textsuperscript{209}

Similarly, in \textit{Realtek v. LSI},\textsuperscript{210} the court granted Realtek’s summary judgment motion on its breach of contract claim for violation of a FRAND commitment. The facts were almost identical to those of \textit{Apple v. Motorola}. The defendants were “contractually obligated under their Letters of Assurance to the IEEE to license the . . . patents on RAND terms and Realtek is a third-party beneficiary.”\textsuperscript{211} The “defendants breached their contractual obligations to IEEE and to Realtek as a third-party beneficiary of that contract by seeking injunctive relief against Realtek before offering Realtek a license” on the RAND-encumbered SEPs.\textsuperscript{212} The court also granted a preliminary injunction barring defendants from enforcing any exclusion order or injunctive relief by the ITC, until the court determined what defendants’ RAND obligations were, and that defendants had complied with them.\textsuperscript{213} Unlike such prior cases as \textit{Apple v. Motorola}, in which the ruling was preliminary or interlocutory,\textsuperscript{214} in \textit{Realtek} the court made a determination on

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\item \textsuperscript{208} \textit{Id.} at *10 (quoting Pappas v. Jack O. A. Nelsen Agency, Inc., 260 N.W.2d 721, 725 (Wis. 1978)); see also \textit{Telefonix, Inc. v. Response Eng’g, Inc.}, No. 12 C 4362, 2012 U.S. Dist. LEXIS 161756, at *12 (N.D. Ill. Nov. 13, 2012) (holding that, contrary to plaintiff’s contentions, “fair” is not “simply too vague a concept to constitute an unambiguous promise.”).
\item \textsuperscript{209} \textit{Apple}, 2011 WL 7324582, at *18.
\item \textsuperscript{210} \textit{Realtek Semiconductor Corp. v. LSI Corp.}, 946 F. Supp. 2d 998, 1008 (N.D. Cal. 2013).
\item \textsuperscript{211} \textit{Id.} at 1006.
\item \textsuperscript{212} \textit{Id.} at 1008.
\item \textsuperscript{213} \textit{Id.} at 1010.
\item \textsuperscript{214} Other courts before \textit{Realtek} also made preliminary rulings denying motions to dismiss in FRAND commitment cases. See, \textit{e.g.}, \textit{Research in Motion Ltd. v. Motorola, Inc.}, 644 F. Supp. 2d 788, 797 (N.D. Tex. 2008), in which RIM argued that Motorola breached contracts it made with IEEE and ETSI to license its SEPs on FRAND terms, and had instead demanded “of RIM terms that are unfair, unreasonable, and, on information and belief, discriminatory.” The court held that RIM was entitled to litigate its breach of contract claim. \textit{ Accord Microsoft Corp. v. Motorola, Inc.}, No. C10–1823 JLR, 2011 U.S. Dist. LEXIS 73827, at *13 (W.D. Wash. June 1, 2011) (holding that Microsoft alleged facts sufficient to state a claim for breach of contract for Motorola’s failure to offer
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the merits that the patentee’s FRAND commitment was a legally binding obligation enforceable by users of the standard involved, that the defendants’ failure to honor the obligation was a breach of contract, and that the plaintiff was entitled to a license on FRAND terms.\textsuperscript{215}

Other possible legal theories applicable here, although courts have not had to rely on them, are acceptance of an offer to make a unilateral contract,\textsuperscript{216} equitable estoppel,\textsuperscript{217} and promissory estoppel.\textsuperscript{218} Ordinarily, the patentee represents (or promises) to the SSO (and its members and the working group for the standard) that it will grant a FRAND license to implementers of the standard if its technology is incorporated into the standard. The SSO and implementers then substantially change their position in detrimental, foreseeable, and reasonable reliance on the representation, by incorporating the technology and designing and marketing standard-compliant products. Courts generally hold that such conduct creates a binding obligation.\textsuperscript{219} These may be sounder legal

licenses on FRAND terms), \textit{aff'd}, 696 F.3d 872, 885 (9th Cir. 2012) (finding existence of bilateral contract where “Motorola made promises to the ITU to license its standard-essential patents worldwide to all comers. In exchange, it received the benefit of having its patents implicated in the standards.”).

\textsuperscript{215} \textit{Realtek}, 946 F. Supp. 2d at 1006, 1008, 1010; \textit{see also} \textit{In re Innovatio IP Ventures, LLC Patent Litig.}, 921 F. Supp. 2d 903, 923 (N.D. Ill. 2013), in which the court held that failure to offer a RAND license promised in an IEEE LOA is a breach of contract: “Innovatio’s predecessors made a contractual promise to Cisco [as an IEEE member] to offer licenses on RAND terms to all users of the relevant IEEE standards. If Innovatio fails to perform that obligation . . . Cisco can sue Innovatio to recover all foreseeable damages it suffers because of that breach.”

\textsuperscript{216} \textit{Cf.} \textit{Restatement of Contracts} ch. 1, § 12 (AM. LAW INST. 1932) (“A unilateral contract is one in which no promisor receives a promise as consideration for his promise.”).

\textsuperscript{217} \textit{SCA Hygiene Prods. Aktiebolag v. First Quality Baby Prods., LLC}, 807 F.3d 1311, 1332 (Fed. Cir. 2015) (en banc) (describing the effect of equitable estoppel as “a license to use the invention that extends throughout the life of the patent”).

\textsuperscript{218} \textit{Cf. Restatement (Second) of Contracts} ch. 4, § 90 (AM. LAW INST. 1979) (“A promise which the promisor should reasonably expect to induce action or forbearance on the part of the promisee or a third person and which does induce such action or forbearance is binding if injustice can be avoided only by enforcement of the promise.”).

\textsuperscript{219} \textit{High Point SARL v. Sprint Nextel Corp.}, 817 F.3d 1325, 1330 (Fed. Cir. 2016) (listing the elements of equitable estoppel); \textit{Law Mathematics & Tech. v.}
theories than bilateral contract, because the SSO does not usually make any return promise in exchange for the patentee’s promise.\textsuperscript{220} The SSO simply performs (if it elects to use the patented technology), thereby accepting a binding offer to make a unilateral contract, or by not performing it does not accept the offer.\textsuperscript{221}

B. FRAND COMMITMENTS FOLLOW PATENT ASSIGNMENTS

A few years ago, there was some question whether an assignee of a SEP on which the assignor had given a FRAND commitment could successfully ignore the commitment. Trolls saw an opportunity to “monetize” SEPs more effectively by “flipping” them into new ownership and then increasing royalties. There should not have been any question, however, because it has long been the law that an assignor can assign only what it owns, and therefore an assignee takes “the assignment of the patent, subject to the legal consequences of [the] previous acts” of the assignor.\textsuperscript{222} It follows that “because the owner of a patent cannot transfer an interest greater than that which it possesses, an assignee takes a patent subject to the legal encumbrances thereon.”\textsuperscript{223} Such legal encumbrances include covenants not to sue and licenses.\textsuperscript{224} Thus, a FRAND-encumbered patent stays so encumbered despite any transfers.

\textsuperscript{220} CF. RESTATEMENT OF CONTRACTS ch. 1, § 12 (AM. LAW INST. 1932) (“A unilateral contract is one in which no promisor receives a promise as consideration for his promise.”).

\textsuperscript{221} CF. RESTATEMENT OF CONTRACTS § 45 (AM. LAW INST. 1932) (“If an offer for a unilateral contract is made, and part of the consideration requested in the offer is given or tendered by the offeree in response thereto, the offeror is bound by a contract . . . .”).

\textsuperscript{222} Worley v. Tobacco Co., 104 U.S. 340, 344 (1881) (citing McClurg v. Kingsland, 42 U.S. (1 How.) 202 (1843)).

\textsuperscript{223} Datatreasury Corp. v. Wells Fargo & Co., 522 F.3d 1368, 1372 (Fed. Cir. 2008).

\textsuperscript{224} V-Formation, Inc. v. Benetton Grp., SpA, No. 02–cv–02259–PSF–CBS, 2006 U.S. Dist. LEXIS 13352, at *18–19 (D. Colo. Mar. 10, 2006) (“Moreover, the license having been given to Benetton by virtue of the covenant not to sue, V-Formation as the subsequent purchaser of the patent would take subject to the outstanding license.”).
In the FTC’s Negotiated Data Solutions case, a scheme (based on assignments) to hold up manufacturers implementing an IEEE 802.3 Ethernet standard led to a prosecution for unfair trade practices. National Semiconductor Corporation (NSC) had participated in standard-setting for the standard, and in 1994 it made a FRAND commitment to the IEEE in a so-called Letter of Assurance (LOA). The LOA provided that, if the IEEE adopted a standard based on NSC’s patented “NWay” technology, NSC would offer to license the technology for a one-time, paid-up royalty of $1,000 per licensee to all manufacturers and sellers of products that use the IEEE standard. The IEEE then incorporated NWay into its 802.3 Ethernet standard, at NSC’s urging, in preference to several alternative technologies. The so-called autonegotiation technique of the patented NWay technology was included in 802.3f and in the subsequent versions of 802.3, so that it was an integral element of the “Fast Ethernet” technology of the standard.

In 1998, NSC went out of the digital business and sold off its digital patents. Subsequently, N-Data, a firm that did not manufacture any products, acquired the patents. N-Data’s business was licensing patents that it acquired from inventors and other previous holders of patents. It then sought to “monetize” the NWay patents (the FTC noted that the term “troll” is sometimes applied to such companies). By then, NWay, with its autonegotiation technique, had become the industry standard technology for fast network interconnection. By 2008, when the FTC suit occurred, the worldwide Ethernet device market was forecast to exceed six

227. Id.
228. See id. at *2, ¶ 14.
229. See id. at *2, ¶ 16.
230. Id. at *4, ¶ 23.
231. Id. at *5, ¶ 33.
233. Id.
million units, and it would have been “expensive and difficult for
the industry to switch to another standard”—a state of affairs
known as “lock-in.”

At that point, N-Data decided it could better monetize its
NWWay patents by demanding royalties far in excess of NSC’s
$1,000-royalty commitment. According to the FTC, because of
the industry-wide lock-in to NWWay, N-Data was able to demand
and levy higher royalties than the industry otherwise would
have paid for the use of the technology. Moreover, by reneging
on the licensing commitment to IEEE, N-Data “was able to
increase the price of an Ethernet technology used by almost
every American consumer who owns a computer.”

Therefore, the FTC charged N-Data with engaging in an unfair method of
competition, in violation of section 5 of the FTC Act. N-Data
settled the suit with the FTC by agreeing to a consent order
prohibiting it from enforcing the NWWay patents unless it had
first offered a paid-up patent license on the terms NSC had
offered in its 1994 LOA to the IEEE.

In one case, the court upheld the actionability of an
antitrust charge that two firms conspired to evade one of the
firms’ RAND commitment and split the proceeds. In the Vizio case, it was alleged that “Thomson and Funai shared a commitment to a common scheme to circumvent Thomson’s FRAND commitment to [an SSO] by agreeing that Funai would collect a second royalty for the same technology, and to share the proceeds of that second royalty between Thomson and Funai,” thus allegedly raising the price of licensing the technology “to supracompetitive levels.” The court found this claim actionable under section 1 of the Sherman Act.

C. CASE LAW ON FRAND ROYALTY DETERMINATION

It has been the law for more than a century that patent infringement damages “must reflect the value attributable to the infringing features of the product, and no more”; the reason is that the infringer has taken, for purposes of assessing compensatory damages, “only the patented technology, and so the value to be measured is only the value of the infringing features of an accused product.” Implementing this fundamental principle of royalty determination has raised many problems. Controversy still surrounds many aspects of determining a FRAND royalty, although determination of what is a reasonable royalty has been a ubiquitous issue in patent infringement cases, long before the current disputes over


241. Id. at *17, *20.

242. Id. at *18–19. The court granted a motion to dismiss a unilateral monopolization claim against the assignee, however, for lack of sufficient market effect. Id. at *12–16.


244. See Jorge L. Contreras & Richard J. Gilbert, A Unified Framework for RAND and Other Reasonable Royalties, 30 BERKELEY TECH. L.J. 1451, 1474 (2015) (“[T]he most common measure of damages in patent cases today, and the exclusive measure of damages for post-judgment infringement (i.e., absent an injunction preventing future infringement), is a ‘reasonable royalty’ attributable to the infringed patent.”); see also Telcordia Techs., Inc. v. Cisco Sys., Inc., 612 F.3d 1365, 1378–79 (Fed. Cir. 2010) (internal quotations and citations omitted) (“Under some circumstances, awarding an ongoing royalty for patent infringement in lieu of an injunction may be appropriate. If the district court determines that a permanent injunction is not warranted, the district court may, and is encouraged, to allow the parties to negotiate a license. The district court may step in to assess a reasonable royalty should the parties fail to come to an agreement.”).
FRAND royalties for SEPs, particularly since the Supreme Court’s decision in the *eBay* case, holding that injunctions against patent infringement are subject to the same, traditional standards as other injunctions, such as showing a likelihood of irreparable injury, thus relegating most patent infringement plaintiffs to reasonable royalty damages relief.

1. The Controversy over Royalty Base

Most products contain multiple components and have both patented and unpatented features. For example, hundreds of components, complying with hundreds of standards, using the technology of hundreds of SEPs, are now found in modern laptop

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245. See, e.g., Dowagiac Mfg. Co. v. Minn. Moline Plow Co., 235 U.S. 641, 648 (1915) (“[T]here was no established royalty. In that situation it was permissible to show the value [of what was taken] by proving what would have been a reasonable royalty, considering the nature of the invention, its utility and advantages, and the extent of the use involved.”); Hunt Bros. Fruit-Packing Co. v. Cassiday, 64 F. 585, 587 (9th Cir. 1894) (“[I]n the absence of [other probative evidence], the only measure of damages was such sum as, under all the circumstances, would have been a reasonable royalty for the defendant to have paid.”); see also text supra note 13.

246. The Supreme Court, in *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006), held that injunctions are not the presumptive norm in patent cases, and when granted must be based on four traditional factors. *Id.* at 393–94. In addition, the Federal Circuit has held that a showing of some “causal nexus” between the infringement and the alleged harm to the patentee must be made as part of the showing of irreparable harm, because infringement does not harm a patentee if consumers buy that product mainly for reasons other than the patented feature. See *Apple Inc. v. Samsung Elecs. Co.*, 809 F.3d 633, 640, 641–42 & n.1 (Fed. Cir. 2015); *Apple Inc. v. Samsung Elecs. Co.*, 735 F.3d 1352, 1364 (Fed. Cir. 2013); *Apple Inc. v. Samsung Elecs. Co.*, 695 F.3d 1370, 1375 (Fed. Cir. 2012); *Apple Inc. v. Samsung Elecs. Co.*, 678 F.3d 1314, 1324 (Fed. Cir. 2012). These principles have made it difficult for patentees to obtain injunctions, and therefore they tend to make judgments of reasonable-royalty damages the norm.
computers and smartphones. This makes it necessary to determine the value contributed to the product by each component or feature and then to “apportion . . . the patentee’s damages between the patented feature and the unpatented features.” That apportionment can, at least in theory, be accomplished in any of three ways: (1) by making the royalty base the smallest saleable patent-practicing unit, (2) by adjusting the royalty rate to a small enough percentage of downstream end-product selling price, or (3) by a sliding-scale combination between those two.

247. A 2010 empirical study, Brad Biddle et al., How Many Standards in a Laptop? (And Other Empirical Questions), ITU-T KALEIDOSCOPE CONFERENCE (2010), https://papers.ssrn.com/sol3/papers.cfm?abstract-id=1619440, concluded that “a modern laptop embodies or utilizes at least 251 interoperability standards, but the actual number is certainly much higher (the authors would be unsurprised by a total number of 500 or more).” They also found that 75% of the standards were subject to RAND requirements, 22% were royalty-free; and 3% were in royalty-bearing patent pools. One might speculate that if each of 75% of 251 RAND standards were allocated a royalty of 1% of sales price, to be divided among the various SEPs incorporated into the standard, the total royalty on the laptop (excluding the royalty-free patents and the pools) would be 188% of its sales price. If each patent of each standard were entitled to, say, 1%, the total royalty would “stack” to an astronomical value.

248. A 2014 study, Ann Armstrong et al., The Smartphone Royalty Stack: Surveying Royalty Demands for the Components Within Modern Smartphones 2–4, 68 (May 29, 2014) (unpublished manuscript), https://www.wilmerhale.com/uploadedFiles/Shared_Content/Editorial/Publications/Documents/The-Smartphone-Royalty-Stack-Armstrong-Mueller-Syrett.pdf, finds that royalties are $121 to $124 for smartphones using either Microsoft Windows Phone or Android or some other open source operating system, the cost of components for which is $120 to $150, and the selling price is approximately $400. The authors also find average cost of the baseband processor that implements cellular functionality is $10 to $13, and announced royalty demands for LTE cellular functionality approximate $60 for a $400 smartphone. The authors state that they “estimate potential patent royalties in excess of $120 on a hypothetical $400 smartphone—which is almost equal to the cost of device’s components.” Id. at 2.

249. Garretson v. Clark, 111 U.S. 120, 121 (1884).

250. See Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1225–27 (calculation of a reasonable royalty can in principle be accomplished “in various ways—by careful selection of the royalty base to reflect the value added by the patented feature, where that differentiation is possible; by adjustment of the royalty rate so as to discount the value of a product’s non-patented features; or by a combination thereof”). The court allowed that “an appropriately apportioned royalty award could . . . be fashioned by starting with the entire market value of a multi-component product” and then “dramatically reducing the royalty rate to be applied,” but it warned that doing this might mislead a
The second and third approaches theorize that the product of royalty and royalty base will remain approximately constant to produce a reasonable royalty remaining the same despite the reciprocal change in the two factors. This is not a realistic theory, but some earlier cases seem to have endorsed it. In the *Lucent* case, the court said:

Simply put, the base used in a running royalty calculation can always be the value of the entire commercial embodiment, as long as the magnitude of the rate is within an acceptable range (as determined by the evidence). Indeed, “[a]ll running royalties have at least two variables: the royalty base and the royalty rate” . . . . There is nothing inherently wrong with using the market value of the entire product, especially when there is no established market value for the infringing component or feature, so long as the multiplier accounts for the proportion of the base represented by the infringing component or feature.

Some lower court decisions followed or even expanded on the concept of a sliding-scale royalty rate/royalty base tradeoff,

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lay jury that “may be less equipped to understand” the difficulties in reaching a proper result. *Id.* at 1227.

251. A skeptic might ask why spokesmen for SEP owners contest this issue so strongly if the end-point is the same no matter how one starts out. See Joseph Kattan, *The Next FRAND Battle: Why the Royalty Base Matters*, CPI ANTITRUST CHRONICLE, Mar. 2015, at 3, 12, https://www.competitionpolicyinternational.com/assets/Uploads/KattanMar-151.pdf (“The revealed preferences of market participants suggest that the royalty base does matter. SEP holders with patent monetization businesses consistently seek to base royalties (and justify royalty levels) for SEPs that read at the component level on the price of the complete systems that incorporate those components. By contrast, standard implementers consistently advocate the use of component prices as the royalty base. . . . The insistence of companies with large patent monetization businesses on basing SEP royalties on the price of complete systems confirms that the royalty base matters. Given the existence of transaction cost inefficiencies in licensing only complete systems and not standard-practicing components, the conclusion that the royalty base affects the royalty amount is unavoidable.”). See also the statement by Ericsson official Tomas Dannelind: “One big advantage with this strategy [downstream royalty base] is also that it is likely that the royalty income will be higher since we calculate the royalty on a more expensive product.” Florian Mueller, *Ericsson Explained Publicly Why It Collects Patent Royalties from Device (Not Chipset) Makers*, FOSS PATENTS (Jun. 29, 2014, 9:02 AM), http://www.fosspatents.com/2014/01/ericsson-explained-publicly-why-its.html#.VRxVb6KlyxM.mailto (quoting Dannelind).

permitting the royalty base factor to be the market price for the finished product. 253

Several factors have been said to make the first (smallest saleable patent-practicing unit) approach more reliable than those using the sliding scale. One is that a jury (or judge) in a patent infringement damages suit may not be able to correctly apportion the value of the patented invention if it considers testimony about the defendant’s entire sales revenue on the finished product. 254 A second, perhaps related, reason is that, when the royalty base is the price of a multi-component product, there is an undue risk of compensating the patent holder for noninfringing components of the product. 255 Another reason is that there is inherently a greater risk of error in calculating, when using a higher of several possible royalty bases, 256 because of inevitable arithmetic errors in making the necessary

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253. In Carnegie Mellon University v. Marvell Technology Group, Civil No. 09–290, 2012 U.S. Dist. LEXIS 120558, at *12 (W.D. Pa. Aug. 24, 2012), and PACT XPP Technologies, AG v. Xilinx, Inc., Case No. 2:07–CV–563–RSP, 2012 U.S. Dist. LEXIS 66436, at *8 (E.D. Tex. May 11, 2012), the courts ruled that it is permissible to start by estimating a reasonable royalty with the sales price of the whole product as a royalty base and then correcting downwards, because “an apportionment analysis needs to start somewhere.” Carnegie Mellon Univ., 2012 U.S. Dist. LEXIS 120558, at *12. In Fractus, S.A. v. Samsung Electronics Co., 876 F. Supp. 2d 802, 834–35 (E.D. Tex. 2012), the court similarly allowed use of evidence of the average overall selling price of the accused cell phone as a starting point for an apportionment analysis. Even more recently, the court in Wisconsin Alumni Research Foundation v. Apple, Inc., 135 F. Supp. 3d 865, 870 (W.D. Wis. 2015), allowed the patentee’s expert “to rely as an initial step in her analysis on the $100 price premium of the accused iPhone 5s over the unaccused iPhone 5c,” but “only as a starting point.” 254. See Ericsson, 773 F.3d at 1226–27 (“[C]are must be taken to avoid misleading the jury by placing undue emphasis on the value of the entire product. . . . reliance on the entire market value might mislead the jury, who may be less equipped to understand the extent to which the royalty rate would need to do the work in such instances.”).

255. Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc. (CSIRO), 809 F.3d 1295, 1302 (Fed. Cir. 2015) (“[W]here small elements of multi-component products are accused of infringement, calculating a royalty on the entire product carries a considerable risk that the patentee will be improperly compensated for non-infringing components of that product.”) (quoting LaserDynamics Inc. v. Quanta Comupt., Inc., 694 F.3d 51, 67 (Fed. Cir. 2012))

computations. A possible fourth reason is that by moving the royalty base farther downstream toward the finished product, thereby commingling many technologies embodied in many other patents, contributing many different functionalities to the aggregate functionality of the end product, it becomes harder to separate the ex-ante value of the relevant SEP from its ex-post value—the value of standardization that is embodied in the final standard-compliant product. Courts began to recognize, around the beginning of the current decade, that it seriously skews the royalty calculation and tends prejudicially to mislead a jury when an inflated royalty base is used. In the Uniloc case, the Federal Circuit observed that “[t]he disclosure that a company has made $19 billion dollars [sic] in revenue from an infringing product cannot help but skew the damages horizon for the jury, regardless of the contribution of the patented component to this revenue.” The Federal Circuit agreed with the trial court’s observation that—“[t]he $19 billion cat was never put back into the bag even by Microsoft’s cross-examination”—and it held that sound precedent did not allow use of the selling price of the end product as a starting point “for minor patent improvements simply by asserting a low enough royalty rate.”

257. For example, consider two ways to measure a multiple $a$ of the difference between two quantities $b$ and $c$ (e.g., by amplifying analog voltage): (1) $ab-a'c$ and (2) $a(b-c)$, where $a$ is supposed to equal $a'$ in an ideal world. The larger the multiple, the greater the probability of error in the first approach. Similarly, in the case of a $500 cell phone that includes a $5 chip, a 5% royalty on the chip is 25 cents and so too is a 0.05% royalty on the cell phone. But the likelihood of getting a jury (or judge) to estimate the second royalty rate at 0.05% rather than, say, 0.06% or 0.04%, or even 0.01% or 0.1%, is poor, and the cash value of the error is multiplied greatly by starting out with an inflated royalty base (error percentage is most likely equiprobable, however one approaches the issue, yet, a 10% error on $500 is $50, a 10% error on $5 is $0.50). Thus, the price of a cell phone clearly reflects, in substantial part, the value of its interoperability, which is a product of standardization and thus ex-post rather than ex-ante. It also reflects the value of extraneous functionalities such as the camera, touchscreen, and amount of memory storage.

258. Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292 (Fed. Cir. 2011).
259. Id. at 1320.
260. Id.
Other courts have widely quoted and followed the not-putting-the-cat-back-into-the-bag warning of the *Uniloc* case. In the *LaserDynamics* case, the Federal Circuit warned:

[N]either cross-examination nor a curative jury instruction could have offset the resulting unfair prejudice[]. Admission of such overall revenues, which have no demonstrated correlation to the value of the patented feature alone, only serve to make a patentee’s proffered damages amount appear modest by comparison, and to artificially inflate the jury’s damages calculation beyond that which is “adequate to compensate for the infringement.”

In that case, the patentee argued that the defendant did not sell any smaller salable patent-practicing unit than a laptop computer, so that the parties would have to use the value of the entire laptop computer as the royalty base, for want of anything else. The court replied that the patentee could have tried to determine an appropriate lump-sum royalty, and in any case the same difficulties in identifying the value that the patented component contributed to the laptop computer would exist “when it comes time to then apportion a royalty rate that accounts for the . . . contribution only[.]” Accordingly, “the exceedingly difficult and error-prone task of discerning the [smallest saleable patent-practicing unit’s] value relative to all other components in the laptop remains.”

The Federal Circuit’s 2015 *CSIRO* decision sums up several justifications for using the smallest salable patent-practicing unit approach for determining SEP royalty base, at least when there is no strong reason for another approach (such as when the technology of the relevant patent is so important in driving consumer demand for the product that it creates the entire value for the product). First, the considerable risk of error in rate

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263. *Id.* at 69.
264. *Id.* at 70.
265. *Id.*. Lower courts have also followed the principle of the cat and bag. See, e.g., Wis. Alumni Research Found. v. Apple, Inc., 135 F. Supp. 3d 865, 870 (W.D. Wis. 2015) (“Given the scale of Apple’s total revenues or total profits (or even just those revenues and profits from the accused iPhones and iPads), Apple’s concern of prejudice is, if anything, magnitudes greater than Microsoft [in *Uniloc*].”).
determination might result in a considerable overpayment.\footnote{Id. at 1302.} Consider a hypothetical case: a 0.1% royalty on a $5 signal-processing chip used to control the brakes in a car may seem a modest, reasonable royalty; but if even a fraction of that royalty rate is applied to the selling price of a $40,000 car, the resulting royalty becomes grotesque—a considerable multiple of the price of the chip itself. Second, “disclosure of the end product’s total revenue ‘cannot help but skew the damages horizon for the jury, regardless of the contribution of the patented component to this revenue.’”\footnote{Id.; see also LaserDynamics, Inc. v. Quanta Comput., Inc., 694 F.3d 51, 67–68 (Fed. Cir. 2012). In the LaserDynamics case, the patentee sought a 2% royalty on the price of an entire notebook computer, for a single patent that covered a method for identifying the type of optical disc inserted into a disc drive of the computer. LaserDynamics, 694 F.3d, at 67–68. The Federal Circuit rejected the royalty demand, instructing that “in any case involving multi-component products, patentees may not calculate damages based on sales of the entire product, as opposed to the smallest salable patent-practicing unit, without showing that the demand for the entire product is attributable to the patented feature.” Id. The court stated that “it is generally required that royalties be based not on the entire product, but instead on the ‘smallest salable patent-practicing unit.’” Id. at 67.} Using a downstream SEP royalty base, as is challenged in the present FTC and Apple cases against Qualcomm, rather than a royalty base of the smallest saleable patent-practicing unit, is likely to lead to gouging manufacturers implementing the standard, and that overcharge is likely to be passed on to the public that buys the standardized product.

The Federal Circuit concluded, therefore, that for a reasonable royalty to measure, as it must, only the value of the patented invention:

\begin{quote}
This value—the value of the technology—is distinct from any value that artificially accrues to the patent due to the standard’s adoption. Without this rule, patentees would receive all of the benefit created by standardization—benefit that would otherwise flow to consumers and businesses practicing the standard. We therefore reaffirm that reasonable royalties for SEPs generally—and not only those subject to a RAND commitment—must not include any value flowing to the patent from the standard’s adoption.\footnote{CSIRO, 809 F.3d at 1305.}
\end{quote}

The \textit{CSIRO} opinion thus emphasizes the interrelation of several factors that characterize current reasonable-royalty
jurisprudence in the Federal Circuit: a reasonable royalty should compensate only for the value of the invention; it should not compensate SEP holders for the value that standardization creates. Moreover, the policy of the patent system, that compensation for the use of patented technology should be based only on the value of the technology used, not on “any value flowing to the patent from the standard’s adoption.”


271. CSIRO, 809 F.3d at 1305. In so ruling, the Federal Circuit did not elaborate on what it meant by “value flowing to the patent from the standard’s adoption.” Id. Clearly, the court at a minimum meant the value resulting from the exclusionary effect of standardization, i.e., the surge in value resulting from having the user at the mercy of the SEP owner. See Apple, Inc. v. Motorola, Inc., 869 F. Supp. 2d 901, 913 (N.D. Ill. 2012), modified on other grounds, 757 F.3d 1286 (Fed. Cir. 2014) (“Once a patent becomes essential to a standard, the patentee’s bargaining power surges because a prospective licensee has no alternative to licensing the patent; he is at the patentee’s mercy.”). It may be argued that the CSIRO court did not intend also to include in the “value flowing to the patent from the standard’s adoption” the value of network effects and interoperability. CSIRO, 809 F.3d at 1305. The court does not seem to consider explicitly any such distinction in standardization value relevant to the court’s public policy analysis. Id. Most commentary accepts that the Federal Circuit does not disaggregate ex-post monopoly surge and network effect surge in SEP value. J. Gregory Sidak, Apportionment, FRAND Royalties, and Comparable Licenses After Ericsson v. D-Link, 2016 U. ILL. L. REV. 1809, 1832 (2016).

Some commentators perceive a relevant distinction, however. See, e.g., Siebrasse & Cotter, supra note 35, at 1174–90 (2017). Sidak, while referring to the very similar language in the Ericsson case, 773 F.3d at 1233 (“The patent holder should only be compensated for the approximate incremental benefit derived from his invention. . . . The royalty for SEPs should reflect the approximate value of that technological contribution, not the value of its widespread adoption due to standardization.”), fervently states a hope that in some way that language will not be “interpreted to mean that one should exclude from a FRAND royalty any and all of the standard’s value.” Sidak, supra, at 1869. Like Sidak, Siebrasse and Cotter also hope for a new interpretation of what they say the court might have meant in Ericsson and CSIRO: “To the extent the Ericsson court did mean that the patentee is not entitled to appropriate any of the value of the standard, this holding is inconsistent with our theory. We therefore urge the Federal Circuit to distance itself from this interpretation in the future.” Siebrasse & Cotter, supra note 35, at 1228.

By now, however, even those commentators who deplore Ericsson and CSIRO’s absolute rejection of ex-post royalty determination and those cases’
accomplished by selecting a royalty base as close as possible to
the object embodying just that patented technology, which is
usually the smallest saleable patent-practicing unit.272

2. Non-Discrimination

Still another consideration relevant for RAND
determination is raised in Apple’s complaint in its case against
Qualcomm—the ND in RAND. The sales price at Walmart for a
16 GB Kyocera 4G LTE smartphone is less than $100, while a
256GB iPhone 7 Plus sells for nearly $1000.273 Even though both
4G LTE smartphones use 4G LTE technology that Qualcomm’s
SEPs cover, the use of a royalty based on selling price results in
a ten-fold discrepancy in dollar royalty—which, Apple argues, is
inconsistent with the FRAND obligation of non-discriminatory
terms, since the difference in royalties is not related to the
patented technology but rather to other features of the

insistence on excluding all values of standardization, including network value,
from the reasonable-royalty calculation, have come to realize that such is what
the Federal Circuit holds. It and lower courts make no distinctions and consider
the value of standardization to include all components of the surplus in ex-post
values. Thus, for example, Siebrasse and Cotter say that “we reject the common
type that the patentee should be confined to the value of its technology prior to
standardization and argue instead that the patentee should be able to capture
some portion of the invention’s increase in value attributable to network effects,
as revealed ex post.” Siebrasse & Cotter, supra note 35, at 1169 (emphasis
added). It therefore appears proper to read the two cases as holding that a
reasonable royalty for a SEP should not include the network value that
standardization generated.

272. The CSIRO court held, however, that an absolute rule that all damages
calculations must always begin with the smallest saleable patent-practicing
unit is “untenable.” 809 F.3d at 1303. It is permissible, also, to rely on royalty
rates of sufficiently comparable licenses, in appropriate cases. Id. The court said
that “there may be more than one reliable method for estimating a reasonable
royalty.” Id. at 1301. For example, when the parties are negotiating for a specific
per unit rate (say, x cents per product), rather than a rate that is a percentage
of a royalty base (say, x% of a sales price of a product), a reasonable royalty
may be determined without reference to the smallest saleable patent-practicing unit.
Id. at 1302–03.

273. Kyocera DuraForce E6560 16GB Unlocked GSM 4G LTE Military
Grade Smartphone w/ 8MP Camera - Black, WALMART (last visited Sept. 23,
-GSM-4G-LTE-Military-Grade-Smartphone-w-8MP-Camera-Black/117746885;
Apple iPhone 7 Plus 256GB Unlocked GSM/CDMA Quad-Core Phone w/ Dual
www.walmart.com/ip/Apple-iPhone-7-Plus-256GB-Unlocked-GSM-CDMA-
Quad-Core-Phone-w-Dual-Rear-12MP-Camera-Black/107542495.
products. Apple also explains that it sells different smartphones at prices ranging from $200 to $1000, but containing similar or the same Qualcomm chipsets, so that the different Apple “devices provide exactly the same standardized cellular functionality,” yet command substantially different royalties because of different memory chips and other features unrelated to the SEPs or patented chipsets. This state of affairs may appear to provide a strong argument in favor of the smallest saleable patent-practicing unit principle.

3. Multiple Patents on Same Component

Court rulings support determining SEP royalties, not only according to the principle of the smallest saleable patent practicing unit, but according to a further principle to be used when other SEPs contribute to the value of the functionality that the relevant smallest saleable patent-practicing unit provides. This principle is that a disproportionate share of the total reasonable royalty should not go to only one patent out of many covering the smallest saleable patent-practicing unit, because the guiding principle in determining reasonable royalty is “what portion of the value of that product is attributable to the patented technology.” When multiple patents cover a component, even if the component is a smallest saleable patent-practicing unit, the total reasonable royalty on that smallest saleable patent-practicing unit should be allocated among these patents in accordance with their respective technological contributions.

274 Apple Complaint, supra note 12, at 37.
275 Id. at 50. Qualcomm has a response to this, discussed at text accompanying infra note 398.
276 VirnetX, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1327 (Fed. Cir. 2014); see Garretson v. Clark, 111 U.S. 120, 121 (1884) (repeating the statement of the lower court that damages can only be calculated based on the value of a final product when a patent holder can show “that the entire value of the whole machine, as a marketable article, is properly and legally attributable to the patented feature”).
277 A proper apportionment in such a case takes into account all of the relevant patents covering a unit (component) within a device. This can be a difficult task when many patents, essential or non-essential, cover the unit. It has been estimated that 250,000 active US patents cover portions of a smartphone. RPX Corp., Registration Statement 59 (Form S-1), SEC.GOV (Sept. 2, 2011), http://www.sec.gov/Archives/edgar/data/1509432
Consider an example that an IEEE tutorial on reasonable royalties provides: a circuit board or sub-assembly with functionality for IEEE Standard 1284, RS-232, and USB port connections, where the SEP whose reasonable royalty is in question relates only to the circuit board’s IEEE 1284 port function.\textsuperscript{278} It would be wrong to base a reasonable royalty for that SEP on the total value of all three distinct connectivity functions of the circuit board. Instead, the reasonable royalty for the SEP on IEEE 1284 should be based on the value of only that SEP’s contribution to the circuit board’s functionality—and not based on the value of the RS-232, USB, or other functionalities of the circuit board. The reasonable royalties for the various relevant patents should be allocated among all of those patents in accordance with the respective values of the functionalities they contribute and the share of that functionality that the individual patent contributes (when several patents contribute to a single function). As the IEEE states, “The values of the various Essential Patent Claims may vary; some, for example, may have higher value because they cover important functionality, while others may have a lower value because they address less important functionality.”\textsuperscript{279} Finally, it should be recognized that a risk of over-compensation occurs unless the value of relevant unpatented technology is considered as well.

4. Determining Royalty When the Smallest Saleable Patent-Practicing Unit Is Quite Large

Similar issues arise when the only product actually marketed is far downstream from the part of the system that the SEP concerns. When that occurs, resort to the smallest saleable patent-practicing unit principle may suggest an unduly inflated royalty base. That issue came up in the 2014 \textit{VirnetX} case, involving a feature in iPhones and Macs that was not separately marketed, so that there existed no smaller saleable patent-practicing unit than the whole iPhones and Macs.\textsuperscript{280} The trial


\textsuperscript{279} \textit{Id.} at 15.

\textsuperscript{280} \textit{VirnetX}, 767 F.3d at 1327–28.
court instructed the jury that it could base damages on the value of an end-product (such as the iPhone) if it was a smallest saleable patent-practicing unit, that is, “the smallest salable unit containing the patented feature.”

On appeal, the Federal Circuit said this was wrong:

The instruction mistakenly suggests that when the smallest salable unit is used as the royalty base, there is necessarily no further constraint on the selection of the base. That is wrong. For one thing, the fundamental concern about skewing the damages horizon—of using a base that misleadingly suggests an inappropriate range—does not disappear simply because the smallest salable unit is used. . . . In other words, the requirement that a patentee identify damages associated with the smallest salable patent-practicing unit is simply a step toward meeting the requirement of apportionment.

Accordingly, “[w]here the smallest salable unit is, in fact, a multi-component product containing several non-infringing features with no relation to the patented feature,” as it was in the case of the iPhones and Macs, a more detailed analysis is needed. The court said that this meant that “a reasonable royalty analysis requires a court to . . . carefully tie proof of damages to the claimed invention’s footprint in the market place.” The Federal Circuit recognized that the footprint might be hard to detect, stating that “we are cognizant of the difficulty that patentees may face in assigning value to a feature that may not have ever been individually sold.” For that reason, “[the Federal Circuit has] never required absolute precision in this task; on the contrary, it is well-understood that this process may involve some degree of approximation and uncertainty.”

281. Id. at 1327.
282. Id.
283. Id.
284. Id. (quoting ResQNet.com, Inc. v. Lansa, Inc., 594 F.3d 860, 869 (Fed. Cir. 2010)) (omission in original).
285. Id. at 1328.
286. Id. In the same vein, the Federal Circuit instructed that a “realistic starting point for the royalty calculations by juries” is “often, the smallest salable unit and, at times, even less.” Ericsson Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1227 (Fed. Cir. 2014) (citing VirnetX, 767 F.3d at 1327–28); see also LaserDynamics, Inc. v. Quanta Comput., Inc., 694 F.3d 51, 68 (Fed. Cir. 2012) (rejecting the use of an entire laptop computer’s value as the basis for calculating royalties where the patent at issue related to optical disc drives).
5. Gaming the System by Adroit Claim Drafting

In theory, one could game the system by adroitly manipulating the patent-practicing unit to expand it. The Federal Circuit’s analyses thus far have concerned necessary reliance on the smallest saleable patent-practicing unit, not on the smallest patent-practicing unit, i.e., that which is claimed in the patent. Under a quirk of current US patent law—contrary to some Supreme Court precedent from about 80 years ago, the *Lincoln Engineering* case—\(^{287}\) it is currently possible to write a valid patent (assuming lack of obviousness) claiming the invention of a novel windshield wiper as “an automobile having a windshield, said windshield having a windshield wiper of such and such a kind, sliddingly located thereon.”\(^{288}\) The theory of the Federal Circuit is that if one can have a patent on \(X\), it only adds further narrowing limitations to the claimed invention to claim \(X+Y\). The latter claim is narrower because device \(X+Y\) necessarily infringes a patent on device \(X\).\(^{289}\) Therefore, the

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287. *Lincoln Eng’g. Co. v. Stewart-Warner Corp.*, 303 U.S. 545, 549–50 (1938) (“[T]he improvement of one part of an old combination gives no right to claim that improvement in combination with other old parts which perform no new function in the combination”). In that case, the Court invalidated a patent claim to a combination of an old grease gun with a novel nozzle tip coupling device.


289. *In re Bernhart*, 417 F.2d 1395, 1402 (C.C.P.A. 1969) (“Such statements in *Lincoln Engineering* are indeed puzzling in view of the fact that the addition
latter claim must be patentable, even though \( X \) interacts with \( Y \) in a conventional or even trivial way.\(^{290}\)

Therefore, the smallest patent-practicing unit for the suggested windshield-wiper-cum-car claim is the whole automobile. A $295,000 Rolls Royce Ghost (the price for the “entry-level” model) embodying the patented combination would be an infringing automobile.\(^{291}\) A modest-seeming 0.1% royalty on the invention would be $250; not a bad inventive reward for conceiving a novel means for wiping windshields.\(^{292}\) By the same token, one might claim a smartphone comprising such and such parts in combination with a novel baseband processor chipset. The smallest patent-practicing unit would be the claimed smartphone, which might sell for $1000. It probably would be prudent not to sell the chipset as such, because that would highlight the anomaly too defiantly.

Would this work? It should work in the Federal Circuit, at least at the panel level, since clear Federal Circuit precedent (Radio Steel and Bernhart) authorizes (or even commands) it. It might even pass muster before the Federal Circuit en banc.\(^{293}\)

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\(^{290}\) Id. Bernhart’s analysis wrongly assumes that what is true for infringement and anticipation analysis, see Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 344 (1961) (“If anything is settled in the patent law, it is that the combination patent covers only the totality of the elements in the claim, and that no element, separately viewed, is within the grant.”), is equally true for all patentability analysis. That is not so, for the courts adopt an “inventive concept” or “essential features of the invention” approach for other issues such as patent eligibility and exhaustion. See Alice Corp. v. CLS Bank Intl, 134 S. Ct. 2347, 2355 (2014); Quanta Comput., Inc. v. LG Elecs., Inc., 553 U.S. 617, 627 (2008); United States v. Univis Lens Co., 316 U.S. 241, 251 (1942).


\(^{292}\) In point of fact, such a 0.1% royalty (rather than, for example, 0.001% or 0.0001%) is not modest at all, considering the minimal technological contribution of the windshield wiper to the whole Rolls-Royce. But many judges and juries, for the reasons the Federal Circuit has given in the Uniloc case, are unable to recognize that. See Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1312, 1321 (Fed. Cir. 2011) (discussing first the default twenty-five percent rule, its history of use, and its potential overestimation of the value of component patents in rejecting use of the rule, and discussing excessive damages generally).

\(^{293}\) The Federal Circuit and its predecessor court have been more inclined to follow their own precedents than the Supreme Court’s. See Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124, 136 (Breyer, J., dissenting)
Yet, this conflicts in spirit with the trend of Uniloc, LaserDynamics, Ericsson, VirnetX, and CSIRO. Something along this line came up in a recent district court decision that was not appealed on this point: the GPNE case.²⁹⁴ In that case, the patentee GPNE asserted a claim to a “node in a data network,” which GPNE argued was an iPhone or an iPad, where the node as claimed comprised a RAM plus an interface plus a baseband processor chipset, all interconnected in a particular way.²⁹⁵ Apparently (this is unclear, however), the elements were interconnected so that they cooperated with one another conventionally, that is, they functioned as such elements ordinarily function together, as in the Lincoln Engineering case.²⁹⁶

The claim was clearly directed to a device larger than, and including, the baseband processor chipset—it was at least arguably directed to a cell phone. The “node” (or cell phone) was indisputably the smallest patent-practicing unit. It is a firm, indeed bedrock, principle of patent law that the patent claim—the specific wording of the claim—defines the invention: “The claim is the measure of the grant.”²⁹⁷ Nonetheless, the court summarily dismissed GPNC’s argument without citation of cases, other than several saying (unexceptionably) that those

²⁹⁶. Universal Oil Prods. Co. v. Globe Oil & Ref. Co., 322 U.S. 471, 484 (1944); Smith v. Snow, 294 U.S. 1, 11 (1935) (“[T]he claims of the patent, not its specifications, measure the invention.”); In re Bernhart, 417 F.2d 1395, 1396 (C.C.P.A. 1969) (“In order to know what the invention is we must, of course, look to the claims which point it out.”); see also Apple Inc. v. Motorola, Inc., 757 F.3d 1286, 1298 (Fed. Cir. 2014); In re Hiniker Co., 150 F.3d 1362, 1369 (Fed. Cir. 1998) (quoting Giles S. Rich, Extent of Protection and Interpretation of Claims—American Perspectives, 21 INT’L REV. INDUS. PROP. & COPYRIGHT L. 497, 499 (1990)) (“The name of the game is the claim.”).

²⁹⁷. Compare Lexmark Int’l, Inc. v. Impression Prods., Inc., 816 F.3d 721 (Fed. Cir. 2016) (en banc), rev’d, 137 S. Ct. 1523 (2017), with Quanta Comput., Inc. v. LG Elecs., Inc., 553 U.S. 617 (2008); compare Parker v. Flook, 437 U.S. 584 (1978), with In re Bergy, 596 F.2d 952, 967 (C.C.P.A. 1979) (“To conclude on the light Flook sheds on these cases, very simply, for the reasons we have stated, we find none.”).
“legal outcomes should not ‘depend simply on the draftsman’s art.’”298 The district court explained its ruling on pure policy

298. GPNE Corp., 2014 WL 1494247, at *13 (citing Mayo Collaborative Servs. v. Prometheus Labs., Inc., 566 U.S. 66, 72 (2012); Flook, 437 U.S. at 593). These are patent-eligibility cases, however, not royalty-determination cases.

Another court stated a similar view, in less detail, in Emerson Elec. Co. v. Suzhou Clea Elec. Applience Co., 4:13CV1043SPM, 2015 WL 8916113, at *1 (E.D. Mo. Dec. 15, 2015). Claim 1 of the infringed patent (U.S. Pat. No. 5,934,165) covered a “caster foot assembly” with a particular configuration. Id. at *3. Other claims covered an appliance (such as a wet/dry vacuum cleaner) including as claim elements the foregoing caster foot assembly combined with other conventional elements of a vacuum cleaner such as a drum and various posts. Id. The patentee argued that the royalty base could therefore properly be the price of the defendant’s whole vacuum cleaner. Id. The magistrate judge rejected the argument, despite the claim language, asserting among other things that the caster foot assembly was patented but the other claimed elements in the combination claims were not (that is simply wrong as a matter of patent law, because what is patented is the combination of all the claim elements), and asserting that “adopting Plaintiff’s reasoning would effectively allow patentees to circumvent the rules of apportionment through artful drafting.” Id. at *5 (citing GPNE). While that last assertion is correct, the fault is that of the law, not the plaintiff’s reasoning.

Golden Bridge Tech. v. Apple Inc., 5:12–cv–04882–PSG, 2014 WL 2194501 (N.D. Cal. May 18, 2014), is similar. The magistrate simply misunderstood the patent. The patent’s independent claims claimed a system (or apparatus) comprising a processor and such other conventional elements as a transmitter, various filters, and other electronic parts. See generally Golden Bridge Tech. v. Apple Inc., 5:12–cv–04882–PSG, 2014 WL 7227282 (N.D. Cal. Dec. 18, 2014) (construing the patent claims). The processor interacted with the other elements in an apparently novel way, but the novel functionality allegedly was carried out only in the processor. Id. at *5–6. Therefore, the magistrate rejected use of the entire claimed subject matter as the royalty base. Id. Again, perhaps a right result from a public policy standpoint, but arrived at in an unprincipled manner. The magistrate did not distinguish the smallest saleable unit (the baseband processor) from the smallest patent-practicing unit (what the claim claimed—a system). If the processor indeed cooperated in a novel, unobvious manner with the other elements of the claimed system, rather than in a conventional manner, arguably the invention was the whole system. Cf. Alice Corp. v. CLS Bank Int’l, 134 S. Ct. 2347, 2359 (2014) (patent invalid because “[i]n short, each step does no more than require a generic computer to perform generic computer functions.”); Anderson’s-Black Rock, Inc. v. Pavement Salvage Co., 396 U.S. 57, 60–61 (1969) (“The combination of putting the burner together with the other elements in one machine, though perhaps a matter of great convenience, did not produce a ‘new or different function,’ [citing Lincoln Engineering] within the test of validity of combination patents. A combination of elements may result in an effect greater than the sum of the several effects taken separately. No such synergistic result is argued here.”). It is unclear what the magistrate meant in saying that the action was all in the processor. Golden Bridge Tech., 2014 WL 2194501, at *5. The filters, for example, were not
grounds, in a series of what purport to be logical inferences but are non sequiturs:

This cursory recitation of the entire device in the asserted claims does not foreclose the component that directly implements the invention from being the smallest salable patent-practicing unit for reasonable royalty purposes. Neither party contests that the patent’s contribution to the art is a signaling technique performed by the baseband processor . . . . Accordingly, the Court will not disregard the policy behind the smallest salable patent-practicing unit doctrine based on GPNE’s assertion that the invention is the entire device. Adopting GPNE’s reasoning would allow patent drafters to effectively abolish the smallest salable patent-practicing unit doctrine by simply drafting patent claims to cover end products rather than the individual components that actually embody the invention. 299

The court added, “Therefore, GPNE may not claim the entire accused iPhones and iPads as the smallest salable patent-practicing units for damages purposes solely because GPNE claimed a ‘node’ having a processor that can perform the invented signaling steps rather than just the processor itself.” 300 The court is saying, in effect, “never mind what the patent claim says, the invention is carried out by the baseband processor chipset.” The court then concluded, ipse dixit, “the Court holds as a matter of law that in this case, the baseband processor is the proper smallest salable patent-practicing unit.” 301 In doing so, the court reached a sound result, from a policy standpoint, but it did so in a not principled, very high-handed manner, and in one perhaps in excess of a district court’s authority to ignore appellate precedent, albeit wrong-minded precedent.

It would have been instructive to have seen how the Federal Circuit would have addressed an appeal of this aspect of the GPNE ruling. In contrast to the Supreme Court, the Federal Circuit considers the “draftsman’s art” entitled to great deference, and the legal outcome often depends on it. 302 It would

decorative potted plants. The proper question was whether the claim elements cooperated in a new and unobvious way, as Black Rock requires.

300. Id. at *13.
301. Id.
302. See, e.g., Helferich Patent Licensing, LLC v. N.Y. Times Co., 778 F.3d 1293, 1297 (Fed. Cir. 2015) (finding the clever claim draftsman’s “painstaking efforts” sufficient to overcome the exhaustion doctrine). But see Alice Corp. Pty. Ltd. v. CLS Bank Int’l, 134 S. Ct. 2347, 2351 (2014) (“This Court has long ‘warn[ed] . . . against’ interpreting § 101 ‘in ways that make patent eligibility
have been even more interesting to see how the Supreme Court would have addressed a Federal Circuit ruling reversing the district court in GPNE, since the scarcely-buried issue here is the Federal Circuit’s authority to overrule the Supreme Court’s Lincoln Engineering decision. Given past relations between

“depend simply on the draftsman’s art.”) (quoting Mayo Collaborative Servs. v. Prometheus Labs., Inc., 566 U.S. 66, 72 (2012), in turn quoting Parker v. Flook, 437 U.S. 584, 593 (1978)); Quanta Comput., Inc. v. LG Elecs., Inc., 553 U.S. 617 (2008) (disregarding the draftsman’s efforts); see also Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124, 137 (2006) (Breyer, J. dissenting). For a critique of the Helferich case, see Richard H. Stern, Heightening Tension Between the exhaustion Doctrine and Field-of-use Licensing in Information Technology Tests the Limits of Each Doctrine (Part 2), 38 EUR. INTELL. PROP. REV. 326 (2016). In the Federal Circuit, as Judge Rich famously said, “the name of the game is the claim.” See In re Hiniker Co., 150 F.3d at 1369. Nicety in claim drafting promotes clarity, predictability, and stability, but it leads to considerable tension in the case law. It appears to have caused the Supreme Court to think it is being bamboozled by fast-talking, city-slicker patent lawyers, and the Court doesn’t seem to like that. However, the clash between form and substance is inevitable because the need to give precision in language in order to give the public notice of the scope of patent monopolies makes form prevail over substance in patent law generally, and certainly in claim drafting. For example, see cases cited supra note 297. But ultimately, the proper function of claims can be satisfied within the limits of Lincoln Engineering and Black Rock.


On January 12, 2018, in Exmark Manufacturing Co. v. Briggs & Stratton Power Products Group, LLC, 2018 U.S. App. LEXIS 783 (Fed. Cir. 2018), a three-member panel of the Federal Circuit upheld (without extensive discussion) the use of the sales price of an entire lawn mower as a royalty base, where the patent (not a SEP) claimed a conventional lawn mower with an improved flow control baffle for directing grass clippings toward a discharge chute. The court said: “Using the accused lawn mower sales as the royalty base is particularly appropriate in this case because the asserted claim is, in fact, directed to the lawn mower as a whole. The preamble of claim 1 recites a ‘multiblade lawn mower.’ It is not the baffle that infringes the claim, but rather the entire accused mower. Thus, claim 1 covers the infringing product as whole, not a single component of a multi-component product. There is no unpatented or non-infringing feature of the product.” Id. at *29. The court allowed, however, that the royalty rate must be selected to apportion the royalty based on the relative values of the conventional elements and unconventional elements of the mower. The court cited Lucent Technologies, Inc. v. Gateway, Inc., 580 F.3d 1301, 1338–39 (Fed. Cir. 2009) for the propriety of this approach, while making no mention of misleading juries; Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1312, 1321 (Fed. Cir. 2011) putting the $19 billion cat back into the bag, see text preceding supra note 261; or LaserDynamics, Inc. v. Quanta Computer, Inc., 694 F.3d 51, 67 (Fed. Cir. 2012) (“[I]t is generally required that royalties
the Supreme Court and the Federal Circuit, it is not difficult to imagine the Court’s response to the Federal Circuit’s arrogation of the power to overrule decisions of the Supreme Court that it deems outdated. If *Lincoln Engineering* is the law then *Radio Steel* is not, and one cannot write valid system-gaming claims of the type suggested above.

*GPNE* may have reached the right result—for the policy reasons that the district court’s opinion stated—but it did not do so in a principled manner. The right way to reach that result would be to restore *Lincoln Engineering*—which only the Supreme Court could do at this point—and thus hold GPNE’s “node” claim invalid, just as a claim to a Rolls-Royce with a novel windshield wiper should be held invalid.

VI. THE 2015 IEEE PATENT POLICY UPDATE

By 2014 the IEEE, a major US SSO whose standardization activity involves (among other things) telecommunications network technology, concluded that the RAND commitments for standards it had adopted were not be based not on the entire product, but instead on the ‘smallest salable patent-practicing unit.’

304. See Impression Prods., Inc. v. Lexmark Int’l, Inc., 137 S. Ct. 1523 (2017) (overturning a line of Federal Circuit decisions that had attempted to “overrule” a century of Supreme Court precedent, although it lacked the judicial authority to do so).

operating in an efficient manner. The commitments were inherently vague, the IEEE said, because they gave no concrete meaning to the crucial term “reasonable royalty rate.” The consequent uncertainty could, and did, lead to expensive litigation whose cost and risk could impede the adoption of a standard. License negotiations occurring after a technology’s inclusion in a standard appeared to involve excessive transaction costs and, in some cases, the lack of definiteness of the reasonable royalty rate commitment caused undue market power (potentially to the point of monopoly), high royalty payments, and ultimately higher prices to consumers. Standard implementers and SEP holders continued to take widely divergent positions on the meaning of ill-defined “reasonable rates” for SEPs. In at least two patent infringement cases relating to the IEEE 802.11 Wi-Fi standard, the patent holder and the implementer were several orders of magnitude apart in their respective valuations of the reasonable rate for SEPs on which the patent holders (or their predecessors) had provided LOAs to IEEE making RAND commitments. Courts had also pointed out the lack of clarity in IEEE’s RAND commitments.

In the cell phone industry, disputes over alleged monopolistic practices—including excessive royalty demands for SEPs and exclusionary practices based on control of SEPs—led to antitrust litigation. In the Broadcom case, for example, Broadcom sued Qualcomm for abusive SEP-related practices, based in large part on the indefinite FRAND commitments Qualcomm had made to SSOs, and similar to those that are challenged in the current FTC and Apple antitrust suits against


307. See id. at 10–11.

308. Id.

309. Id. at 10–12.

310. For example, the district court in the Ericsson case—which involved a dispute over what qualifies as a RAND royalty for SEPs for the IEEE 802.11 standard—stated, “[t]he paradox of RAND licensing is that it requires a patent holder to offer licenses on reasonable terms, but it offers no guidance over what is reasonable.” Ericsson Inc. v. D-Link Sys., Inc., 6:10–CV–473, 2013 WL 4046225, at *25 (E.D. Tex. Aug. 6, 2013), aff’d in part, vacated in part, rev’d in part, 773 F.3d 1201 (Fed. Cir. 2014).
In addition, Antitrust Division and FTC officials repeatedly suggested in speeches that action was necessary to clarify RAND commitments because of their ambiguity in defining reasonable royalty rates.\textsuperscript{312}

A. The IEEE “Clarifies” Its Patent Policy

After more than a year of deliberation, in 2014 the IEEE tentatively adopted a new Patent Policy, largely tracking the rulings on reasonable royalties in the line of case law that Part V of this Article discusses. The IEEE governing body made the effectiveness of the policy update contingent, however, on obtaining advice (so-called “clearance”) from the Antitrust Division that the policy changes would not constitute what some SEP-holder spokesmen contended was oligopsonistic price fixing.\textsuperscript{313} In September 2014 the IEEE submitted a request for a

\textsuperscript{311} Broadcom Corp. v. Qualcomm Inc., 501 F.3d 297 (3d Cir. 2007). One of the different antitrust charges was that Qualcomm had fraudulently induced SSOs into basing the UMTS telecommunication standard on Qualcomm’s technology by making later-broken promises to grant licenses on FRAND terms, while Qualcomm actually intended to offer them only on non-FRAND terms once implementers were locked into the UMTS standard.


business review letter to the Antitrust Division,\textsuperscript{314} which in January 2017 responded that it did not see a likely antitrust violation calling for any prosecutorial action.\textsuperscript{315} The Antitrust Division stated:

The Department concludes that the Update has the potential to benefit competition and consumers by facilitating licensing negotiations, mitigating hold up and royalty stacking, and promoting competition among technologies for inclusion in standards. The Department cannot conclude that the Update is likely to harm competition. Further, to the extent that there are any potential competitive harms, the Department concludes that the Update's potential procompetitive benefits likely outweigh those harms.\textsuperscript{316}

In March 2015, the IEEE formally revised its Patent Policy concerning RAND royalties for SEPs covering the technology that IEEE standards embody.\textsuperscript{317} The update provided a more specific definition of the concept of reasonable rate. According to the Patent Policy update, a reasonable rate for a SEP must be based on the \textit{ex-ante} principle—excluding the value conferred by including the patented technology in the standard.\textsuperscript{318} In addition, a reasonable royalty rate should (if at all possible) be based on consideration of:\textsuperscript{319}

- “The value that the functionality of the claimed invention or inventive feature within the Essential Patent Claim\textsuperscript{320} contributes to the value of the relevant functionality\textsuperscript{321} of the

\begin{center}
U.S. Dep’t of Justice (Jan. 28, 2015), https://www.criterioneconomics.com/docs/proposed_ieee_bylaw_amendments_affecting_frand/licensing_of_seps.pdf (“Oligopsonistic collusion within standard-setting organizations (SSOs) should be no different. Collusion among implementers would harm the standardization process, innovation, and consumers. The IEEE’s proposed amendments are an agreement in restraint of trade that would coordinate the actions of buyers to reduce the price they pay for a valuable input. Far from deserving a positive business review letter, collusion within SSOs regarding the licensing of SEPs should be \textit{per se} illegal under section 1 of the Sherman Act.”).
\end{center}

\textsuperscript{314}. Letter from Michael A. Lindsay to William J. Baer, \textit{supra} note 306.
\textsuperscript{315}. DOJ Response to IEEE, \textit{supra} note 5.
\textsuperscript{317}. INST. ELECT. \& ELECS, ENG’RS, \textit{supra} note 4.
\textsuperscript{318}. \textit{Id.} § 6.1. This portion of the definition says “shall mean.”
\textsuperscript{319}. \textit{Id.} This portion of the definition says “should include.”
\textsuperscript{320}. \textit{Id.} § 6.2. The IEEE Patent Policy uses the term “Essential Patent Claim” to refer to the relevant claim of a SEP.
\textsuperscript{321}. The reference to the “relevant functionality” emphasizes the fact that a component or sub-assembly may have multiple functions in a device, only one
smallest saleable Compliant Implementation [i.e., smallest saleable patent-practicing unit] that practices the Essential Patent Claim.\textsuperscript{322}

- “The value that the Essential Patent Claim contributes to the smallest saleable Compliant Implementation that practices that claim, in light of the value contributed by all Essential Patent Claims for the same IEEE Standard practiced in that Compliant Implementation.”\textsuperscript{324}

Using the smallest saleable patent-practicing unit as a royalty base implements two important policies. One is that the SEP royalty should be based on the value of the relevant functionality—not the unrelated functionality—of the standard-compliant unit.\textsuperscript{325} For example, a notional cell phone may contain a baseband processor chipset (with $10 worth of functionality), an EPROM (with $5 worth of functionality), a DRAM (with $5 worth of functionality), a camera (with $20 worth of functionality), and a touchscreen (with $10 worth of functionality). The EPROM, DRAM, camera, and touchscreen have $40 worth of functionality unrelated to the $10 worth of functionality of the baseband processor chipset. The SEP royalty for the baseband processor chipset should be based just on its of which is relevant to SEP concerns (the circuitry for the other functions may be unpatented or may be patented under different patents). \textit{Id.} § 6.1. For example, as the IEEE explains in an introduction to its Patent Policy, a circuit or sub-assembly might “implement[] IEEE Standard 1284\textsuperscript{TM}, RS-232 and USB,” but the SEP might “relate[] only to the circuit’s IEEE 1284 parallel port function.” \textit{Inst. Elec. & Elecs. Eng’rs, supra} note 278, ¶ 43. In that case, the “relevant functionality” on which the SEP’s reasonable royalty should be based is only that IEEE 1284 functionality, and no royalty for that SEP should be levied for the device’s RS-232 or USB functionality. \textit{Id.}

\textsuperscript{322} The IEEE-SA bylaws define “Compliant Implementation” (as that term is used in the Patent Policy) to mean “any product (e.g., component, sub-assembly, or end-product) or service that conforms to any mandatory or optional portion of a normative clause of an IEEE Standard.” \textit{Inst. Elec. & Elecs. Eng’rs, supra} note 4, § 6.2. Thus, the royalty base (called for by the IEEE standards when determining a RAND royalty for SEPs) is the smallest saleable “component, sub-assembly, or end-product” whose manufacture, use, or sale would infringe the relevant SEP. \textit{Id.} For example, a CDMA-compliant smartphone would not be a smallest saleable patent-practicing unit; rather, a CDMA chip or chip within the smartphone would be the smallest saleable patent-practicing unit.

\textsuperscript{323} \textit{Inst. Elec. & Elecs. Eng’rs, supra} note 4, § 6.1.

\textsuperscript{324} \textit{Id.}

\textsuperscript{325} \textit{Inst. Elec. & Elecs. Eng’rs, supra} note 278, ¶ 43.
$10 worth of functionality, not the additional $40 worth of functionality of the other patented or unpatented parts.

Second, a cell phone has many patented and unpatented components besides a baseband processor chipset, which one SEP may cover. Other patented and unpatented technologies may make up the other components, and they also contribute to the value of the entire unit. A disproportionate share of the total reasonable royalty should not go to only one patent out of many technological inputs. If a cell phone has many components—embodies 200 patents, for example—and the traffic will bear only a $20 reasonable royalty, then one SEP should not appropriate $18 of the total $20. In the Ericsson case, the court explained that since “the 802.11 [Wi-Fi] standard encompasses numerous technologies to enable devices to communicate with each other,” and the SEPs involved in the case covered only a small part of 802.11, the proper royalty award “must be apportioned to the value of the patented invention (or at least to the approximate value thereof), not the value of the standard as a whole.”

B. SEP-OWNER OPPOSITION TO PATENT POLICY UPDATE

The Patent Policy update did not go unchallenged. Opposition occurred mainly from owners of SEPs for technology incorporated into standards for the cell phone industry, which accounts for a disproportionately large share of US sales of standard-compliant products, and is largely based on the IEEE 802.11 Wi-Fi standard. Ericsson, Interdigital, Nokia, Qualcomm, and other cell phone SEP-owning stakeholders and their spokesmen vigorously argued against the IEEE Patent Policy’s use of the smallest saleable patent-practicing unit as the preferred royalty base, and against its refusal to accord SEP owners the right to cash in on the ex-post value of patents that standards have anointed as SEPs. Prior to the 2015 Patent

328. Alcatel-Lucent, Ericsson and Qualcomm, with support from Fraunhofer, InterDigital, Nokia, Orange, Royal Philips and Siemens, filed an
Policy’s adoption, these SEP holders argued within the IEEE against its adoption. After the governing bodies in IEEE tentatively approved the 2015 Patent Policy—subject to government review and clearance—these companies urged the Department of Justice not to grant clearance to the policy because it was, they said, an antitrust violation.\footnote{329}

After the government granted a clearance and the IEEE announced the 2015 Patent Policy update, several important SEP owners publicly stated their unwillingness to license their patents under the RAND terms of the 2015 Patent Policy.\footnote{330} They announced that they would license SEPs only on a basis excluding the policies to which they objected (especially, the ex-ante royalty base and the smallest saleable patent-practicing

\footnote{329. See, e.g., Letter from J. Gregory Sidak to Renata B. Hesse, \textit{supra} note 313. Sidak said that he was an advisor of clients “that hold valuable portfolios of SEPs for mobile telecommunications devices” and that they had encouraged him to write to the government, but he insisted that he expressed strictly his own views. \textit{Id.} at 1. His legal argument would appear to be that a collective agreement not to take a patent license on other than particular terms (e.g., only ex-ante royalties) is tantamount to a boycott. \textit{See} Jones Knitting Corp. v. Morgan, 361 F.2d 451, 459 (3d Cir. 1965). Further, he may be contending that the IEEE is an oligopsonistic buyer’s cartel, engaging in a royalty price fix. \textit{See} Mandeville Island Farms v. Am. Crystal Sugar Co. 334 U.S. 219 (1948) (holding that a buyers’ price fix violates Sherman Act); Nat’l Macaroni Mfrs. Ass’n v. FTC, 345 F.2d 421, 426–27 (7th Cir. 1965) (same). \textit{See also} Addamax Corp. v. Open Software Found., 152 F.3d 48, 52 (1st Cir. 1998), in which HP, DEC, and other computer manufacturers formed the Open Software Foundation to develop security software for UNIX; they chose to incorporate into their software a cheaper software security product than that of plaintiff Addamax, who then sued, charging a buyers’ cartel to reduce prices. The court refused to use a \textit{per se} rule and found that under the rule of reason there was no violation, because of the procompetitive potential of the defendants’ group—a “venture [for] producing a new product” that could make “a productive contribution to the economy.” \textit{Addamax}, 152 F.3d at 52. The court also found that, even assuming an antitrust violation, the alleged violation was not a substantial cause of plaintiff’s injuries. \textit{Id.} at 54–55.

Next, they attempted (unsuccessfully) to persuade ANSI to de-certify IEEE as an SSO.332

Some of the SEP holders released statements that they would not accept the 2015 Patent Policy update and would not grant licenses on the terms it prescribed. Qualcomm’s chief licensing lawyer stated, “Qualcomm will continue to submit information that could be considered for inclusion in the standard, but it will set its own royalty commitment similar to the old rules.”333 Interdigital’s CEO stated, “In a nutshell, we advised the IEEE that our company objects to their entirely new policy on patents and, going forward, on a case-by-case basis, will provide alternative licensing assurances to those specified in the 2015 policy.”334 He explained that the IEEE’s “move could slash revenues for standards developers.”335 Nokia stated bluntly that it would not grant licenses under the new IEEE policy:

Nokia notified IEEE before the changes were adopted that it would not be prepared to make licences available under the new patent policy, but that it would continue to honour commitments already given under the previous policy. Nokia will stick to that position and

331. Id.
333. Decker & King, supra note 330.
is prepared to offer licences under its future SEPs on the previous patent policy terms.336

How the SEP owners’ opposition to the 2015 Patent Policy amendment will ultimately be resolved is unclear. As they have threatened, the SEP owners can totally or selectively defect from the IEEE standardization process. This could affect future standardization, for standards such as 5G (to be deployed in 2020 and beyond),337 as well as further incremental improvements of 4G. The considerations are quite complex (and it is uncertain what IEEE’s future role will be—for example, in whether IEEE 802.11 will evolve into 5G technology).

The outcome would depend on the future availability of technology alternatives to that of Qualcomm and its allies.338 There are two factions in contention here: On one side are the SEP holders allied with Qualcomm (located at the upstream end of the cell phone industry distribution chain), whose business model is primarily the monetization of SEPs for royalty revenue collected from the second faction. On the other side is a group of hardware and software standards implementers who support the 2015 IEEE Patent Policy. These appear to be Apple, Cisco, Broadcom, Hewlett Packard, Intel, Marvell, Microsoft, Samsung, and Verizon339—royalty-paying companies operating


337. See text supra notes 69–74.

338. Another factor is how fast CDMA becomes irrelevant, making CDMA backward compatibility unnecessary. See text supra note 84 (referring to shutdowns of legacy CDMA systems).

339. See Chandler & Ohana, supra note 335. Although the authors list Broadcom among the supporters of the IEEE Patent Policy, curiously, Broadcom and its subsidiaries (LSI, Agere, and Avago) are defendants in patent infringement litigation over SEPs for technology used in the IEEE 802.11 and ITU H.264 standards. See, e.g., Funai Elec. Co. v. LSI Corp., No. 16-cv-01210-BLF, 2017 WL 1133513 (N.D. Cal. Mar. 27, 2017). In this litigation, the defendants have allegedly violated FRAND commitments by demanding downstream royalties on the sales price of consumer end products (such as TV sets), and refusing to license the SEPs for royalties based on the price of the smallest saleable patent-practicing units (semiconductor chips used in the end
downstream, toward the ultimate consumer end of the distribution chain. Cisco has been the most active publicly of these companies in trying to promote acceptance and implementation of the 2015 Patent Policy update.\footnote{Cisco has offered—without success—numerous proposals to clarify what RAND commitment applies to different standards, projects, and project participants in IEEE standard-setting. See infra note 355 and accompanying text.}

Unless Cisco and its allies find that—in order to manufacture their future products—they will need the technology that Qualcomm and its allies develop, they will be able to implement the 2015 Patent Policy successfully. If that is the case, the Qualcomm group’s threat to go on strike will be ineffective for new standardization projects. The group could still withhold their patents,\footnote{Under U.S. law, a patent owner is free to refrain from licensing or utilizing patented technology. See Special Equip. Co. v. Coe, 324 U.S. 370 (1945); Cont’l Paper Bag Co. v. E. Paper Bag Co., 210 U.S. 405 (1908); see also 35 U.S.C. § 271(d)(4) (2010) (patentee not guilty of misuse because it merely has “refused to license or use any rights to the patent”). On the other hand, an injunction against patent infringement would be very unlikely, see eBay Inc. v. MercExchange, LLC, 547 U.S. 388, 391 (2006), and reasonable royalty damages might be small in the case of an unexploited patent.} but then they would earn no revenue from them. Conversely, if the Qualcomm group’s future inventions prove indispensable, post-2015 IEEE standardization could falter,\footnote{See Rick Nelson, Qualcomm Responds to Updated IEEE Standards-Related Patent Policy, EVALUATION ENG’G (Feb. 11, 2015), http://www.} unless those pressing implementation of the 2015

products). First Amended Complaint ¶¶ 66, 67, 86, 87, Funai Elec. Co. v. LSI Corp., No. 16-cv-01210-BLF, 2016 WL 7645013 (N.D. Cal. Aug. 29, 2016) (“Agere would only license its essential 802.11 patents if it received royalties based on the sales price of the end consumer product in which those components are contained—a price frequently hundreds of times greater than the component price. . . . Because of, among other reasons, Defendants’ policy of attempting to capture the value of the end consumer product, rather than the value of the component that provides WLAN connectivity, Defendants have offered to license their allegedly essential patents to Funai under only unreasonable and discriminatorily exorbitant terms. . . . [LSI] would only license its essential H.264 patents if it received royalties based on the sales price of the end consumer product in which those components are contained—a price frequently hundreds of times greater than the component price. . . . Because of, among other reasons, Defendants’ policy of attempting to capture the value of the end consumer product, rather than the value of the component that provides H.264 functionality, Defendants have offered to license their allegedly essential patents to Funai under only unreasonable and discriminatorily exorbitant terms.”). The accusations in the complaint were upheld against the defendants’ motion to dismiss. Funai Elec., 2017 WL 1133513, at *11.
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Patent Policy back down. Which direction events will take depends on facts as to which more information will be needed.343

The considerations regarding pre-2015 technology and RAND commitments are different, despite the case law discussed previously in Part V, because an option other than direct confrontation is available to the SEP owner group—delay because of uncertainty and doubt. The IEEE administration—particularly the IEEE’s patent committee—has sought to remain neutral and avoid taking any definite position on whether the 2015 Patent Policy covers RAND commitments and works in progress, that began before 2015.344 This stance creates a

evaluationengineering.com/qualcomm-responds-to-updated-ieee-standards-related-patent-policy (“We believe engineers from Qualcomm have been the largest technology contributor to IEEE’s 802.11ac standard and 802.11ah draft standard for Wi-Fi.”); see also Ron D. Katznelson, Perilous Deviations from FRAND Harmony—Operational Pitfalls of the 2015 IEEE Patent Policy (Oct. 8, 2015) [hereinafter Katznelson, Perilous Deviations], http://works.bepress.com/rkatznelson/83/ (“Many top quality and complex standards projects may grind to a halt unless IEEE-SA reverses course . . . .”). Katznelson claims this is already occurring. See Ron D. Katznelson, The IEEE Controversial Policy on Standard Essential Patents – The Empirical Record since Adoption, Address at the Symposium on Antitrust, Standard Essential Patents, and the Fallacy of the Anticommons Tragedy, Berkeley, CA (Oct. 29, 2016) [hereinafter Katznelson, IEEE Controversial Policy], https://works.bepress.com/rkatznelson/80/.

343 One recent study found no decrease in company filing of LOAs with IEEE-SA, and an increase to an all-time high in LOA submissions immediately after the 2015 Patent Policy update, accompanied by a higher level of standardization work. See Tim Pohlmann, EMPIRICAL STUDY ON PATENTING AND STANDARDIZATION ACTIVITIES AT IEEE 1, 11–13 (2017), http://www.fairstandards.org/wp-content/uploads/2017/03/IPlytics_2017_Patenting-and-standardization-activities-at-IEEE.pdf. Pohlmann states that a recent study—referring to Katznelson, IEEE Controversial Policy, supra note 342—containing suggestions “that IEEE LOAs have declined due to the IEEE’s adoption of updates to its patent policy appear to be both incorrect and misleading.” Id. at 13.

344 An FAQ 84A, proposed by IEEE-SA, which was never formally adopted for inclusion in INST. ELECTR. & ELECTR. ENGR’S, supra note 278, but nonetheless represents IEEE administrative policy, stated in part: “In updating its patent policy, the IEEE-SA expresses no view as to whether any specific provision in the March 2015 update does, or does not, represent any substantive change from the pre-March 2015 IEEE-SA patent policy.” E-mail from Gil Ohana, Senior Dir. of Antitrust & Competition, Cisco Sys., to IEEE-SA Standards Board Patent Committee (Nov. 25, 2015), http://grouper.ieee.org/groups/pp-dialog/email/msg00040.html. This statement is consistent with the IEEE’s letter to the Antitrust Division requesting business review. See Letter from Michael A. Lindsay to William J. Baer, supra note 306, at 19 (“The proposed policy does not retroactively amend previously Accepted Letters of Assurance.
climate of uncertainty, and it plays into the hands of those who seek to delay implementation of the 2015 policy update.

A considerable amount of standardization effort is directed to incremental modification and extension of the 802.11 Wi-Fi standard, the implementations of which include cellular technology. The IEEE has a type of letter of assurance called a “blanket LOA.” A blanket LOA makes a RAND commitment that applies to all SEPs that a company may currently or in the future have the right to license. For example, for a blanket LOA’s RAND commitment made for a given number standard with any suffix letter (e.g., all 802.11 Wi-Fi), it is the current policy of the IEEE Patent Committee that whatever patent policy applied at the date the LOA with that RAND commitment was made continues in effect indefinitely. That LOA and RAND commitment remains in effect unless superseded by a later new LOA (to which the 2015 Patent Policy would

Patent owners who do not wish to submit a Letter of Assurance under the proposed policy are free not to do so.”). The letter also stated: “IEEE has publicly stated that it does not seek to amend retroactively the terms of any previously submitted Letter of Assurance, and that in adopting the policy IEEE-SA expresses no view as to whether any specific provision in the draft policy does, or does not, represent a substantive change from the current policy.”


346. INST. ELEC. & ELECS. ENG’RS, supra note 4, § 6.1. This contrasts with an LOA limited to the patented technology used only in a single standard, such as 802.11a. See Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc. (CSIRO), 809 F.3d 1295, 1297–98, 1305 (Fed. Cir. 2015) (seeming to indicate that a LOA for one standard does not apply to subsequent iterations of the standard). The CSIRO court, however, imposed a reasonable royalty requirement applicable to all SEPs, as a matter of general patent law. See text preceding supra note 269 and infra note 378.

347. See INST. ELEC. & ELECS. ENG’RS, supra note 278, ¶ 14.
automatically apply). At the same time, no IEEE position is taken as to the legal effect of such pre-2015 RAND commitments, including whether the RAND royalty is determined ex-ante or ex-post, and whether the smallest saleable patent-practicing unit principle applies, so that IEEE leaves those matters undetermined.

For example, consider a company making a pre-2015 RAND commitment for 802.11a. A minimum RAND commitment could be limited to the technology used in 802.11a and then reused in enhancements of 802.11a. Or the company could make a greater, blanket RAND commitment for all further 802.11 standards. If blanket, the same RAND commitment would apply even to proposed 802.11az, or to a notional 802.11zzzz, with the same allegedly undetermined legal effect. The IEEE’s administrative refusal to take any position on whether the 2015 Patent Policy applies to pre-2015 LOAs and RAND commitments leaves the matter uncertain and vulnerable to various SEP owners’ idiosyncratic interpretations of the effect of the 2015 Patent Policy update.

At this time, therefore, considerable uncertainty exists over how the 2015 Patent Policy update applies to different 802.11 amendments, and different participants in standard-setting activities may be subject to different policies, or if not different policies then to different interpretations of the IEEE’s policy. The uncertainty has led to two disputes over how the 2015 Patent Policy update applies to different SEPs—the “grandfather” controversy and the “retroactivity” controversy.

C. The Grandfather Controversy

CSR plc, a relatively small British company, in 2009 provided a blanket LOA for all 802.11 standardization then in

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348. Id.
349. Old LOAs and RAND commitments become irrelevant only if the IEEE chooses to designate a variation on or amendment to a prior standard such as 802.11 with an entirely new number such as IEEE 899.99. That would probably not occur for any additional Wi-Fi standards such as 5G technology, although the matter seems wholly arbitrary. The CSIRO case illustrates the problem. CSIRO, 809 F.3d at 1297–98.
effect, in progress, or to occur in the future. This provided a RAND commitment for CSR's SEPs in accordance with the pre-2015 Patent Policy (whatever it was), which was established in 2007. The 2007 policy had no definition or gloss on what was a reasonable royalty. In August 2015, several months after the March 2015 adoption of the Patent Policy update, Qualcomm acquired CSR. Qualcomm then took the position that by acquiring CSR it became “grandfathered” under CSR's 2009 LOA and RAND commitment. Qualcomm interprets that LOA as not obliging it to operate under the principles of the 2015 Patent Policy, such as ex-ante royalties and the smallest saleable patent-practicing unit principle, for all Qualcomm-owned 802.11 SEPs, past or future.

Because the IEEE failed to take any position on the grandfather issue, Cisco repeatedly proposed issuance of statements interpreting the 2015 Patent Policy update in one way or another to prescribe a definite rule of some kind. As of

354. See INST. ELEC. & ELECS. ENGR’S, supra note 278.
355. See, e.g., E-Mail from Gil Ohana, Senior Dir. of Antitrust & Competition, Cisco Sys., to David L. Ringle, Director, IEEE-SA Governance (Nov. 11, 2016), http://grouper.ieee.org/groups/pp-dialog/email/msg00411.html; E-Mail from Gil Ohana, Senior Dir. of Antitrust & Competition, Cisco Sys., to David L. Ringle, Director, IEEE-SA Governance (Mar. 9, 2017), http://grouper.ieee.org/groups/pp-dialog/email/msg00432.html (“If an Accepted LOA pre-dates the current version of the patent policy text, a Working Group chair or Sponsor chair may must disclose that fact to the Working Group and also invite submission of a new LOA in addition to the Accepted LOA already on file.”); see also Gil Ohana, Presentation to IEEE-SA Patent Committee
2017, all of these proposals have failed to gain acceptance within the IEEE Patent Committee. They foun-dered ostensibly on the rock of “retroactivity.” But it was more likely because of the IEEE’s culture of non-confrontation, its shock and dismay at the unanticipated violent opposition to, and rancor generated over, the announcement of the 2015 Patent Policy update, and perhaps a sense of loss over the deterioration of IEEE’s former collegiate standard-setting atmosphere. That desire to avoid controversy has left the matter for ultimate resolution only in the courts.

The grandfather concept may be an illusion, however, and the grandfathers may turn out to have the same legal status as everyone else. As is discussed below, in the CSIRO case the Federal Circuit ruled that determination of a reasonable royalty follows much the same principles for SEPs with (and without) RAND commitments, particularly the requirement of ex-ante royalty determination.

D. THE RETROACTIVITY CONTROVERSY

In and preceding 2015, when the IEEE adopted the 2015 Patent Policy, the IEEE asserted that the amended Patent Policy merely clarified the prior version of the Patent Policy, which was silent on ex-ante royalty rates and the smallest saleable patent-practicing unit principle. The February 2015 IEEE Statement Regarding Updating of its Standards-Related Patent Policy asserted, “[t]his update is designed to provide greater clarity and predictability for patent-holders and implementers.” In its letter to the Antitrust Division requesting a business review and clearance for the Patent Policy, the IEEE stated that it was acting in response to antitrust enforcement officials’ statements “suggesting that SDOs consider taking steps to eliminate some of the ambiguity that requires difficult ex post deciphering of the scope of a F/RAND


357. Id.
commitment.” The letter also denied intent to amend preexisting RAND commitments. Blog commentary seemed to accept the “clarification” characterization of the Patent Policy update.

Qualcomm and other SEP holders did not agree, however, that the 2015 Patent Policy update merely “clarified” matters, yet left them substantively unchanged. Qualcomm asserted: “The new IEEE Patent Policy cannot be called FRAND” and it “cannot reasonably be called a clarification; it is a total rewrite that requires material, binding concessions by SEP-owners.” Nokia and Panasonic representatives have similarly emphasized to the IEEE Patent Committee that they regarded pre-2015 LOAs as binding contracts between IEEE and SEP holders.

358. See Letter from Michael A. Lindsay to William J. Baer, supra note 306, at 12. At the same time that the IEEE asserted that it was just “clarifying” its policy, it also denied that it was acting retroactively and stated that it took no position on whether the 2015 update made any substantive change. Id. at 15 n.33.

359. Id. If the IEEE were going to make such statements, perhaps it would have been better advised to add, when referring to preexisting RAND commitments, “which we, of course, understand in light of Federal Circuit precedents such as CSIRO and Ericsson.”

360. See, e.g., Brian Scarpelli, Reflecting on the One Year Anniversary of the IEEE’s Patent Policy Changes, LINKEDIN (Mar. 29, 2016), https://www.linkedin.com/pulse/reflecting-one-year-anniversary-ieee-patent-policy-brian-scarpelli (“The IEEE-SA’s updates have provided some much-needed clarifications to the participants of the IEEE-SA in threshold areas, such as what constitutes a ’reasonable’ royalty and when seeking an injunction is appropriate (among other areas).”).

owners, which IEEE was now (over their objection) retroactively rewriting.362

How Qualcomm’s attempt to avoid the 2015 Patent Policy by seeking to operate under CSR’s old “grandfather” LOA and how its allied SEP holders’ objections to implementation will ultimately fare is still unresolved. It can be anticipated that the “retroactivity” debate will continue for some time. On the one hand, Qualcomm and its allies (Nokia, Ericsson, and other SEP holders) will say that they never agreed to any SEP-licensing commitment to the smallest saleable patent-practicing unit principle, ex-ante royalties, or to upstream royalties only, and that “a deal is a deal.” Moreover, there may be some shopping around to buy up old LOAs in order to claim grandfather rights. Eventually, the matter will be litigated and the courts will decide it.

E. RETROSPECTIVITY OF THE 2015 PATENT POLICY

How will the courts will rule on the retroactivity and grandfather controversies, if and when they are litigated? The SEP holders seek to invoke a doctrine with considerable emotional appeal. As the Supreme Court has admonished:

Elementary considerations of fairness dictate that individuals should have an opportunity to know what the law is and to conform their conduct accordingly; settled expectations should not be lightly disrupted. For that reason, the “principle that the legal effect of conduct should ordinarily be assessed under the law that existed when the conduct took place has timeless and universal appeal.”363

362. E-mails from some members of the Standards Board Patent Committee insisted that the 2015 Patent Policy unlawfully sought to impose a “retroactive application of terms and conditions by one party to the contractual commitment to the other party.” Email from John Kolakowski, Nokia, to IEEE-SA Standards Board Patent Committee (Dec. 2, 2016), http://grouper.ieee.org/groups/pp-dialog/email/msg00419.html. He added: “As far as I’m aware, this would not be permitted under the contract laws of any jurisdiction. If IEEE wishes to change the terms of that deal, then it must either obtain the Submitter’s consent or find alternative technology.” Id. Another such comment was that the proposal to apply the 2015 Patent Policy to patents that pre-2015 LOAs covered was “that IEEE-SA breach[es] its obligations under those contracts to compel those legacy SEP holders to LOA terms they never agreed to – i.e., unilaterally reopen[es] the contract to new terms.” Email from Ron D. Katznelson, President, Bi-Level Techs., to IEEE-SA Standards Board Patent Committee (Dec. 2, 2016), http://grouper.ieee.org/groups/pp-dialog/email/msg00419.html.

363. Landgraf v. USI Film Prods., 511 U.S. 244, 265 (1994) (citation omitted).
The retroactivity doctrine is usually confined to whether it is unconstitutional to criminalize by statute conduct that was innocent when committed or to increase the penalty for past acts.\textsuperscript{364} But courts apply the doctrine against retroactivity to civil matters as well, as to which courts use similar principles when deciding whether a \textit{retrospective} application of a rule is legitimate.\textsuperscript{365} As Justice Story explained, two hundred years ago, any measure “which takes away or impairs vested rights acquired under existing laws, or creates a new obligation, imposes a new duty, or attaches a new disability, in respect to transactions or considerations already past, must be deemed retrospective.”\textsuperscript{366} Whether the measure is \textit{improperly} retrospective, however, and should therefore be condemned, is more complicated. A court must ask what is “the nature and extent of the change in the law and the degree of connection between the operation of the new rule and a relevant past event,” and such cases may well “leave room for disagreement in hard cases.”\textsuperscript{367} Nonetheless, “familiar considerations of fair notice, reasonable reliance, and settled expectations offer sound guidance.”\textsuperscript{368}

Under that approach a court would probably hold the 2015 Patent Policy update a restatement of existing law on what is a reasonable royalty, that long predated the update and the original RAND commitments from the late 1990s inception of 802.11 standardization, and therefore that the Patent Policy update is not retroactive at all, or at worst is permissibly retrospective.\textsuperscript{369} It did not take away or impair vested rights, or

\begin{itemize}
\item \textsuperscript{364} See Johannessen v. United States, 225 U.S. 227, 242 (1912) (“Finally it is insisted that, if retrospective in form, the section is void, as an \textit{ex post facto} law within the prohibition of Art. I, § 9 of the Constitution. It is, however, settled that this prohibition is confined to laws respecting criminal punishments, and has no relation to retrospective legislation of any other description.”).
\item \textsuperscript{365} Courts do not usually explain the legal basis for challenging the legality of retrospective laws, but it appears to be due process. See, \textit{e.g.}, Costello v. United States, 365 U.S. 265, 283–84 (1961) (“Depriving him of his fraudulently acquired privilege, even after the lapse of many years, is not so unreasonable as to constitute a denial of due process.”).
\item \textsuperscript{366} Society for Propagation of the Gospel v. Wheeler, 22 F. Cas. 756 (No. 13,156) (C.C.D.N.H. 1814).
\item \textsuperscript{367} \textit{Landgraf}, 511 U.S. at 270.
\item \textsuperscript{368} Id. These appear to be due process considerations.
\item \textsuperscript{369} This statement assumes that courts would treat legislative retroactivity doctrine applicable \textit{in principle} to an allegedly retrospective
create new obligations, impose new duties, or attach new disabilities. A series of decisions of the Federal Circuit interpreting RAND commitments under LOAs for 802.11 and other standards, and also the proper test for reasonable royalty in the absence of any contractual RAND commitment,\textsuperscript{370} came to the same conclusion. For any royalty to be reasonable, the Federal Circuit ruled, it had to follow well-established principles going back at least as far as the Garretson case in 1884,\textsuperscript{371}

These principles are essentially the same as those of the 2015 Patent Policy. “[T]he governing rule is that the ultimate combination of royalty base and royalty rate must reflect the value attributable to the infringing features of the product, and

contract interpretation. Indeed, however, there is no such thing as contract interpretation retroactivity. As the Ninth Circuit explained in Pauma Band of Luiseno Mission Indians v. California:

[T]he term “retroactive” is a misnomer in the realm of contract interpretation. Once a court has interpreted an ambiguous contract provision that is and has always been the correct interpretation from its formation. Although the cases discussing the retroactivity of judicial decisions interpreting statutes may be instructive, a contract is fundamentally different from a statute or a body of law. . . . Thus, a contract provision has only one true meaning—what it meant when written—even though the parties may later dispute the correct interpretation. . . . When dealing with interpretation of a contract there is no such thing as a “change in the law”—once a final judicial decision determines what the contested language supports, that is it. Pauma Band of Luiseno Mission Indians v. California, 813 F.3d 1155, 1165 (9th Cir. 2015). It may be a legal fiction that the term “reasonable royalty” in the pre-2015 802.11 LOAs “is and has always been” what the Federal Circuit in CSIRO says it means, but it is one that overwhelms the SEP holders’ contentions about retroactivity. See also \textit{Restatement (Second) of Contracts} § 204 (AM. LAW INST. 1981) (“When the parties to a bargain sufficiently defined to be a contract have not agreed with respect to a term which is essential to a determination of their rights and duties, a term which is reasonable in the circumstances is supplied by the court.”); U.C.C. § 2-305 (AM. LAW INST. & UNIF. LAW COMM’N 1977) (stating where there is a contract for the sale of goods, but nothing is said as to price, the price is a reasonable price at the time). That means the courts determine the price if the parties reach impasse.

\textsuperscript{370} The Patent Code provides: “Upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer.” 35 U.S.C. § 284 (2012). Generally, absent special circumstances, the damages in a patent infringement case are limited to a reasonable royalty for the use of the invention. \textit{But cf.} cases and text \textit{supra} note 179 (identifying cases involving special circumstances allowing for other measures of damages).

\textsuperscript{371} Garretson v. Clark, 111 U.S. 120 (1884).
no more.” That value is the measure of what was taken from the patentee, and thus the proper measure of a reasonable royalty. The infringing features of the product are, ordinarily, what the SEP claims, and that typically corresponds to no more than the smallest saleable patent-practicing unit. Moreover, ex-ante determination of the proper royalty for a SEP is obligatory because the extra monopoly price that attaches when a patent is made essential through its selection in a standard is not attributable to the merits of the patented technology, yet a reward for those merits is all that the patentee is entitled to. As the Federal Circuit stated in the CSIRO case:

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. These steps are necessary to ensure that the royalty award is based on the incremental value that the patented invention adds to the product, not any value added by the standardization of that technology.

Accordingly, the 2015 Patent Policy update is not retroactive or retrospective at all, and even if it were retrospective, it would not be unfairly or unjustly retrospective. A court would probably reject the challenge that IEEE’s Patent Policy “rewrites” the contract made with SEP owners. Moreover, even if grandfather rights can in some way be acquired by buying a company with a pre-2015 LOA and RAND


375. The SEP owners are thus in the position of Molière’s M. Jourdain who had been speaking in prose for 40 years without knowing it. JEAN BAPTISTE POQUELIN MOLIÈRE, LE BOURGEOS GENTILHOMME, act 2, sc. 4 (trans. Philip Dwight Jones) (1670), http://www.online-literature.com/moliere/middle-class-gentleman/7/.

376. See Johannessen v. United States, 225 U.S. 227, 242-43 (1912) (“[T]he act provides [only] that he shall be deprived of a privilege that was never rightfully his. Such a statute is not to be deemed an ex post facto law.”). According to the Federal Circuit, the value of standardization was never rightfully the patent owner’s. See text and cases supra notes 266–72.
commitment, the result would not be to change the purchaser’s legal obligations regarding such issues as ex-ante royalty rates and use of the smallest saleable patent-practicing unit principle. Thus, SEP owners had fair notice of what to expect from courts and should not have expected or relied on a contrary result. On the other hand, the IEEE’s continuing refusal to take a position on whether the 2015 update made any substantive change in RAND commitments could hamper its ability to make this argument to a court, perhaps because of laches or estoppel, if the IEEE somehow became involved in a court proceeding. An 802.11 implementer engaged in patent infringement litigation with a SEP owner, however, would not be deprived of the precedential effect of previous Federal Circuit decisions interpreting pre-2015 RAND commitments and general law on the meaning of “reasonable royalty,” even in the absence of explicit RAND commitments.

VII. WHO IS ENTITLED?

Below the surface of all the controversy over “a deal is a deal” and whether the rules of the Federal Circuit and the IEEE Patent Policy update deprive SEP holders of their property rights and legitimate expectations is the question: who should

377. It is questionable that one can buy grandfather rights under an LOA and then use those rights to limit the buyer’s obligations that it would otherwise have. An LOA is an encumbrance; it creates an obligation. When one acquires a debt, by succeeding to a debtor’s asset, for example, by acquiring a house subject to a mortgage, one does not erase one’s own prior obligations. The SEP grandfather argument confuses an encumbrance with a privilege—a detriment with a benefit.

378. In CSIRO and Ericsson, the Federal Circuit held that a royalty award must be based solely on the ex-ante value of the patented technology and “not any value added by the standardization of that technology,” and that this rule applies to all SEPs irrespective of whether they are RAND-encumbered. CSIRO, 809 F.3d at 1304–05 (Fed. Cir. 2015); Ericsson, 773 F.3d at 1232. Even if the 2015 Patent Policy had made a substantive change in the IEEE’s standard RAND commitment, therefore, that would not affect the applicability of the ex-ante principle. Similarly, the reasons for using the smallest saleable patent-practicing unit principle for royalty bases do not depend on a RAND commitment or even SEP status. See CSIRO, 809 F.3d at 1302.

379. In United States v. Willow River Power, Justice Jackson asked whether the courts will provide a remedy because a property right has been invaded, or whether a property right exists because the courts will enforce it. United States v. Willow River Power Co., 324 U.S. 499, 503 (1945) (holding that the company seeking compensation should have no remedy, because Congress had failed to
rightly own the benefits of standardization (the surplus that standardization creates) or, more generally, how should the monetary benefits be allocated among stakeholders and claimants? As discussed at the outset of this Article, standardization causes interoperability, which causes network effects, and the network then generates value that increases greatly with the number of users joining the interoperable network. That value is vastly greater than the sum of the values that would exist if the individual elements in the network were isolated from one another in their original form instead of being interconnectable so that they can interoperate. That value is reflected in the surplus between the ex-ante value and ex-post value of a SEP.

SEP holders claim that, as creators of technologies that are the basis for the benefits of standardization, they have a strong claim—they are entitled—to the extra value (the surplus) that standardization generates. They warn also that, if they are denied adequate rewards to “incentivize” their technological contributions, the benefits of standardization and technological progress will dry up because the standard-setting process will die—the goose will no longer lay its golden eggs. Those two points, made in a variety of ways, are the main arguments of

order that any enforceable right existed in the subject matter); see also Plato, EUTHYPHRO (photo reprint) (1895) (in which Plato asks Euthyphro: “Is the pious loved by the gods because it is pious, or is it pious because it is that which the gods love?”). What the SEP owners’ property rights are (or are not) is the end point of the legal analysis, not its starting point.

380. In a smartphone market of 200 million users, the aggregate value of the network is roughly 200 million times the sum of the individual user network values. See Appendix A infra.

381. Or at least as the assignees of the patents awarded to the inventors of that technology, and usually the employers paying the salaries of such inventors.

382. The ingredients of the surplus are described in Part I. The principal and most heatedly contested ingredient, but not the only one, is the value of network effect resulting from the interoperability of standardized products. Another ingredient is the exclusionary value of a SEP that standardization creates.

383. See Letter from J. Gregory Sidak to Renata B. Hosse, supra note 313, at 2 (“Whatever static benefits from lower prices might flow to consumers from downstream manufacturers in the short run surely would be more than offset by forgone consumer surplus in future periods because of reduced innovation and diminished dynamic efficiency.”).
SEPs owners and their spokesmen for their claim of entitlement to the surplus.

Some downstream implementers of standards, such as iPhone seller Apple, claim they are the innovators that lay the golden eggs, and by implication deserve to claim the value of smartphone standardization. The Federal Circuit and other courts say that SEP owners deserve only the intrinsic, ex-ante value of their technology, and not the value that standardization confers on SEPs—that surplus should flow to consumers and implementers, rather than to patentees:

[A] reasonable royalty calculation under [35 U.S.C.] § 284 attempts to measure the value of the patented invention. This value—the value of the technology—is distinct from any value that artificially accrues to the patent due to the standard’s adoption. Without this rule, patentees would receive all of the benefit created by standardization—benefit that would otherwise flow to consumers and businesses practicing the standard. We therefore reaffirm that reasonable royalties for SEPs generally—and not only those subject to a RAND commitment—must not include any value flowing to the patent from the standard’s adoption.

Professioral commentators say that the public needs to be protected from forced wealth transfers such as from smartphone-purchasing consumers to smartphone-SEP owners that seek to evade their FRAND commitments.

384. See Apple Complaint, supra note 12 (accusing defendant Qualcomm of establishing a business model for collecting patent royalties on the technological contributions of others and their innovations unrelated to Qualcomm’s technology). Apple states that “Apple engineers create[d] a revolutionary . . . breakthrough technology” and “Qualcomm insists on royalties” on it; “Apple spends billions redefining the concept of a smartphone camera” and Qualcomm decides to collect “tribute” on it. Id. at 1–2. Apple does not explicitly articulate the next step of the syllogism—that it is entitled to claim the surplus that standardization creates, by making the benefits of these technological advances available to the millions of intercommunicating US iPhone owners. Its statement can be understood, however, to imply that.


386. Steven C. Salop & Carl Shapiro, Whither Antitrust Enforcement in the Trump Administration?, ANTITRUST SOURCE, Feb. 2017, at 1, 16, https://www.americanbar.org/content/dam/aba/publishing/antitrust_source/feb17_salop_2_16.pdf (“If . . . a narrow view [is taken] of the role of antitrust and patent law in preventing SEP owners from evading their FRAND commitments, potentially very large amounts of money would flow from ordinary consumers purchasing smartphones (as one leading example) to a small number of entities that hold SEPs relating to smartphones and have promised to license those patents on FRAND terms.”).
Spokesmen for SEP owners may deplore the tide of controversy that has displaced the former acquiescence of implementers and the IEEE in letting SEP owners define what royalties are RAND, on their own terms—described as “a long history of developing policies in consensus fashion” where “one would be best advised to let individuals [sic] companies agree on terms.”\footnote{387} But cynical observers may respond that the 2015 Patent Policy update involves:

the sort of policy change that could never achieve consensus, because the economic interests of the parties are inherently at odds. . . . That SEP holders, themselves, complain about these kind [sic] of things is easily understood. You have a (minority) faction that has historically been conferred with a tremendous business advantage by a policy that converted what should naturally be competitive-source negotiations into single-source negotiations. Nice work if you can get it. They have come to view that advantage as an entitlement, and they’re not about to give it up quietly. They’ll raise any objection they can. . . . \footnote{388}

Making a rational assessment of this debate calls for a sensitive balance of interests. It also demands an evaluation of relative values, like those of promoting innovation and those of protecting the public from forced wealth transfers,\footnote{389} among others, which implicates one’s “hierarchy of values.”\footnote{390} The remainder of this Article explores that subject further, to consider in more detail the policy arguments that spokesmen for

\footnote{387. Alden Abbott, Comment to IEEE Patent Policy Change Would Undermine Property Rights and Innovation, TRUTH ON Mkt. (Feb. 10, 2015, 8:40 AM), https://truthonthemarket.com/2015/02/04/ieee-patent-policy-change-would-undermine-property-rights-and-innovation; see also Katzenelson, Perilous Deviations, supra note 342 (describing the “salutary aspects of FRAND Harmony [that] have been exploited by companies and industries for decades,” but are now imperiled); Salop & Shapiro, supra note 386. Judge Posner would doubtless consider the “salutary harmony” of “let[ting] individuals [sic] companies agree on terms” to be like letting a highwayman and stagecoach passenger individually agree on terms when the highwayman says, “Stand and deliver!” See Apple, Inc. v. Motorola, Inc., 869 F. Supp. 2d 901, 913–14 (N.D. Ill. 2012), modified on other grounds, 757 F.3d 1286 (Fed. Cir. 2014) (declining to enjoin Apple’s sale of an infringing product where such an injunction would result in patent royalties reflecting the hold-up value of the patent instead of its ex-ante market value).}


\footnote{390. 2 HAROLD D. LASWELL & MYRES S. MCDouGAL, JURISPRUDENCE FOR A FREE SOCIETY: STUDIES IN LAW, SCIENCE AND POLICY 1045 (1992).}
SEP-owning stakeholders make to justify their claims about the values standardization creates.

As already indicated, major SEP holders have spoken out against at least two aspects of the judicial, governmental, and device-manufacturers’ positions discussed earlier, as well as against the IEEE 2015 Patent Policy (at least as it applies to 802.11 Wi-Fi SEPs). They strongly oppose:

- the *ex-ante* royalty rate determination principle, which expressly denies that SEP owners have any right to share in the value that standardization creates; and

- the policy to base royalties on the smallest saleable patent-practicing unit, and refuse to base them on the price of downstream products that combine a smallest saleable patent-practicing unit with other components to form a composite finished product.

The two principles are intertwined in the arguments that SEP stakeholders make because the reason for the second principle is to provide a way to implement the first. This part of the Article now addresses and evaluates various formulations of those arguments.

A. WE ARE ENTITLED TO SHARE

On the first point, SEP spokesmen have argued that SEP owners are entitled to profit from the adoption of standards and their resulting benefits, because it is unfair not to let them share:

The [IEEE Patent Policy] provision that “reasonable rates” should “exclude” any value associated with incorporating the patented technology into the standard is the most objectionable aspect of the proposed changes, implying as it does that patent holders should not share in the gains from standardization (other than via the volume effect).

391. See, e.g., Decker & King, *supra* note 330.
This is more a statement of hurt feelings than a substantive argument. It is asked, “Why shouldn’t SEP holders share?” But why should they share, if the value is created by an arbitrary SSO anointment rather than specific technological superiority? Why, for example, is LTE any more entitled to be anointed, and therefore its SEP owners enriched, than the alternative technology WiMAX, unless LTE is in fact superior enough to WiMAX to justify a price premium over WiMAX and other technologies? Many have observed that the choice of one or another technology for anointment as the standard is more often arbitrary than based on technological merit. 394

Even when an anointed technology is superior, its market value (i.e., ability to command payment) is always increased above its pre-standardization value because standardization excludes any competitive alternatives. 395 The surplus is an artifact of the standardization process. As Judge Posner put it, any manufacturer seeking to make a standard-compliant product “has no alternative to licensing the patent; he is at the patentee’s mercy.” 396 The claimed “right to share in the gains from standardization,” meaning here ex-post rather than ex-ante incorporated into a standard, and clearing the market of products that are not standard-compliant.


395. See TIM POHLMANN & KNUD BLIND, LANDSCAPING STUDY ON STANDARD ESSENTIAL PATENTS (SEPs) 55 (2016) (“[I]t is uncertain whether declared SEPs are more valuable and therefore declared essential for a standard, or whether these patents become more valuable only after being declared standard essential.”). But see DIRECTORATE FOR FIN. & ENTER. AFFAIRS COMPETITION COMM., ORG. FOR ECON. CO-OPERATION & DEV., INTELLECTUAL PROPERTY AND STANDARD SETTING 14 (2014), http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP(2014)27&doclanguage=en (“Rysman and Simcoe (2008) find that SEPs have a much higher number of forward citations than the average patent and observe that the inclusion in a standard can have a positive effect on the value of a patent. Lerner et al. (2007) study data from patent pools and conclude that the pool patents are more important, i.e. receive more citations, and that this holds both before and after the pool formed.”).

determination of royalties, is therefore in substantial part a euphemism for enjoying the fruits of having standards users at the SEP holders’ mercy.397

B. DOWNSTREAM PRICES BETTER REFLECT THE VALUE OF THE TECHNOLOGY TO END-USERS

The advocates for SEP owners do have more substantive arguments, which should not be ignored and go beyond merely expressing hurt feelings or a wish to exploit the monopoly power that standardization can generate. These arguments ought to be aired, evaluated, and engaged with. Thus, an attorney for Qualcomm argues that it is proper to base royalty on the sales price of a smartphone because a user of a more expensive smartphone derives greater benefit from the SEPs whose technology it embodies than a user of a cheap smartphone or cell phone does.

A more expensive, high-end smartphone, with features such as a large, high-resolution screen, a high-quality camera, and photo and video editing capabilities, makes greater use of and benefits more from improved communications than a basic device does. A user of the more capable device will undoubtedly download, upload, stream, and post to social media more photos and videos, with bigger file sizes, as a result of higher resolutions. As an example, the vastly improved data transmission rates supported by the 4G LTE standard contribute far more value to such a high-end device than to a less capable phone. It is only fair that the maker of the device should pay more (in terms of a higher royalty) for the use of the technology in the phone that derives more value from the technology.398

This argument may have some force. Arguably, the fair and reasonable royalty for a patent should depend on the extent of the benefit the patented technology confers on the user. But there are two patent law problems with the argument and one fundamental pragmatic problem, and each of the three will be addressed in turn.

397. Id.; see also United States v. Terminal R.R. Ass’n, 224 U.S. 383 (1912). This is not to imply that the surplus is entirely due to monopoly power, for it is not. The surplus results also from network effect and attendant scale economies. Although FRAND requirements may lessen or eliminate monopoly-power effects, they do not lessen network-related effects.

First, US patent law has a curious and seemingly anomalous position on this issue of exacting further rewards for the use of patented technology physically embodied in an article of commerce sold downstream in the marketplace. Under the *General Talking Pictures* doctrine, patent law permits so-called “field-of-use” licensing, which allows different licensing arrangements to be made for manufacturing different products with different uses at different royalty prices: a patentee may license a first firm to manufacture a patented circuit for incorporation into a home radio receiver (but only for that use) at one royalty, while the same circuit can be licensed to a second firm for manufacturing TV transmitters at a higher royalty. 399

Presumably, under present law, Qualcomm could license A to make and sell baseband processors for incorporation into smartphones having less than 256 GB of memory, and license B to make and sell baseband processors for incorporation into smartphones having more than 256 GB of memory. Or it could license C to make and sell baseband processors for incorporation into smartphones selling for less than $500, and license D to make and sell baseband processors for incorporation into smartphones selling for more than $500. 400

On the other hand, US patent law does not allow patentees to manufacture and then sell patented products (say, vacuum tubes or ICs) to other persons, subject to a restriction that they be used or resold only for a particular use, such as only in the home radio field and not sold to TV set manufacturers. 401 The Supreme Court recently reaffirmed the principle of the exhaustion doctrine:

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399. See *Gen. Talking Pictures Corp. v. W. Elec. Co.*, 304 U.S. 175, 182 (1938), *aff'd on reh'g*, 305 U.S. 124 (1938) (affirming the legitimacy of license restricting amplifiers for use in home radios and not for use in theaters); *Armstrong v. Motorola, Inc.*, 374 F.2d 764, 774 (7th Cir. 1967) (enforcing license permitting use of patent in FM radios and not in FM broadcast transmitters—for which a greater royalty was charged). According to the dissent in the *General Talking Pictures* case, however, the so-called amplifiers were shelf-item vacuum tubes sold on the open market. *Gen. Talking Pictures*, 304 U.S. at 186 (Black, J., dissenting).

400. See *Impression Prods., Inc. v. Lexmark Int'l, Inc.*, 137 S. Ct. 1523, 1534–35 (2017). Whether that would be commercially feasible as a business matter is another question.

When a patentee sells one of its products, then the patentee can no longer control that item through the patent laws—its patent rights are said to "exhaust." The purchaser and all subsequent owners are free to use or resell the product just like any other item of personal property, without fear of an infringement lawsuit.\(^402\)

Once a patentee chooses to sell its patented product, "that product is no longer within the limits of the [patent] monopoly and instead becomes the 'private, individual property' of the purchaser, with the rights and benefits that come along with ownership."\(^403\) A patentee may permissibly limit the extent to which it parts with its monopoly power when licensing another to manufacture the patented product, as in the General Talking Pictures case, but post-sale restriction is not part of a patentee's bundle of rights (i.e., its statutory monopoly power). Therefore, "when an item passes into commerce, it should not be shaded by a legal cloud on title as it moves through the marketplace."\(^404\)

Any purported post-sale restriction is legally ineffective under patent law.\(^405\) In the Impression Products case, the Supreme Court rejected the contrary ruling below of the Federal Circuit that conflated the rule on post-sale restrictions with the rule of the General Talking Pictures case on manufacturing licenses.\(^406\)

\(^{402}\) Impression Prods., 137 S. Ct. at 1529.

\(^{403}\) Id. at 1531 (quoting Bloomer v. McQuewan, 55 U.S. 539, 549–50 (1852)).

\(^{404}\) Id. at 1534.

\(^{405}\) The Court stated that the patentee’s sale of an item “exhausts all of its patent rights in that item, regardless of any restrictions the patentee purports to impose.” Id. at 1529. Because patent policy appears to object to such restrictions, insisting on such a restriction as a condition of sale may well be misuse. See, e.g., id. at 1530. Cf. Zenith Radio Corp. v. Hazeltine Research, Inc., 395 U.S. 100, 140–41 (1969) (insisting upon total-sales royalty is misuse but consensual use of such a royalty for mutual convenience is not misuse). In any case, the conduct when insisted upon would appear to contravene patent policy. See Impression Prods., 137 S. Ct. at 1532. Whether contract law may provide a remedy for a breach of contract was left undecided in the case. The Court stated, “The single-use/no-resale restrictions in Lexmark’s contracts with customers may have been clear and enforceable under contract law, but they do not entitle Lexmark to retain patent rights in an item that it has elected to sell.” Id. at 15231 (emphasis added). But allowing a contract remedy is inconsistent with patent policy. See Kimble v. Marvel Entm’t, LLC, 135 S. Ct. 2401 (2015); Lear, Inc. v. Adkins, 395 U.S. 653 (1969). Both Kimble and Lear hold that contracts contrary to patent policy are unenforceable because patent policy trumps and preempts state contract law. For a more elaborate discussion of the issues concerning contractual enforcement of post-sale restrictions after Impression Products, see Stern, supra note 173, at 654–55.

\(^{406}\) Impression Prods., 137 S. Ct. at 1533–35.
The Court insisted on maintaining the distinction between, and opposite rules for, sales and licenses to manufacture.\footnote{Id.}

As the law now stands, therefore, it allows patentees to structure manufacturing licenses to capture values associated with different fields of use, even though not described in the patent claims, thus permitting different prices for different downstream uses. At least it does so unless some other law forbids the conduct because of its results.\footnote{Field-of-use licensing is not totally immunized from the antitrust laws. See Hartford-Empire Co. v. United States, 323 U.S. 386, 400–02 (1945) (holding a glass bottle cartel based on field-of-use licensing unlawful because of its anticompetitive effects); see also United States v. Glaxo Grp. Ltd., 410 U.S. 52, 64 (1973) (involving both post-sale restrictions and a manufacturing license limitation against sales of a drug in a form useful to generic drug companies, but the Court did not even mention the distinction between the manufacturing patent license limitation and the post-sale restrictions as being relevant to the outcome); Ethyl Gasoline Corp. v. United States, 309 U.S. 436, 457–58 (1940) (holding that a cartel regimenting the gasoline industry on the basis of a combination of post-sale restrictions on a patented product and field-of-use restrictions based on manufacturing licenses violated the Sherman Act).}

But the law does not authorize such downstream control for sales of the same patented product. Courts have made a trade-off between competing policies regarding reward incentives and the need for competition and liquidity in marketplaces.\footnote{Moreover, the potential harm to the public from post-sale restrictions on patented articles is excessive. See Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502, 516 (1917); see also Keeler v. Standard Folding-Bed Co., 157 U.S. 659, 667 (1895) (“The inconvenience and annoyance to the public that [allowing post-sale restrictions] would occasion are too obvious to require illustration.”). Another factor in the trade-off is a concern lest upstream actors appropriate technology values created by downstream actors, thereby skewing the reward and incentive mechanism, and discouraging downstream innovation. See Application-Dependent SEP Licensing, FAIR STANDARDS ALLIANCE (Aug. 30, 2016), http://www.fair-standards.org/wp-content/uploads/2016/09/FSA-Application-Dependent-Licensing-Paper.pdf.}

This result would seem to apply particularly for

\footnote{The longstanding doctrine of patent exhaustion provides that the initial authorized sale of a patented item terminates all patent rights to that item.”; see also Impression Prods., 137 S. Ct. at 1537 (“[T]he right to exclude just ensures that the patentee receives one reward”); Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 360 (1961) (Black, J., concurring) (“One royalty to one patentee for one sale is enough under our patent law as written.”).}
the use of SEPs, because the value of the product sold downstream derives in substantial part from the legally tolerated agreement of standard setters to anoint the product for standard-compliance and thus exclude non-compliant products.\textsuperscript{411} That is not a patent law problem, however, but rather a competition law problem, and one to be addressed separately.

There is a second patent law problem with the argument made about the greater uploading and downloading (and so forth) benefits that the 4G LTE patented technology confers on standard-compliant smartphones using it. The SEP itself is not a patent on downloading, uploading, streaming, and social media posting of more photos and videos, with bigger file sizes and higher resolutions. A smartphone SEP ordinarily claims only a semiconductor chip circuit for encoding or decoding a signal for cellular telephony in a telecommunication device that someone else (such as Apple or Samsung) designs and makes—and the patent claims only the circuit’s structure without reference to the number of downloads and postings to social media in which the patented chips participate. If the patentee invented a way to increase the number or speed of downloads and postings, and was entitled to collect payment for that, he should have claimed it as such in his patent application (such as “a method for increasing the downloading and uploading capability of a smartphone to such and such an extent, comprising doing such and such . . .”) and let the patent agency (the PTO) determine whether the claimed invention was meritorious enough to deserve a patent.\textsuperscript{412}

\textsuperscript{411} See cases cited supra notes 24–32 and accompanying text.

\textsuperscript{412} See Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 25–26 (1966) (quoting Lincoln Eng’g Co. v. Stewart-Warner Corp., 303 U.S. 545, 58 (1938)) (refusing to consider an unclaimed feature of the patented plow in determining patent validity, saying, “[n]o such function . . . is hinted at in the specifications of the patent. If this were so vital an element in the functioning of the apparatus it is strange that all mention of it was omitted”)}. The PTO would ask and determine: Is it patentable subject matter? Is the alleged benefit obvious? Is there any connection between that capability and why a patent should be allowed?
Still, it is troublesome to dismiss entirely the argument that a moral claim arises from conferring a benefit. That raises the issue, however, of who is conferring what benefit on whom. For example, if I invent scissors, is it appropriate that I be able to enforce different payments from those of my customers who use the benefit of my invention to clip bond coupons and those who use it to cut out paper dolls? In a Lockean property analysis, property values derive from mingling one’s labor with something out there in the world to make a new composite, which thereby becomes one’s property.\footnote{\textit{See John Locke, Two Treatises of Government} 306 (Peter Laslett ed., Cambridge Univ. Press 1960) (1690) ("Whatsoever then he removes out of the State that Nature hath provided, and left it in, he hath mixed his Labour with, and joyned [sic] to it something that is his own, and thereby makes it his Property").} I do not mingle my labor with the coupon clipper’s coupon to create his dividends. He is the one mingling his labor to earn the monetary rights that follow from wisely investing, clipping his bond coupons, and cashing them in. Furthermore, absent a patent on what is sought to be cashed in on, the argument that “it is only fair” that the patentee be paid extra for the expensive but unpatented downstream features loses its force. Whatever could be, but is not, patented falls into the public domain, and others have a right freely to copy it.\footnote{\textit{See Bonito Boats, Inc. v. Thunder Craft Boats, Inc.}, 489 U.S. 141, 164 (1989).} And that is even more the case for what cannot be patented at all.\footnote{\textit{See Compco Corp. v. Day-Brite Lighting, Inc.}, 376 U.S. 234, 237–38 (1964) ("Here Day-Brite’s fixture has been held not to be entitled to a design or mechanical patent. Under the federal patent laws it is, therefore, in the public domain and can be copied in every detail by whoever pleases.").}

This leads into the third difficulty with the “it is only fair” argument: who creates the value of standardization—even assuming, \textit{arguendo}, that it is relevant to ask that question (rather than look merely to the precedents of patent law and competition law) to determine what royalty is FRAND. The SEP owners say that they are the creators of the value of standardization, by employing the inventive engineers who devise patented technology used in standards.\footnote{\textit{See, e.g., Nelson, supra note 342.}} But that is not so. The main value of standardization, apart from impermissible values such as monopoly power or holdup, is that it creates

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\begin{enumerate}
    \item[413.] \textit{See John Locke, Two Treatises of Government} 306 (Peter Laslett ed., Cambridge Univ. Press 1960) (1690) ("Whatsoever then he removes out of the State that Nature hath provided, and left it in, he hath mixed his Labour with, and joyned [sic] to it something that is his own, and thereby makes it his Property").
    \item[415.] \textit{See Compco Corp. v. Day-Brite Lighting, Inc.}, 376 U.S. 234, 237–38 (1964) ("Here Day-Brite’s fixture has been held not to be entitled to a design or mechanical patent. Under the federal patent laws it is, therefore, in the public domain and can be copied in every detail by whoever pleases.").
    \item[416.] \textit{See, e.g., Nelson, supra note 342.}
\end{enumerate}
interoperability (along with resulting manufacturing economies of scale and the other benefits described in Part I).417 It does that by the concerted fiat of the standard setters,418 who agree on what shall be the technological rules (protocols) in the standard.419 The standard setters do not own the patent nor are they the manufacturers that implement the standard.420 They are, or say they are, independent and disinterested technicians who volunteer to devote their time and effort only to further the good of society.421 It is not the technology, as such, or its creators

417. See text and citations, supra notes 15–19.
418. The concerted agreement by standard-setters that excludes the unanointed technologies from the standard could be an antitrust violation were it not for the procompetitive effects of standardization. See Standard Sanitary Mfg. Co. v. United States, 226 U.S. 20, 48–49 (1912) (holding that an agreement among enamelware manufacturers not to deal in substandard goods was an antitrust violation); Broadcom Corp. v. Qualcomm Inc., 501 F.3d 297, 309 (3d Cir. 2007) (citation omitted) (“[S]tandard setting enhances consumer welfare and competition in the marketplace and is, therefore, consistent with the procompetitive aspirations of antitrust law. Thus, private standard setting—which might otherwise be viewed as a naked agreement among competitors not to manufacture, distribute, or purchase certain types of products—need not, in fact, violate antitrust law.”).
419. For example, in the IEEE, a supermajority consensus in the working group for developing the details of a standard must agree to the technology choices. Letter from Michael A. Lindsay to William J. Baer, supra note 306, at 5–9. Then that standard must be ratified by the IEEE-SA Standards Board, before it can be released. Id.; see also INST. ELEC. & ELECS. ENGR’RS, supra note 4, § 5. To some extent this process may appear like the “extra-governmental agency, which prescribes rules for the regulation and restraint of interstate commerce” condemned in Fashion Originators’ Guild of America v. FTC, 312 U.S. 457, 465 (1941), but the law considers it benign because of the procompetitive benefits of standardization. See Broadcom, 501 F.3d at 309.
420. When a standard setter owns the patents and manufactures the standard-compliant product, an antitrust violation could result if a rule-of-reason analysis established that the consequent anticompetitive conduct outweighs the procompetitive benefits. See Princo Corp. v. Int’l Trade Comm’n, 616 F.3d 1318, 1335–36 (Fed. Cir. 2010) (holding, under rule of reason, that the MPEG standard’s pooling of patents by competitive manufacturers Sony and Philips did not unreasonably restrain trade, because of lack of adverse market effect).
that proximately cause the benefits of standardization. It is, instead, the determination to standardize according to the particular technological criteria collectively agreed upon by the standard-setters—the SSO and its working groups—that causes the benefits of standardization. The SEP owners’ argument, therefore, that they have a moral claim to the benefits of standardization, because they created them and then provided them to the end user public, is based on an erroneous premise. SEP owners neither create nor provide the benefits of standardization to the public—standard setters do, purportedly doing so in order to benefit humanity. In effect, they designate the public as third-party beneficiaries of their unpaid efforts. In short, creation of technology is not creation of standardization, nor creation of the standard using the technology, nor creation of the benefits of standardization.422 The benefits are a gift to the public from the selfless, public-spirited technicians who develop the standard “for the benefit of humanity.”423

C. THE SYNERGISTIC VALUE CHAIN SHOULD TRUMP THE SHORTCOMINGS OF COMPETITION

Other SEP-holder spokesmen phrase the argument that SEP owners create the public benefits resulting from standardization, in slightly different terms, speaking of value flowing downstream synergistically from the patented LTE chip:

               
               

in instructing that participants have a fiduciary duty not to exercise powers in “the interest of your employer or any entity with whom you are otherwise affiliated,” and not to participate in actions “in which a participant’s decisions or votes could substantially and directly affect the participant’s professional, personal, financial or business interests.” Claire H. Topp, Overview of Certain Legal Issues and Responsibilities, A Presentation to the IEEE Standards Association Standards Board and Committees, New Member Orientation (Mar. 2017), https://standards.ieee.org/about/sasb/nmo_ct.pdf. These words may, at times, be more aspirational than actualized. See Bob Liu, IEEE Unable to Agree on 802.11g Standards, WI-FI PLANET (May 18, 2001), http://www.wi-fiplanet.com/news/article.php/782961/IEEE-Unable-to-Agree-on-80211g-Standards.htm (describing how a TI official, as chair of 802.11g group, attempted to block consideration of rival Intersil’s technology for incorporation into standard, but his ruling was overturned on appeal within IEEE).

422. The issue of attribution to an agent or actor is a difficult policy question invoking the shades of Mrs. Palsgraf and the owners of the ship Polemis. To avoid unduly interrupting the flow of this Article, further discussion of this issue is relegated to Appendix B, infra.

423. See, e.g., IEEE Mission and Vision, supra note 421.
But the value to consumers of the camera phone, and thus the value to them of the cellular capability, is enhanced by the ability to share pictures taken with the camera in the phone over the cellular network with others. And conversely the value of the camera capability is enhanced by the ability to send photos via the cellular network. That is, there is a value synergy between the camera feature and the cellular capability. Focusing only on the “smallest saleable unit” ignores this source of synergistic value. . . . [The IEEE policy] denies the patent holder any share of that synergistic value, which can be considerable. In our view, that is not “reasonable” in the sense of “commercially reasonable,” and fails to “adequately compensate” the patent holder for that aspect of the infringement. 424

They thus argue that there is a “value chain” that flows synergistically downstream from the chipset level. They contend that the 2015 IEEE Patent Policy—and any Federal Circuit case law—to the effect that a RAND royalty should be based on the smallest saleable patent-practicing unit—and thus should be measured at the chipset level—“ignores the fact that both handset manufacturers and cellular service providers are also using the patented technology to sell products/services, and that the value that they receive from using the patented technology is unlikely to be reflected in actual chipset prices/profit margins.” 425 Why? The reason, they explain, is competition:

It would be one thing if one were to show that chipset manufacturers were able to set the prices of chipsets so as to extract all of the value that those “downstream” from them in the “value chain” received from using the patented technology, but that is unlikely given competition at the chipset level. . . . Simply put, there is no reason to believe that a royalty assessed at the chipset (“component”) level, especially one assessed with reference to chipset prices and chipset profits, adequately captures the value to those at other levels in the value chain—such as handset manufacturers and cellular service providers—of using patented cellular technology. Such royalties are not likely to be “adequate.” 426

At this point, any “fairness” argument has gone astray. The protest made here is that free competition in semiconductor chips is unfair and its benefits to the public should not be allowed. It is also a complaint that the legal doctrine that, once a patented product is sold, the product is no longer under the

425. Teece & Sherry, supra note 393, at 8–9.
426. Id. at 9.
protection of the patent law (the "exhaustion doctrine"), is wrong and that in a well-ordered world the doctrine would be abolished. This is not the place to address that argument in detail, but there are strong reasons why the US courts have followed that doctrine for well over a century.\footnote{427} In any case, the translation into plain English of the SEP spokesmen's argument made here is that cell phone buyers should be forced to fork over more cash to SEP holders so that the latter could adequately capture (or fully extract) the monetary value that would exist, but for competition in the chip market. That is not an appealing argument.\footnote{428}

Moreover, the argument is, essentially, a plea to scrap patent law's long-settled entire market value royalty principle—that in order to recover as damages a percentage of total revenues or profits attributable to an entire multi-component product, such as a cell phone, the patentee must establish that the patented component or feature drives the market demand for the entire product.\footnote{429} But when the value of one component out of many components that make up the value of the entire

\footnote{427.} See Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502, 516 (1917); Adams v. Burke, 84 U.S. 453, 456 (1873). In the \textit{Motion Picture Patents} case, the Court held that "[t]he patent law furnishes no warrant for such a practice [controlling customers' post-sale use of patented products in order to increase patentee's revenue], and the cost, inconvenience, and annoyance to the public which the opposite conclusion would occasion forbid it." 243 U.S. at 516. \textit{See also} Impression Prods., Inc. v. Lexmark Int'l, Inc., 137 S. Ct. 1523, 1532 (2017) (quoting Keeler v. Standard Folding Bed Co., 157 U.S. 659, 667 (1895)) ("The inconvenience and annoyance to the public that an opposite conclusion would occasion are too obvious to require illustration.").

\footnote{428.} The Supreme Court has instructed that the policy of the antitrust laws "precludes inquiry into the question whether competition is good or bad." Nat'l Soc'y of Prof'l Engrs v. United States, 435 U.S. 679, 695 (1978); \textit{see also} Standard Oil Co. v. FTC, 340 U.S. 231, 248 (1951) ("The heart of our national economic policy long has been faith in the value of competition."); United States v. Socony-Vacuum Oil Co., 310 U.S. 150, 221–22 (1940) (the antitrust laws do not "permit[] the age-old cry of ruinous competition and competitive evils to be a defense" nor "genuine or fancied competitive abuses as a legal justification").

\footnote{429.} For this rule \textit{see, e.g.}, Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc. (\textit{CSIRO}), 809 F.3d 1295, 1301 (Fed. Cir. 2015); VirnetX, Inc. v. Cisco Sys., Inc., 767 F.3d 1308, 1326–27 (Fed. Cir. 2014); Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1345 (Fed. Cir. 2011) (citation omitted) ("The entire market value rule allows a patentee to assess damages based on the entire market value of the accused product only where the patented feature creates the 'basis for customer demand' or 'substantially create[s] the value of the component parts.'"); \textit{see also} Garretson v. Clark, 111 U.S. 120 (1884).
product is proposed to be made the base for a royalty determination, it is no more entitled to such treatment than each of the other components. Therefore, if all SEP-embbodying components are rewarded that way (in terms of the value of downstream products), and each SEP is by definition essential, the stacked sum of the values comprising the royalty base will likely exceed 100 percent of the market value of the product. The royalty sum will not be a reasonable royalty, the individual royalties so computed will not be reasonable royalties, and the traffic could not bear them. Reasonable royalties are those attributable to the patented invention (that which is claimed), meaning attributable to the features of the product that constitute or directly result from the patented invention, not the other features of the product. 430

D. INCENTIVIZE ME OR I’LL DEFECT

A highly theoretical argument is often made by SEP owner spokesmen—that lessened compensation to SEP owners will “disincentivize” them from creating technology and contributing it to standardization, stagnating further standardization. For example:

If the SEP holder cannot capture any of the value from standardization that its technology creates for the standard, it will have a dampened incentive to continue contributing its best technologies to SSOs. In the long run, the quality of technologies contributed to a future standard—and the expected value of that new standard—would decrease. The SEP holder’s decision to contribute its technologies to a standard depends on the compensation that an SEP holder expects to obtain from such a contribution, compared with the SEP holder’s alternative option to monetize its invention outside the standard. . . . If the SEP holder expects not to be compensated fully for its contributions, it will not commit its most valuable technologies to the standard. 431

430. Ericsson Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1226 (Fed. Cir. 2014). This rule goes back to the 19th century. See Garretson, 111 U.S. at 121 (1884); Seymour v. McCormick, 57 U.S. 480, 490–91 (1854) (holding that the owner of patent on seat for machine for reaping grain was not entitled to damages based on value of entire machine).

431. Sidak, supra note 271, at 1869; see also supra text and sources accompanying notes 342–43. This is also the thrust of Teece and Sherry, supra note 393, who ask whether the IEEE shot itself in the foot by adopting the 2015 Patent Policy update.
But the amount of dampening of incentive (assuming that we do not already have enough or more than enough incentive for smartphones) may well be outweighed in impact by the prospect of nonetheless gaining first-user and head-start advantage from incorporation of one’s technology into a standard, and the opportunity to increase one’s equipment sales (anointed with the imprimatur of the standard), even if one cannot also obtain monopoly profits as well, from SEP royalties. In a sense, those advantages are a form of “the compensation that an SEP holder expects to obtain” from such a SEP contribution, but the commentator fails to take those significant incentives into consideration. Moreover, the supposed “SEP holder’s alternative option to monetize its invention outside the standard” may be a figment of the SEP holder spokesman’s imagination. If an alternative technology becomes standard, the only opportunity to monetize the withheld invention may be to incorporate the technology into unsaleable non-standard products. Defection may be a poor business strategy.

Furthermore, a considerable amount of standardization activity has been coming from groups that prohibit the participating companies or individuals from collecting SEP royalties—so-called “RF-RAND” (royalty-free RAND) and “RAND-Zero” (RAND with zero royalties) groups or groups that

432. As in the case of the TI-Intersil 802.11g contest that resulted in zero-royalty offers. See supra note 22.
433. Sidak, supra note 271, at 1869.
434. Id.
rely on promises not to assert essential-patent claims—as well as from SSOs that permit RAND licensing but whose members in practice collect royalties on few, if any, standards. The availability of these important, royalty-free technology sources is a factor in evaluating the threatened “disincentivization” and massive resistance against the policies reflected in the IEEE 2015 Patent Policy update.

Finally, the disincentivization argument is pure ipse dixit, for no analysis of comparative rates of return on alternative investment opportunities is offered. Nor is any empirical support provided. The rhetoric of “Incentivize me or I’ll defect” is completely unsupported and therefore not credible.

E. LEGAL SYMMETRY

One final, more subtle—perhaps the most elaborately and thoroughly conceived—argument for awarding SEP owners the value of network effects should be considered. Professors Siebrasse and Cotter make a complex, theoretical argument to justify the entitlement of SEP owners to a share of the surplus that standardization creates, up to the entirety of network value, as a matter of justice (equal treatment and legal symmetry) and on grounds of furthering economic efficiency.

436. The Internet Engineering Task Force (IETF) is such a group. IETF strongly prefers to use unpatented or royalty-free technologies, but allows its working groups to adopt technology with a commitment of RAND terms, or even with no licensing commitment, when that technology is superior enough (and sufficiently cost-justified) to unpatented and royalty-free alternatives. See generally Jorge L. Contreras, A Tale of Two Layers: Patents, Standardization, and the Internet, 93 DENVER L. REV. 855, 867–74 (2016), http://www.iilj.org/wp-content/uploads/2017/01/Contreras-A-Tale-of-Two-Layers-Patents-Standardization-and-the-Internet.pdf.

437. See Biddle et al., supra note 247, at 2. This study found that 22% of standards used for laptops were developed under royalty-free policies. See id. fig.2.

438. See PÖHLMANN, supra note 343, at 12–13 (finding no decline in participation in IEEE standardization).

439. Their arguments are developed both in Siebrasse & Cotter, supra note 20, and in Siebrasse & Cotter, supra note 35. See also Norman V. Siebrasse & Thomas F. Cotter, A New Framework for Determining Reasonable Royalties in Patent Litigation, 68 FLA. L. REV. 929 (2016), http://www.floridalawreview.com/wp-content/uploads/1-Siebrasse-Cotter.pdf, in which the authors describe their methodology more generally when it is applied to patent infringement without particular emphasis on SEPs and standardization. The New Framework article, however, is more concerned with how best to calculate a reasonable royalty than
They begin by disaggregating the surplus into components. The first is network effects, mainly the increase in end-user interconnectivity because of interoperability, but also such other effects as reduction of manufacturing costs resulting from economies of scale. The other major component is a group of “evil” values of one sort or another, mainly sunk cost holdup, as well as disproportionate capture of value by opportunistic SEP owners that have made only minor contributions to the technology of the standard. They say that the evil values are cancelled out by their SEP owner reward methodology. They with (as the present Article is) the justifications advanced for awarding the values of standardization (particularly network effect value) to one or another stakeholder.

440. This component may also include reduced transaction costs associated with repeated, less diverse transactions, and intangible social benefits such as increased innovation and increased competition. It is unclear from their analysis whether they assign to this category the sales-enhancement prestige effects of anointment of equipment that result from attaching to it the label or imprimatur of the standard—as in the case of the 802.11g TI-Intersil contest. See supra discussion and sources cited at note 22. This value should be considered, because it can be significantly rewarding to a seller. Id. A related value that probably is or should be included here is facilitating sales of complementary products as in the case of the Windows operating system software. Siebrasse & Cotter, supra note 20. To be sure, these values go to relevant SEP owners automatically, and no one appears to object to that or to propose to prevent it—beyond the case law requirement that royalties awarded in patent infringement suits will conform to the body of law described in such cases as CSIRO. See supra text accompanying notes 266–72.

441. It is unclear to which category they assign non-sunk cost holdup, i.e., the “surge” value due to exploitation of the monopoly power standardization confers on a SEP, unless that power is cabined by FRAND or some other mechanism, and is not due to the exploitation of sunk costs. See supra text accompanying notes 27–34. They may consider this value a legitimate part of the value of standardization, to which SEP owners have a claim. For example, they state: The broader definition of holdup that is more commonly used by the courts encompasses anything that allows a SEP owner to charge more after adoption of the standard (ex-post) than it could have charged before (ex-ante). This includes increased value due to network effects if the standard is widely adopted . . . . Siebrasse & Cotter, supra note 20, at 368.

442. Although the authors insist that, according to economic theory, their methodology will eliminate sunk cost holdup, it is not clear that their methodology will in fact succeed in doing that. However, that may not be a concern, for they emphasize that their approach “probably cannot be directly implemented in practice,” and their goal is only to “provide[] a principled way of interpreting the valuation principles articulated” in the IEEE Patent Policy
disclaim providing any holdup values to SEP owners, not because they believe holdup is unfair or dishonest, but because it is inefficient: risk of becoming subjected to holdup would discourage implementers from making socially valuable investments that might make them vulnerable to holdup, and the prospect of the rewards of sunk cost holdup would induce patentees to overinvest in developing patents to capture (in troll-like manner) implementers’ sunk costs.443

They find it intuitively unfair that users of the technology employed in a standard should capture all of the network value of standardization when the users, in contrast to the SEP owners, have “contributed nothing at all to the development of that technology.”444 Therefore, they say, the SEP owner is entitled to capture the “properly defined” part of the value of standardization (such as the network value).445

They contend that the Federal Circuit and the IEEE Patent Policy mistakenly assume, when insisting that a reasonable royalty must be limited to the “value of the technology,” that what constitutes the “value of the technology” is self-evident. The authors insist that the value of any given technology is the value of its functionality to its users.446 For example, they say, the value of Wi-Fi to users of that technology, whether consumers or manufacturers, would be the same irrespective of whether that bundle of technology emerged from the IEEE 802.11 multi-actor process or from a single inventive entrepreneur, such as the inventors Charles Steinmetz or Nikola Tesla, or for that matter a single inventive corporate entity such as Bell Labs.447 They insist that it is impossible conceptually to separate the respective contributions to the value of standardization of the value of network due to interoperability

and such recent Federal Circuit cases as Ericsson and CSIRO. Siebrasse & Cotter, supra note 35, at 1169.
443. Id. at 1190.
444. Id. at 1179. But creation of technology is not creation of standardization or creation of the standard. See supra text following note 421.
446. Id. at 1202 (“In our view, ‘the value of the technology’ is simply the value of the technology to users; or more precisely, the value of the functionality provided by the patented technology.”).
447. Id.
and the value of the technology itself.\textsuperscript{448} To the user of technology they are all one and the same; they are all one undifferentiated aggregate.

Thus, the authors deny that the pre-standardization and post-standardization (i.e., ex-ante and ex-post) values or market prices of a patent or patented product can be meaningfully compared. They assert that strategic conduct and the anticipation of the possibility of gain from standardization anointment make it impossible; this so distorts the ex-ante price that it cannot be determined properly, leaving the only accurate price the ex-post price.\textsuperscript{449} At the very least, they say, the ex-post value of an invention to its users provides a sounder and more accurate basis for determining the value of patented technology.\textsuperscript{450} Therefore, one should give up on trying to determine reasonable royalty solely on the basis of ex-ante value or the so-called value of the technology itself, because there is a mystery factor operating that keeps us from ever grasping (shades of the Heisenberg principle and Schrödinger’s cat) the real ex-ante value.\textsuperscript{451}

This seems to be an overstatement. Clearly, LTE patents were worth more in the licensing marketplace after LTE’s

\textsuperscript{448} Id. at 1202–03 (“But it is conceptually impossible to separate the contribution of the technology and the contribution of the network effects, unless we say that the value of the technology is the value when there are no network effects at all.”).

\textsuperscript{449} They suggest also that there is some hypocrisy in the courts’ purporting to reject all reference to ex-post values, since courts accept the commonly used running royalty, which in its total must be based on the product of price and sales volume. Sales volume necessarily increases if the standard is successful, so that total royalty increases ex-post. Id. at 1220 (“[A]ny running royalty in which the amount owing to the patentee increases with total sales will reflect in large part the increased value of the technology due to standardization”). Therefore, they say, even those who assert “that the SEP owner is not entitled to capture the value arising on standardization . . . cannot mean that the patentee is not entitled to any part of the value arising from network effects.” Id. This argument shows, however, only that SEP owners are generally conceded the right to enjoy the volume effect on their revenues. Cf. Teece & Sherry, supra note 393 (asserting that excluding SEP owners’ right to volume effect on revenues is a problem with new IEEE policies). But the fact that SEP owners are conceded to have the right to profit from volume effects does not logically entail their right to profit from network effects.

\textsuperscript{450} See Siebrasse & Cotter, supra note 35, at 1202.

\textsuperscript{451} Id. at 1176–78; 1201–02 (asserting that an intuitive valuation of a technology’s value is impossible even in a simple example).
proponent (Qualcomm) defeated the proponents of IEEE 802.16 (WiMAX) for 4G standardization, and WiMAX patents were probably less valuable ex-post. Moreover, its CDMA patents became vastly more valuable to Qualcomm after it persuaded TIA to adopt it as standard over rival technologies. The same would apply to contests over de facto standards. A Betamax license for manufacturing videotape players, and the Betamax videotape players themselves, must have commanded a lower market price after VHS triumphed over Betamax—and vice versa for VHS prices. It ought to be possible to determine such matters approximately, if it is indeed relevant to do so.

But is it really necessary to know exactly or accurately what the surge is from ex-ante to ex-post? We generally have an approximate idea of what a total reasonable royalty is for a standard-compliant product, on the basis of “what the traffic will bear,” which is usually considerably less than the sum of individually and separately calculated reasonable royalties. When one is obliged to apportion royalties among many SEPs, as is usually the case for high-tech products, it would seem reasonable to assume that the mystery factor operates more or less equally on all of the SEPs. Hence, if one allocates the total reasonable royalty for a standard-compliant product among all the relevant SEPs, according to their respective technical merits, as the district courts seem to have been doing, when they were

452. The Federal Circuit instructs that great precision in determining reasonable royalties is unnecessary. See, e.g., VirnetX, Inc. v. Cisco Systems, 767 F.3d 1308, 1330 (Fed. Cir. 2014) (internal quotations omitted) (“We have long acknowledged that any reasonable royalty analysis necessarily involves an element of approximation and uncertainty.”).

453. See supra text accompanying notes 247–48, 277.

454. See, e.g., Microsoft Corp. v. Motorola, Inc., No. C10-1823JLR, 2013 WL 2111217, at *73 (W.D. Wash. Apr. 25, 2013). In that case the district court considered the fact that there are “at least 92 entities that own 802.11 SEPs,” so that if each of them sought a royalty equal to Motorola’s “request of 1.15 % to 1.73 % of the end-product price” the aggregate sum would add up to far more that what the court considered was the upper limit of a possible reasonable royalty—because it was a sum that “would exceed the total product price,” which could not be a RAND royalty, since it would “make the end-product price untenable commercially.” Id. For those reasons, the court considered Motorola’s royalty proposal more than the traffic could bear and thus not a reasonable royalty. Accordingly, it lowered the royalty to counteract a stacking effect. Id. at *86 (“Thus, the fee that results from a hypothetical RAND negotiation is necessarily informed by the court considering the entire world of known SEPs relevant to a given standard. That ultimate sum must be the aggregate
not basing royalties on comparable licenses, and as patent pools routinely do in accordance with an agreed-upon formula or with the aid of technical experts, the exact ex-ante prices should have been if the mystery factor had not been operating. Because the traffic cannot bear a stacked royalty, by lowering royalties to a non-stacked level the necessary shrinkage and allocation cancels out the effect of the mystery factor. If that is valid, then the authors’ concern that we cannot have a conceptual theory based on ex-ante pricing (because, they say, we cannot know the “real” ex-ante value, or at least the perceived ex-ante value much more poorly reflects the real value of technology to users than the ex-post value does) is misplaced, and the conclusions they draw from that concern do not follow.

There is, therefore, an approximate “shrunk” ex-ante price that factors into the reasonable royalty calculation. The ex-ante principle of Ericsson and CSIRO then becomes more of a philosophical or aspirational principle generally guiding the courts, however, rather than an actual procedure for calculating a reasonable royalty for a specific patent infringement (a royalty which is lowered to some extent because a stacked royalty is licensing fee of all essential patents calibrated against the principle that license fees should not be stacked in such a way that makes implementation of the standard prohibitively expensive.”).

455. Various patent pools that received business review clearance letters from the Department of Justice have used different such royalty-revenue allocation arrangements. For example, a DVD6C pool managed by Toshiba used an agreed allocation formula based on several factors, including frequency of infringement of the patent. Letter from Joel I. Klein, Assistant Att’y Gen., U.S. Dep’t of Justice, to Carey R. Ramos, Counsel for DVD Licensors 7 (June 10, 1999), http://www.usdoj.gov/atr/public/busreview/2485.pdf. Another common procedure, used for example in the MPEG-2 pool, is simply to allocate royalty-revenue on the basis of the patentee’s percentage of all patents in the pool. See, e.g., Letter from Joel I. Klein, Assistant Att’y Gen., U.S. Dep’t of Justice, to Gerrard R. Beeney, Counsel for MPEG-2 Licensors 3 (June 26, 1997), https://www.justice.gov/sites/default/files/atr/legacy/2006/10/17/215742.pdf.


457. The courts’ reluctance to allow stacking tends to limit the permissible sum of royalties on a standard-compliant product to less than the arithmetic sum of the individual royalties would otherwise be. Thus, a falling tide lowers all boats. The fallen-tide, “what the traffic will bear” royalty sum, however, does overstate the numbers and to that extent overcompensate SEP owners, because it does not add in the value of unpatented technology that provides part of the value. In effect, that value gets allocated to the SEP owners’ shares.

unreasonable).\textsuperscript{459} And, in any case, the issue over which figurative blood is running in the streets is not how in detail to calculate a reasonable royalty based on \textit{ex-ante} value (or whether one can do so accurately). Rather, the controversy is over whether to base reasonable royalties on an upstream or downstream royalty base, and whether to award SEP owners all, some, or none of the network value (and related values) that standardization generates.

At this point, it is possible to address the authors’ main argument, to which the foregoing analysis leads up. The attempted deconstruction of \textit{ex-ante} pricing is just a foundation for advancing the commentators’ proposals to replace it with a system ("contingent \textit{ex ante} pricing")\textsuperscript{460} awarding network values to SEP owners. The authors address why the network effect on a SEP’s value \textit{should} go in whole or in part to the SEP owners.\textsuperscript{461} They say, correctly, that current US patent law holds that a patentee acting alone can charge as high a royalty as he wants, or that the market will bear.\textsuperscript{462} Thus, if Charles Steinmetz were unilaterally licensing his patents, he could

\textsuperscript{459}. This borrows from Siebrasse and Cotter, who say:

[O]ur proposed approach, like most idealized models, probably cannot be directly implemented in practice. It is nonetheless useful as a conceptual benchmark for assessing the merits of more practical methodologies and comparators, which should serve as proxies for the theoretical ideal. Our approach also provides a principled way of interpreting the valuation principles articulated in the emerging case law, as well as the recently adopted [IEEE Patent Policy] (which, like some of the cases cited above [CSIRO, Ericsson] states that a FRAND royalty should not include the value resulting from a patent’s inclusion in a standard.

\textit{Id.} at 1169–70.

\textsuperscript{460}. \textit{See id.} at 1164 n.15 ("[U]nder the contingent \textit{ex ante} approach the patentee is entitled to the value of the patented technology \textit{ex ante} (that is, prior to incurring sunk costs) given that the patent is chosen for inclusion in the standard, over the value of the next-best unpatented technology \textit{ex ante} had \textit{that} technology been chosen for inclusion in the standard.").

\textsuperscript{461}. \textit{See id.} at 1168.

\textsuperscript{462}. Siebrasse & Cotter, \textit{supra} note 35, at 1178 ("[A] classic example of the patent system working the way it should: the patentee invents a valuable product, charges what the market will bear and is rewarded accordingly."); see Brulotte v. Thys, 379 U.S. 29, 33 (1964) ("A patent empowers the owner to exact royalties as high as he can negotiate with the leverage of that monopoly."); W.L. Gore & Assocs. v. Carlisle Corp., 529 F.2d 614, 623 (3d Cir. 1976) ("The general rule is that, absent any overriding unlawful conduct, ‘A patent empowers the owner to exact royalties as high as he can negotiate with the leverage of that monopoly.’").
charge a royalty that included network value. Yet, so many patents are needed to comply with a standard for such a complex product as a cell phone that no licensor can provide all the necessary technology and patents.\footnote{RPX estimates that 250,000 patents are relevant to cell phones, but not all of them are SEPs. See RPX Corp., supra note 277, at 59. Nonetheless, thousands are SEPs. See Mobile Communications, supra note 77.} It is necessary to provide would-be implementers with a portfolio of SEPs owned by many different SEP holders. Considerations of legal symmetry (i.e., giving equal treatment and equal justice to all similarly situated SEP owners), they say, dictate that the SEPs of many SEP owners combined in such a portfolio may be licensed just as Steinmetz’s (or those of a single proprietor of a de facto standard) could—that is, at a price that includes the network value.\footnote{See Siebrasse & Cotter, supra note 35, at 1235–36.} It is thus unreasonable not to treat all patentees alike.\footnote{Id. at 1203–04 (“In our view, the patent system should not discriminate between inventions depending on the source of their value to users, but if there is an argument to be made for discrimination on that basis, surely network effects are not a source of value that should be particularly disfavored.”).} They add that paying patent owners enough to incentivize them is necessary. Otherwise they will defect to other endeavors, hampering standardization.\footnote{Id. at 1203 (arguing that, for example, if the owner of an invention that greatly increases Wi-Fi speeds “is not entitled to capture any value of standardization, there will be a substantially greater incentive to invent technologies like [fashion fads] rather than enhanced WLAN, even though the social value is the same in either case.”).}

For these reasons, the authors suggest a hypothetical model of how best to allocate the values of standardization (such as network effect value) between users of a standard (i.e., implementers) and an SSO having as its members a consortium of SEP owners.\footnote{Id. at 1197.} The model contemplates a several-step process in which the SEP-owner-SSO would negotiate with user-implementers \textit{ex-ante}, for a royalty rate to be used on condition that the standard under consideration is adopted.\footnote{See id. at 1198.} This model, in allowing a consortium of patentees to license a portfolio of SEPs, suggests an arrangement something like the MPEG patent pool for digital video and audio technology.\footnote{See generally MPEG-2 FAQ, supra note 80 (explaining the basics of a MPEG-2 Patent Portfolio License).} The authors...
believe that this negotiation would result in the SEP owners, through a collective bargaining process akin to that established under the NLRA, capturing a portion of the network value that standardization generates, with an upper limit of the entire value. They believe that the SEP-owner SSO, acting as whole would want and therefore act non-opportunistically in a manner to ensure both adequate compensation for themselves and, by not setting an excessive royalty level, widespread adoption of the standard.

This is an ambitious and ingeniously constructed program. There are some problems in the details, however. The legal symmetry and equal justice argument is based on the premise that different patentees (say, Steinmetz compared to Ericsson + Nokia + Qualcomm + . . .) are similarly situated in regard to royalty pricing. The proposal calls for concerted price determination among competitors, in part with the laudable aim of avoiding stacking and allocating SEP royalties in a way that avoids disproportion. It also has the avowed aim of increasing SEP royalties to SEP owners, so that all or part of network effect value goes to the members of the consortium of SEP owners.

A consortium of Ericsson, Nokia, Qualcomm, and so on, however, is not the factual or legal equivalent of Charles Steinmetz. First, what might be only fair for Steinmetz, the individual inventor, confronted by such implementers as Apple, Cisco, HP, Microsoft, and Samsung, individually or collectively, is not fair for Ericsson + Nokia + Qualcomm + . . . The symmetry and equal justice argument presupposes similarly situated actors. That premise does not apply to the facts. Therefore, symmetry and equal justice do not require awarding network values in whole or in part to SEP holders.

470. 29 U.S.C. § 157 (2012) (providing employees with the right to engage in "concerted activities for the purposes of collective bargaining or other mutual aid or protection").
472. Id. at 1207–09.
473. Id. at 1239–40.
474. Id. at 1238.
475. Id. at 1218 ("It is unobjectionable for the patentee to appropriate some part of the increased value derived from network effects on standardization.").
476. See pie chart supra note 94 (showing the market share, and thus suggesting the bargaining power, of such a hypothetical consortium).
Further, under settled principles of US law, concerted price determination among SEP holders that are competitors is not the same as unilateral price determination.\textsuperscript{477} The legal standard to which a group of actors—whether labeled a consortium, joint venture, cartel, or walking conspiracy—is subject is less permissive than that for a single actor’s unilateral conduct.\textsuperscript{478} The MPEG pool was cleared in a Department of Justice business review letter, because of its procompetitive benefits, but the clearance was based on the assurance that “contemplated royalty rates are likely to constitute a tiny fraction of MPEG-2 products’ prices, at least in the near term.”\textsuperscript{479} It was thus anticipated that the effect of the horizontally concerted pricing would be to lower total royalties, not raise them by awarding network value to SEP owners.\textsuperscript{480} It is extremely unlikely that a proposal with the avowed purpose to raise royalties through concerted action among competitors

\textsuperscript{477} See, e.g., United States v. U.S. Gypsum Co., 333 U.S. 364, 400–01 (1948) (Sherman Act was violated when in cross-licenses “the defendants, constituting all former competitors in an entire industry, had acted in concert to restrain commerce in an entire industry under patent licenses in order to organize the industry and stabilize prices.”); United States v. Line Material Co., 333 U.S. 287, 312 (1948) (patent law does not confer on a patentee “authority to combine with other patent owners to fix prices on articles covered by the[ir] respective patents,” and the Sherman Act prohibits it); United States v. Masonite Corp., 316 U.S. 265, 276 (1942) (holding combination of patentees illegal when they pooled patents and designated one pool member to determine prices; because “there was price-fixing, the fact that there were business reasons which made the arrangements desirable to the [defendants] . . . or the fact that from other points of view the arrangements might be deemed to have desirable consequences would be no more a legal justification for price-fixing than were the ‘competitive evils’ in the Socony-Vacuum case.”).


\textsuperscript{479} Letter from Joel I. Klein to Carey R. Ramos, supra note 455, at 11.

\textsuperscript{480} Id. at 11–15.
would similarly receive clearance, or survive a litigation challenge, nor should it. Therefore, to the extent, if any, that concerted price-setting is necessary in order to avoid runaway stacking and disproportion, in the course of awarding network values to SEP owners, the project cannot pass legal muster.

The incentivization argument is also subject to question. It does not consider the many non-royalty benefits to a SEP owner of anointment in a standard that Part I discusses, or the possible availability to implementers of alternative sources of technology. These factors may well provide a sufficient basis to deter SEP holder defection. And even if the risk of defection threatened to harm the standardization process gravely, that would not save a horizontal agreement to raise royalty rates to a non-ruinous level. Agreements among patentees to prevent allegedly harmful competition have fared badly in the courts for at least a century.

For these reasons, whatever are the merits of contingent ex-ante pricing in general, this carefully constructed argument that allocating at least some network value to SEP owners is necessary to be fair to them and to provide adequate incentives

481. See cases cited supra note 477.
482. See Leegin Creative Leather Prods. v. PSKS, Inc., 551 U.S. 877, 893 (2007) (“A horizontal cartel among competing manufacturers . . . to increase price is, and ought to be, per se unlawful.”).
483. See text and citations, supra notes 15–19.
484. Supra text accompanying notes 435–37.
485. Arizona v. Maricopa Cty. Med. Soc’y, 457 U.S. 332, 346 (1982) (quoting United States v. Socony-Vacuum Oil Co., 310 U.S. 150, 221 (1940)) (“Congress has not left with us the determination of whether or not particular price-fixing schemes are wise or unwise, healthy or destructive. It has not permitted the age-old cry of ruinous competition and competitive evils to be a defense to price-fixing conspiracies.”); United States v. Apple, Inc., 791 F.3d 290, 332 (2d Cir. 2015) (citations omitted) (“[T]he Sherman Act does not authorize horizontal price conspiracies as a form of marketplace vigilantism to eliminate perceived ‘ruinous competition’ or other ‘competitive evils.’ Indeed, the attempt to justify a conspiracy to raise prices ‘on the basis of the potential threat that this conspiracy poses . . . is nothing less than a frontal assault on the basic policy of the Sherman Act.’”); Freeman v. San Diego Ass’n of Realtors, 322 F.3d 1133, 1152 n.24 (9th Cir. 2003) (“If there is any argument the Sherman Act indisputably forecloses, it is that price fixing is necessary to save companies from losses they would suffer in a competitive market.”).
to keep them from defecting from standardization does not make a persuasive case.

The arguments for awarding SEP holders some or all of the surplus that standardization generates should be evaluated in terms of the likelihood that the factual assumptions that underlie them are well supported. The assertion that failure adequately to incentivize SEP owners by paying them ex-post, downstream royalties will result in defection simply is inconsistent with such empirical data as the existence of Bluetooth, USB, and HTML, as well as the collateral benefits of anointment that visibly cause patent owners to vie for the chrism of standardization for their products, even to the point of dedicating their patent rights to implementers in order to gain it. At the very least, the reality of the threatened defection and consequent loss of future technology for standardization is not proved. The moral argument also fails because creating technology is not equivalent to creating standardization and its benefits.

F. THE END IS NOT IN SIGHT

Thus far, the group of major SEP holders—such SEP holders as Qualcomm, Ericsson, InterDigital, and Nokia—have not receded from their position that they will not yield to the 2015 Patent Policy. It has been observed, “It remains to be seen how the IEEE will respond to these statements,” so that if the IEEE also sticks to its position, “[t]here clearly is a possibility for ‘brinkmanship’ and/or inefficiency (avoiding the use of societally-beneficial patented technology).”487 However, the strength of the threat of withdrawal from the standard-setting process depends on how essential, as a practical matter, the future technology of present SEP owners will be. If alternative technologies will continue to be available, as some have

487. Teece & Sherry, supra note 393, at 11; see also Richard Lloyd, One Year on and the IEEE’s Controversial Patent Policy Changes Continue to Divide Technology Companies, IAM (May 16, 2016), http://www.iam-media.com/Magazine/Issue/78/Insights/One-year-on-and-the-IEEEs-controversial-patent-policy-changes-continue-to (“Effectively, the situation is at an impasse.”).
claimed, the threat to withdraw from the standardization process will be empty. Then the technology of future 6G, 7G, and 802.11zzzz will embody the competing alternative technologies, and the 2015 Patent Policy will fully apply. SEP holder spokesmen, however, predict the death or maiming of standardization. Whether that happens involves the prediction of future events. The answer will come from the facts yet to emerge, not the present rhetoric of those who oppose or support the 2015 Patent Policy update.

One commentator, Darryl Lim, sees this controversy as a “convergence of technologies and a divergence of interests,” and this applies particularly to smartphones. Traditional industry boundaries have been shattered between such hitherto disparate industries as software and wireless telecommunications, drawing such once unlikely rivals as Apple, Cisco, Huawei, Microsoft, Nokia, Qualcomm, and Samsung into a collision course. These companies “exist at different points on the value chain, and have different incentives. For instance, a handset maker views patent royalties as a cost,” but a SEP-owner firm may view them “as a source of revenue.” Therefore,

488. In Ericsson the court observed, “When a technology is incorporated into a standard, it is typically chosen from among different options. Once incorporated and widely adopted, that technology is not always used because it is the best or the only option; it is used because its use is necessary to comply with the standard.” Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1233 (Fed. Cir. 2014). See also J.S. Greenfield, supra note 21 (“There are two classes of standard essential patents: those that would be essential to any possible standard, regardless of design choices, and those that are essential to a particular standard, on the basis of design choices made in creating the standard. Most SEPs fall into the latter category.”).

489. See, e.g., Teece & Sherry, supra note 393, at 13; Katznelson, IEEE Controversial Policy, supra note 342; Sidak, supra note 271, at 1865–67.

490. See Gregory K. Leonard, Reflections on the Debates Surrounding Standard-Essential Patents, ANTITRUST SOURCE, Aug. 2015, at 2, http://www.americanbar.org/content/dam/aba/publishing/antitrust_source/antitrust_source/aug15_leonard_7_21f.pdf (“In light of the ambiguity of the theoretical models, empirical analysis is needed to sort out whether changing the balance between innovators and implementers would increase or decrease innovation. . . . Importantly, scant empirical evidence exists regarding whether innovation is, or has been, at the optimal level.”).


492. Id. Moreover, different patent-owning actors may have competing business models that threaten one another’s operation. For example, after
Lim argues, one’s perception of the antagonists in the controversy depends on one’s “ideological point of view, much like how one man’s terrorist is another man’s freedom fighter.”

Thus, in the 802.11 standoff Qualcomm and its allies threaten the IEEE with secessionist brinkmanship, and they contend the IEEE Patent Policy will “deter innovators who would otherwise invest more heavily in new technologies,” leading to the death of 802.11 standardization progress. Lim concludes, “As with many things in life, the truth can be complicated and each choice comes with its own set of tradeoffs.” That is an understatement: the truth is not only complicated; it is elusive—a scarcely visible, inconstant, distant star.

The question of who should own the value that standardization creates—for example, for smartphones—is answerable (if at all) only after a series of difficult factual determinations and in the wake of a series of value judgments that the different stakeholders will dispute. The fact issues largely have already been suggested. The value judgments, although unarticulated, may already be implicit. Is there a deficit of smartphone innovation that we need or desire to see remedied? Would the wealth transfer to SEP owners be effective

Google acquired the Motorola portfolio of telecommunications patents, it adopted a policy of distributing the Android operating system for cell phones freely, in order to encourage widespread adoption of the software to facilitate the sale of cheap cell phones and the development of collateral markets for Google’s Android-related application software. This posed a threat, however, to Microsoft’s business model, which was based on generating revenue from selling its Windows operating system to OEMs, and to Apple’s business model, which was based on selling expensive iPhones and keeping its software proprietary. The different business goals of these companies led them into smartphone war against one another, now largely subsided due to regulatory action (and superseded by the current smartphone controversy in which former adversaries Apple and Microsoft are allied against Qualcomm). See John D. Harkrider, Seeing the Forest Through the SEPs, 27 ANTITRUST 22, 25–28 (2013); see also Siebrasse & Cotter, supra note 20.

493. Lim, supra note 491, at 22.
494. Id. The controversy seems to be confined to 802.11 Wi-Fi, and does not extend even to the many other IEEE standardization activities affected by the 2015 Patent Policy update. See Lloyd, supra note 487 (“One point that the policy proponents emphasise is that IEEE standards cover a far broader range of technology than simply Wi-Fi. ‘Nobody at IEEE feels under pressure to review the policy because it’s non-controversial in 99% of what they do,’ insists Gil Ohana senior director for anti-trust and competition at Cisco.”); cf. Lim, supra note 491, at 22.
495. Lim, supra note 491, at 22.
to increase smartphone innovation to a higher and more desirable level? Are the other commercial incentives that motivate technology creators to gain standardization anointment for their technology already sufficient to create as much inventive incentive as is socially desirable? That is, are other economic incentives (such as value of head start) operating at a level sufficiently high that the proposed wealth transfer would not significantly increase incentivization at all, much less by an amount producing a socially desired result? Even assuming that the wealth transfer from smartphone buyers to SEP owners would bring about greater technological progress in smartphones that prospective smartphone buyers would desire (faster video downloads, shorter connection delays, speedier transmittals of selfies to one’s friends, the Internet of Things), is spending that amount an investment that smartphone buyers (or society) would prefer to make, in order to gain such smartphone advances, rather than spending that in acquiring other possible goods and services (such as housing, food, clothing, vacations, and so on)? The debate has not so far addressed these issues directly, nor is it likely to. Instead, unarticulated assumptions prevail.

It is not only the SEP holders who rely on unarticulated assumptions. When the Federal Circuit in the *CSIRO* case asserts that reasonable royalties “must not include any value flowing to the patent from the standard’s adoption” because “[w]ithout this rule, patentees would receive all of the benefit created by standardization—benefit that would otherwise flow to consumers and businesses practicing the standard,” the court assumes without explanation that consumers and businesses

496. See supra note 22 (discussing the 802.11g contest between Intersil and TI that was driven to such an extent by the desire to sell equipment using the patent owners’ technology that the patent owners agreed to royalty-free licenses for implementers in order to sell the equipment).

497. See generally 5G – Advantages & Disadvantages, TUTORIALS POINT, https://www.tutorialspoint.com/5g/5g_advantages_disadvantages.htm (last visited Oct. 1, 2017) (cataloging the possible advantages of 5G and IoT—such as multitasking while talking on the telephone with another person (e.g., simultaneously chatting and checking weather and location); attending classes and lectures at remote locations; doctors’ treating patients at remote locations; governmental organizations’ more easily monitoring and investigating, anywhere).
implementing the standard should be the ones to whom the benefits of standardization flow.498

Yet, as SEP-owner spokesmen say, why should the gains from standardization all flow to implementers, and none to patent holders?499 Sidak makes this argument in more detail and with more fervor, in a lengthy criticism of the Federal Circuit’s Ericsson decision:

Those who believe that a FRAND royalty should not include any of the standard’s value assume that SEP holders that have contributed to the creation of the standard’s value should not capture any of that value. Implicit in that assumption is the idea that the implementers are entitled to capture the entirety of the surplus that is not passed on to consumers. What normative principle makes implementers worthier claimants to the producer surplus (or, more properly, seller surplus) from the standard than SEP holders, without whose inventions no standard would exist? No economic or normative justification supports the assumption that all of the seller surplus from the standard should accrue to the implementers. Without the SEP holder’s contribution to the value of the standard, the implementer’s profit from the sale of the end product that practices the standard would not exist. There is no economically sound reason to deny an SEP holder any portion of the value of the standard that it helped to create.500

One implementer provides an answer of sorts: “the standards process exists not to enrich a few patent holders, but rather to simplify product introduction and interoperability for consumers around the world.”501 But then one must ask whether this proposition is self-evident. To paraphrase Sidak, what

499. See, e.g., Luke Froeb & Mikhael Shor, Innovators, Implementers, and Two-sided Hold-up, ANTITRUST SOURCE, Aug. 2015, at 4–5, 10, http://www.mikeshor.com/research/antitrust/antitrustsource.pdf (criticizing DOJ and IEEE Patent Policy for their focus on the smallest salable patent-practicing unit principle, because, in his view, “if a patent provides even a dollar of incremental value to the implementer beyond what is reflected in the smallest component, then that is a dollar that economic efficiency would require the innovator to appropriate in part” and, further, for “assuming that economic rents above those in the smallest component should flow primarily to the implementer of the end product” rather than to SEP owners. Froeb and Shor conclude that “basing royalties on the smallest salable component [poses] the risk of under-rewarding innovators for their investments” and “is likely to retard innovation, reduce incentives to participate in standards, and [thus] reduce economic welfare.”); Teece & Sherry, supra note 393, at 6–7.
500. Sidak, supra note 271, at 1867.
501. Chandler & Ohana, supra note 335 (emphasis added).
normative principle makes consumers worthier claimants?\textsuperscript{502} Perhaps, the dispositive normative principle is that the right rule is that which should bring about the greatest amount of good for the greatest number, attributed to Mill.\textsuperscript{503} We can explore, then, the ramifications of accepting utilitarianism as the Prime Directive.

G. APPLICATION OF UTILITARIAN THEORY

When SEP-holder spokesmen argue there is no principled reason the surplus that standardization creates should go to implementers rather than to SEP owners,\textsuperscript{504} they are quite right, in a very limited sense. Under true utilitarian principles, the surplus should go to neither SEP owners nor implementers, but instead should go farther down the distribution chain to the far more numerous consumers.\textsuperscript{505} The unfairness charge in \textit{FTC v. Qualcomm} may also rest in part on the claimed unfairness to consumers of exacting SEP royalties far in excess of FRAND rates, which causes higher smartphone prices when passed down

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502. See Sidak, supra note 271, at 1867. \\
503. \textit{JOHN STUART MILL, UTILITARIANISM 7} (George Sher ed., 2002) (1861) ("Actions are right to the degree that they tend to promote the greatest good for the greatest number."); see also \textit{JEREMY BENTHAM, Preface to A COMMENT ON THE COMMENTARIES AND A FRAGMENT ON GOVERNMENT} (J.H. Burns & H.L.A. Hart eds., Cambridge Univ. Press 1988) (1776) ("[T]his fundamental axiom, it is the greatest happiness of the greatest number that is the measure of right and wrong."); \textit{FRANCIS HUTCHESON, AN INQUIRY INTO THE ORIGINAL OF OUR IDEAS OF BEAUTY AND VIRTUE IN TWO TREATISES}, Treatise 2, Section III (VIII) at 180 (2d ed. 1729) ("[T]hat Action is best, which procures the greatest Happiness for the greatest Numbers; and that, worst, which, in like manner, occasions Misery."). \\
504. See Sidak, supra note 271, at 1867. \\
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the distribution chain.\textsuperscript{506} In the \textit{Sperry & Hutchinson} case, the Supreme Court endorsed the concept of a pure unfairness case.\textsuperscript{507} The principal unfairness alleged was a practice that oppressed consumers and burdened them with higher grocery prices by forcing trading stamps on them, when they could have preferred to spend the cost of stamps on necessities, such as clothing for their children, rather than "redeem" stamps for S\&H’s luxury goods.\textsuperscript{508} Implicit in such a theory of unfairness, when it is applied to the allegations of FTC \textit{v. Qualcomm}, is that the royalties Qualcomm exacts are not fair and reasonable because they unfairly hijack the value of standardization away from consumers to whom they rightfully should flow.

Similarly, the Apple complaint in \textit{Apple v. Qualcomm} argues that Qualcomm should not commandeer the value of standardization by charging royalties for its SEPs far in excess of FRAND rates, and Apple implies that if Qualcomm is required to charge Apple only FRAND royalties, that decrease in Apple’s costs will trickle down to the public in the form of lower smartphone prices.\textsuperscript{509} That may be implicit, also, in the Federal

\textsuperscript{506} See FTC Complaint, \textit{supra} note 11, at 1 ("Qualcomm has engaged in exclusionary conduct that . . . raises prices paid by consumers for cell phones and tablets."); \textit{id.} at 63 ("These higher all-in prices . . . raise handset prices paid by consumers."); \textit{id.} at 87 ("The tax thereby maintains Qualcomm's monopoly power and raises handset prices paid by consumers."); \textit{id.} at 136 ("Qualcomm’s anticompetitive practices have . . . increased consumer prices . . . ").

\textsuperscript{507} FTC \textit{v. Sperry & Hutchinson Co.}, 405 U.S. 233, 248 (1972) (endorsing the unfairness doctrine in principle, but finding the FTC's decision defective, because the alleged unfairness was not properly supported by linkage in the Commission's opinion between findings and conclusions).

\textsuperscript{508} The practice was said to work "to the detriment of consumers on whom ultimately falls the burden of paying for trading stamps." \textit{Sperry & Hutchinson Co. v. FTC}, 432 F.2d 146, 152 (5th Cir. 1970) (Wisdom, J., dissenting). "A substantial number of retailers admit that they cannot offset the costs of stamps at all except by passing the cost on to the consumer in the form of higher prices."

\textit{Id.} at 152 n.3. "The housewife cannot decline to save stamps; she is virtually forced to do so. . . . [T]he housewife must submit to the collecting of trading stamps." \textit{Id.} "[F]airness to consumers requires that they should have the right to dispose of stamps that came to them with their purchases of goods and services." \textit{Id.} at 155. "S&H's suppressive activities have a detrimental effect on consumers . . . ." \textit{Id.} at 156.

\textsuperscript{509} Apple Complaint, \textit{supra} note 12, at 1–3 (describing how Qualcomm’s alleged practices increase Apple’s costs whenever it improves its devices in ways that are popular with consumers). Unlike SEP holders, implementers such as Apple do not come out blatantly and say they are entitled to the surplus that standardization creates. They appear to be content to rest by suggestion and
Circuit’s oblique statement in the *CSIRO* case that the benefits of standardization should flow to implementers and consumers rather than to SEP owners.\textsuperscript{510} The court may assume without articulation that benefits that flow to implementers will continue to flow down the distribution chain to consumers.\textsuperscript{511} Whether a decrease in implementers’ costs will indeed flow down to consumers (here, smartphone buyers) depends on a number of unmentioned factors—in particular, whether the market is sufficiently competitive to compel that to happen,\textsuperscript{512} instead of letting implementers simply pocket the money.\textsuperscript{513}

There are serious practical and political problems, however, in validating a consumer claim to the monetary benefits of standardization that is more forceful than merely hopeful. The general consumer public does not have a seat at the table when implication on the trickle-down theory, or just prefer discreet silence. Cf. supra citations and text accompanying note 384.

\textsuperscript{510} Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc. (*CSIRO*), 809 F.3d 1295, 1305 (Fed. Cir. 2015) ("Without this rule [that patentees are entitled to the value of the invention, and not value accruing because of standardization], patentees would receive all of the benefit created by standardization—benefit that would otherwise flow to consumers and businesses practicing the standard.").

\textsuperscript{511} Sidak speaks of implementers capturing the surplus resulting from standardization, and then not passing “the entirety of the surplus . . . on to consumers.” Sidak, supra note 271, at 1867.

\textsuperscript{512} The smartphone market presently tends to be an oligopoly, indeed a duopoly or near duopoly between Apple and Samsung. According to comScore, in January 2017 Apple had a 44% market share and Samsung had 28%. The next seller had approximately 10%. See Adam Ismail, *Apple, LG Rise in U.S. Smartphone Market Share as Samsung Falters, Report Says*, DIGITAL TRENDS (Mar. 8, 2017), http://www.digitaltrends.com/mobile/us-smartphone-market-share-january-2017/. Legal precedent supports the conclusion that such a market structure is an oligopoly. See United States v. Visa U.S.A., Inc., 344 F.3d 229, 239–40 (2d Cir. 2003) (finding it proper to presume “that Visa U.S.A. and MasterCard, jointly and separately, have power within the market for network services” where “Visa U.S.A. members accounted for approximately 47% of the dollar volume of credit and charge card transactions, while MasterCard members accounted for approximately 26%.”). Those market share percentages are close to those for Apple and Samsung. This is not to suggest that Apple and Samsung are engaged in wrongdoing; the market share data simply suggest a market structure such that competitive forces may not at this time compel a trickle-down effect. But see Koren W. Wong-Ervin & Joshua D. Wright, *Intellectual Property and Standard Setting*, 17 FEDERALIST SOCIETY REV. 52, 57 n.48 (2016) (contending that the smartphone market is unconcentrated).

\textsuperscript{513} In that event, the consumer is left to complain and curse like Mercutio, in *WILLIAM SHAKESPEARE, ROMEO AND JULIET*, act 3, sc. 1.
SSOs operate, nor does it have much real representation in the organs of government. It therefore remains problematic that the general consumer public could succeed in capturing the monetary value of network effect or other related values, other than fortuitously.

CONCLUSION

The question posed by the title of this Article cannot be answered persuasively without answering an expanding, fractal universe of other questions—what is the good, which goods are greater than others, are the values of the different goods incommensurate, will the Internet of Things bring about less or more examined lives—in saecula saeculorum. If one makes the assumptions that have been suggested tentatively in the preceding discussion, one can conclude, as the Federal Circuit decisions imply and the FTC seems also to believe, that the monetary benefits of standardization belong to the public and not to SEP owners. Nor do they properly belong to implementers, who are, however, a necessary conduit for the benefits to flow down (if they will) to the public. There does not appear to be any legal mechanism by which the public could pry the monetary benefits of standardization out of the hands of implementers, if those implementers gain them under CSIRO and then decide to hold on to them. The public can hope, however, that competitive or rivalrous market forces will cause a reasonable share of those benefits to trickle down to consumers such as buyers of smartphones.

Even without that to-be-hoped-for trickle-down effect, the antitrust suits of the FTC and KFTC (and perhaps other foreign regulatory agencies) against Qualcomm might embolden Intel, Samsung, and perhaps others to infringe Qualcomm’s CDMA.

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514. This is so despite the lofty, aspirational sentiments described supra in text accompanying note 421. SSOs may at times succumb to a type of regulatory capture. See Liu, supra note 421. In two reported cases, companies controlled and manipulated SSOs to exclude competitive technology. See Am. Soc’y of Mech. Eng’rs v. Hydrolevel Corp., 456 U.S. 556 (1982); Radiant Burners, Inc. v. Peoples Gas Co., 364 U.S. 656 (1961).

515. Intel and Samsung have already publicly accused Qualcomm of the monopolistic patent abuse charged in FTC v. Qualcomm, asserting that they have been victims of Qualcomm’s exclusionary practices. See Florian Mueller, Intel Supports FTC Against Qualcomm, Says Antitrust Investigations Enabled Its New Deal with Apple, FOSS PATENTS (May 16, 2017), http://www
SEPs in order to manufacture and sell backward-compatible 4G smartphones.\textsuperscript{516} Or some other firms might even be emboldened to bring essential-facility cases\textsuperscript{517} to compel Qualcomm to sell to them, on a RAND basis, its premium-tier LTE/CDMA baseband processor chipsets, and thus pry open and fragment the now-

\textsuperscript{516} Issues regarding the RAND obligation to license SEPs are discussed extensively in the literature and are beyond the scope of this Article. See supra section V.C. on RAND.

\textsuperscript{517} The essential facility doctrine is discussed in infra note 522. But see generally James R. Ratner, \textit{Should There Be an Essential Facility Doctrine?}, 21 U.C. DAVIS L. REV. 327 (1988). The district court in the FTC case against Qualcomm has suggested this possibility, in denying Qualcomm’s motion to dismiss the case for failure to state a claim. The court ruled that the FTC pleaded a viable case under the antitrust laws that Qualcomm is not entitled to refuse to license its chip manufacturer competitors. FTC v. Qualcomm Inc., No. 17-CV-00220-LHK, 2017 WL 2774406, at *83–84 (N.D. Cal. June 26, 2017) (“[T]he Court finds that FTC has adequately alleged that, under the circumstances presented here, Qualcomm violated a duty to deal in refusing to license its FRAND-encumbered SEPs to its modem chips competitors. Thus, FTC has adequately alleged that Qualcomm’s refusal to license its SEPs to its modem chips competitors is independent anticompetitive conduct that violates § 2 of the Sherman Act, and thus violates § 5 of the FTCA.”).
concentrated high-end smartphone market.\textsuperscript{518} If that occurred, competitive forces might then cause the benefits of standardization of smartphone technology to flow down to smartphone consumers even without their needing always to depend on the kindness of implementers or SEP owners.

\footnotesize
\textsuperscript{518} See United States v. Glaxo Grp. Ltd., 410 U.S. 52 (1973) (holding that, in an antitrust case in which the antitrust violation was furthered by the defendant’s use of patent control, compulsory product sales and patent licensing, on a RAND basis, are ordinary and customary forms of relief); \textit{id.} at 64 ("Mandatory selling on specified terms and compulsory patent licensing at reasonable charges are recognized antitrust remedies."); \textit{id.} at 59 ("[M]andatory sales and reasonable-royalty licensing [of relevant patents are] well-established forms of relief when necessary to an effective remedy, particularly where patents have provided the leverage for or have contributed to the antitrust violation adjudicated."); Image Tech. Serv., Inc. v. Eastman Kodak Co., 125 F.3d 1195, 1225–26 (9th Cir. 1997) (requiring non-discriminatory, but not reasonably priced, sales of patented and unpatented repair parts, for ten years, as relief in monopolization case). Moreover, the growth of VoLTE, and the gradual replacement of legacy CDMA networks, see \textit{supra} note 84, may erode the market power that CDMA SEPs confer, rendering Qualcomm’s present monopoly obsolete. \textit{See supra} note 84.
Network effects

A network effect (also called a network externality or demand-side economy of scale) is the effect that additional users of a good or service have on the value of that product to other users. When a network effect is present, the value of a product or service is dependent on the number of others using it. The classic example is the telephone, in that the more people who own telephones that can interoperate, the more valuable the telephones are to each other owner.\(^\text{519}\)

Accordingly, one possible measure of the value of a network to a user is the number of possible interconnections the user can make, and the total value of the network is the number of interconnections that the network can make among users. As shown in the accompanying diagram, the number of possible one-to-one telephone conversations when there are two subscribers is 1. When there are three subscribers there are 3 possible. For four subscribers, 6. For five, 10, and so on. In other words, the first of \(n\) telephone subscribers can engage in \(n-1\) possible conversations. The second one can engage in \(n-2\) possible conversations (not including the already counted first subscriber). The sum \(S\) or total number of possible conversations

\[ S = \frac{n(n-1)}{2} \]

is \((n-1) + (n-2) + (n-3) \ldots + 2 + 1 + 0\). (The last, \(n\)th one has nobody not already counted.) It can be shown that \(S = n(n-1)/2\).

Very roughly, the total value of an \(n\)-node telephone network is proportional to \(n^2\)—more precisely, \(k_2n(n-1)/2\)—the number of possible two-member combinations among the \(n\) nodes, where \(k_2\) is a constant representing units of benefit to a network subscriber. (If one considered three-party conference calls, which occur less frequently than two-person calls, their additional value would be approximately proportional to \(n^3\)—more precisely, \(S_3 = k_3n(n-1)(n-2)/6\), where \(k_2 \gg k_3\). This additional increment is small enough to be ignored.)

APPENDIX B

Who Proximately Causes the Benefits of Standardization?

The issue of who is responsible for creating the benefits of standardization, or who or what is the proximate cause of those benefits, is complex and difficult, riddled with public policy judgments. Moreover, it may be questioned whether the issue is relevant to a legal determination of reasonable royalty levels for SEPs, and the issues within that of whether to use as a royalty base the price of the smallest saleable patent-practicing unit or that of a downstream product.

In many ways, this matter of the responsibility for creation of standardization’s benefits, particularly interoperability and network effects, is like the issue of remote or proximate cause in tort law. That issue, too, has been difficult to settle, and riddled with policy judgments. Moreover, distinguished jurists—Cardozo, Pound, and Andrews, for example, in the *Palsgraf* case—have disagreed over what is remote or proximate, direct or indirect, and foreseeable or unforeseeable, as well as those factors’ proper roles in deciding cases.

Perhaps, a concrete example may help to describe the issue. Consider wheat flour and bread. Wheat flour is almost, but not quite, a but-for element for bread (like a technology covered by a SEP). (There are other grains, used to a slight extent for bread.)

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kinds of bread—for example, rye, barley, rice. They may be regarded as “alternative technologies.”) There are, however, other necessary inputs for bread—for example, yeast, sugar, salt, water, oil or shortening, not to mention other inputs that must be used, such as labor, ovens, fuel, pots and pans. Moreover, there are other inputs for standardization besides technology. Finally, wheat flour is an input for other things besides bread—spaghetti, pizza crust, brioches, croissants, cookies, wedding cakes.

Imagine, now, that I am Mr. Miller, an individual wheat flour manufacturer and seller or the representative of a consortium of millers. I go to Mr. Baker to negotiate the future price of flour. “You realize,” I say to him, “that my flour is an essential ingredient for your bread and other products. Indeed, I feel I am responsible for creating the value of your bread, croissants, cakes, and so forth. Without my flour, you could not make and sell them. I have noticed that you use my flour in varying proportions (by weight) to make bread, brioches, cakes, etc., and the products have varying utilities to your customers, and they pay you varying prices based on the value to them of the different products.”

I continue: “I propose to institute a new pricing regime. I feel that I am entitled to share in the value to the customer of what is made with my flour. It is only fair that I do so. I will no longer sell you flour at such and such a number of dollars per pound of flour. Rather, I will charge you in proportion to the value of the end products that you sell to the customer. For example, $1 per pound for flour used in making bread; $2 per pound for flour used for brioches; $3 per pound for flour used for wedding cakes.”

What is the proper outcome for the discussion between Mr. Miller and Mr. Baker?

SEP owners have no more claim to the value of downstream products than Mr. Miller has (or for that matter, than the wheat farmer has) to the value of Mr. Baker’s wedding cakes. One may multiply examples, such as the weaver of cloth or maker of thread having a claim on the value of the couturier’s dresses; or the seller of pots to the value of the chef’s menu items; or that Westlaw has to the revenue from users’ billable hours. We do not have, or wish to have, a society in which the sellers of inputs have a claim on the value of their customers’ downstream products.
In that case, one might say, why not just let the Invisible Hand of the free and open market determine the price of a SEP, with or without network value, as the process determines? But there is no free and open market for SEP-encumbered technology. The market has been irrevocably regimented, first by the patent system, then by standardization, which created the network effect of interoperability and simultaneously created monopoly power by prescribing standard technology, in place of free and open markets. For better or worse, the mechanism for SEP royalty determination we have, instead of the Invisible Hand of the market, is patent infringement litigation in the federal courts and an accumulation of many years of patent and antitrust precedents. Both bodies of precedent require that downstream use and price restrictions on sold goods must be reasonable, and to some extent outlaw them entirely.\footnote{See generally Impression Prods., Inc. v. Lexmark Int'l, Inc., 137 S. Ct. 1523 (2017); Continental T.V., Inc v. GTE Sylvania Inc., 433 U.S. 36 (1977); White Motor Co. v. United States, 372 U.S. 253 (1963).}

Our SEP royalty system now operates substantially as a regulatory scheme in which the one-time role of the ICC for railroad rate regulation is played by the courts, usually the Federal Circuit, but sometimes another court of appeals such as the Ninth Circuit when only antitrust claims or breach of contract claims (rather than patent infringement or patent declaratory judgment claims) are at issue, with occasional further appellate review in the Supreme Court. The courts do not consider it proper for a seller of technology (or chipsets) essential to manufacturing standard-compliant products to price the technology (or chipsets) to implementers on the basis of the implementers' standard-compliant products made by using the technology (or chipsets). Is that wise? That may be the wrong question (although the Federal Circuit has given good reasons for an affirmative answer). The right question, when one considers SEP-holder claims to be entitled to a share of the value of standardization, may be: is that legal rule permissible?

SEP owners enjoy their monopoly power (to the extent they have it) only because the state (the government) tolerates their antitrust law-violating potential of designating some technologies as standard and excluding other technologies,
because of sufficient counterbalancing procompetitive effects of standardization. But the concerted restrictive action in standardization—a naked agreement among competitors not to manufacture, distribute, or otherwise deal in non-standard products, and thereby to exclude those products from the market, that leads to the conversion of patents into SEPs—is not free-market conduct, and therefore its SEP holder participants do not enjoy all the privileges of participants in a free market. They have obligations that are the quid pro quo for the governmental toleration of their concerted action and monopoly power. The obligations include not pricing their monopolized product (SEP technology or SEP licenses) at all that the traffic can bear, namely the ex-post value of the technology, including network value.

That argument does not require the conclusion that none of the price increment (the surplus) resulting from state-sanctioned creation of monopoly power should go to SEP owners. Rather, it could just as well follow, as some spokesmen for SEP owners suggest, that an undefined “proper” share of the entire surplus should go to SEP owners. But there are objections to that proposal. One is that no sound criterion has been proposed to determine the “proper” share, and if it is not well-defined, SEP owners (or some of them, who adhere to the precepts of Gordon Gekko) will try to seize all of it. A second objection, and to me the more important one, is that the state (acting through its agents that the law designates) decided to tolerate standardization’s otherwise unlawful concerted action—a naked, exclusionary agreement. Since the surplus exists only because the state decided to permit the monopolistic conduct, the state may (on Hobbesian principles) decide how to allocate the surplus (except for unconstitutional allocation decisions). That is, the state may decide to tolerate the monopolistic conduct of standardization on only such conditions as it chooses, so long as the conditions are not unconstitutional. The relevant conditions—ex-ante, upstream royalties based on the smallest saleable patent-practicing unit principle—are not unconstitutional.  

522 The condition that the surplus that standardization creates must not go to SEP owners and must instead go to implementers and consumers (per CSIRO) is hardly an unconstitutional condition. A due process or equal protection argument would surely fail because patent infringement litigation is
If the state decides to allocate the surplus value, over and above *ex-ante* value, to consumers, that is within its powers and is consistent with Benthamite and Millsian principles of how to operate a government. The state is not obliged to allocate a share of the surplus to SEP owners, as it presently declines to do (per *CSIRO* and its ilk). There is no reason for it to do so, absent a persuasive argument that doing so will more greatly benefit society than not doing so. That argument has not yet been satisfactorily made, as is discussed in Part VII.

So, who or what is responsible for creating the benefits of standardization? At one level of analysis, it has been the members of the SSOs, as described in Part VII. But at a more fundamental level, it is the state, by its toleration of the monopolistic acts of standard-setting, in order to further the public good because of the perceived procompetitive benefits of standardization. Only the state, as the organ of positive law according to the will of the general public, has the sovereign power either to tolerate standard-setting, or leave it unexcused and condemned by the otherwise applicable principles of law (the Sherman Act). And thus the state creates (and proximately causes) the benefits of standardization. Other claims to be the Promethean fire bringer of standardization’s benefits are spurious.

due process, and SEP owners are not members of a protected class. Moreover, it is not a regulatory taking of property, for there never was any right to engage in the concerted restrictive activity involved in standardization. See *Allied Tube & Conduit Corp. v. Indian Head, Inc.*, 486 U.S. 492, 500 (1988); *Standard Sanitary Mfg. Co. v. United States*, 226 U.S. 20 (1912).