



FRAND AND THE SMALLEST SALEABLE UNIT



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I. INTRODUCTION

Standard-setting organizations (“SSOs”) incorporate patented technology into standards, such as those enabling cellular telephony. While there may originally have been credible alternatives to the patented technologies ultimately selected by standard-setting organizations, once a patented technology is included in a standard, firms using the standard must use the patented technology in order to be standard-compliant, and the technology thus becomes “standard essential.” One of the primary economic concerns that can arise in that situation is that holders of standard essential patents (“SEPs”) may be able to hold up licensors by demanding payments related to access to the standard itself rather than the intrinsic value of the patents. That is, because both consumers and producers make investments that are to various degrees irreversible and are based on standards, the loss of access to a standard can become very costly. SEP holders can potentially exploit those sunk costs – which are generally unrelated to the value of any particular patented technology – and hold up users of the standard.

While hold-up can occur with any patent where the patent-holder attempts to extract value unrelated to the patented technology, the concern is particularly important in the

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standard setting context because of the elimination of competition through the actions of the SSO. In part because SSOs could be subject to antitrust liability for excluding competition through the collective action of industry participants, SSOs address these concerns by requiring firms whose patented technology may be included to agree to license those patents on fair, reasonable and non-discriminatory (“FRAND”) terms.⁵ The application of the FRAND concept to licensing terms allows SEP holders to collect royalties based on what they could have secured for their patents *ex ante*, before they declared their patents to be standard essential, and not appropriate to themselves the increased value of the patents that stems from the incorporation of the patents in industry standards, which is commonly referred to as the hold-up value.⁶

The FRAND concept intersects with the smallest saleable unit (“SSU”) rule, which is a patent law concept that seeks to limit patent holders’ ability to collect royalties that exceed the contributions of their patents. This rule requires that patent damages (and, hence, patent royalties) be calculated on the basis of the value of the smallest saleable patent practicing unit unless the patent drives demand the demand for the entire product in which the smallest saleable unit is incorporated. Although the SSU rule has its origins outside the standard-setting context, and applies to all patents, it is of particular importance in enforcing a FRAND commitment, precisely because hold-up is of particular concern in the standard setting context. This article discusses the intersection between the SSU rule and FRAND requirements.

II. BACKGROUND OF THE SSU RULE

A more than century old patent damages doctrine requires “apportion[ing] the defendant’s profits and the patentee’s damages between the patented feature and the unpatented features [of the infringing product],” unless “the entire value of the whole machine, as a marketable article, is properly and legally attributable to the patented feature.”⁷ This “entire market value” rule has been at the center of a number of highly publicized cases decided by the Court of Appeals for the Federal Circuit that involved computing and electronic products. The issue in these cases was whether patentees holding patents over individual, typically minor, features of richly featured, complex products such as computers or office software were entitled to single digit percentage damages based on the entire market value of these products. The court held that the rule requires royalties to be based on the value of the smallest saleable unit that practices a patented feature, unless the patented feature drives the demand for the entire product.⁸

⁵ Dennis Carlton & Allan Shampine, *An Economic Interpretation of FRAND*, 9 J. COMPETITION L. & ECON. 531 (2013) (hereafter “Carlton & Shampine, *Economic Interpretation*”).

⁶ See, for example, Fed. Trade Comm’n, *The Evolving IP Marketplace: Aligning Patent Notice And Remedies With Competition* (2011) (hereafter “Evolving IP Marketplace”).

⁷ *Garretson v. Clark*, 111 U.S. 120, 120 (1884) (internal quotation marks omitted).

⁸ See, e.g. *Lucent Tech., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1332 (Fed. Cir. 2009) (damages for patent on “date picker” feature of Microsoft Outlook may not be based on entire market value of Outlook); *Uniloc USA, Inc. v. Microsoft Corp.*,



Under these holdings, patent damages may be “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.’”⁹ The basis for this rule is a concern that “[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.”¹⁰

For example, in *LaserDynamics*, the plaintiff sought damages of two percent of the price of laptop computers for a single patent that allows optical disc drives to identify what type of disc is inserted into them (“optical disc discrimination”). Looked at in isolation, that figure might strike a trier of fact as a relatively small portion of the price of the laptop. However, laptop computers are complex products that implement at least 251 industry standards,¹¹ most of which are subject to numerous patents, as well as highly sophisticated non-standardized technologies that themselves are subject to numerous patents. If there are 5,000 patents used in a laptop and each were to receive a two percent royalty, the royalty on a \$1,000 laptop would be \$100,000. This, of course, makes no economic or business sense as no supplier could sell a \$100,000 laptop or pay for the stack of license fees if the laptop sells for \$1,000.

The final product price would have to adjust enough to make it feasible (profitable) for manufacturers to pay the sum of even small royalties imposed on the end product. Considering a single patent in this larger context, a two percent royalty for the one patent is not so innocuous, and one should think hard about the value of that patent in the context of the large amount of additional functionality in a laptop.¹²

The smallest saleable patent practicing unit for these purposes is the component that substantially embodies the infringed patent claims. Thus, where all of the inventive elements of a patent are substantially embodied within an individual component, the non-inventive mention of other components in patent claims does not enable the patentee to collect damages based on the value of a larger product that incorporates those additional components.¹³

The Federal Circuit has extended the smallest saleable unit requirement to sub-components. This is an important refinement of the rule in an era in which systems on a chip combine the functionalities of numerous discrete components on a single piece of silicon. The court held that where the smallest saleable component is itself a multicomponent product, patent damages must account for the “portion of the value of that product [that] is

632 F.3d 1292 (Fed. Cir. 2011) (damages for software activation patent may not be based on entire market value of Microsoft Windows and Office).

⁹ *Id.* at 1318 (citations omitted).

¹⁰ *LaserDynamics, Inc. v. Quanta Computer, Inc.*, 694 F.3d 51, 67 (Fed. Cir. 2012).

¹¹ Brad Biddle et al., *How Many Standards in a Laptop? (And Other Empirical Questions)* (2010), available at: http://www.standardslaw.org/How_Many_Standards.pdf.

¹² *LaserDynamics*, 694 F.3d at 69.

¹³ *In re Innovatio IP Ventures, LLC Patent Litigation*, 2013 WL 5593609, at *13 (N.D. Ill. 3 Oct. 2013).



attributable to the patented technology.”¹⁴ Accordingly, the “realistic starting point” for computing royalties is “the smallest salable unit and, at times, even less.”¹⁵ Moreover, in cases involving SEPs, “[j]ust as we apportion damages for a patent that covers a small part of a device, we must also apportion damages for SEPs that cover only a small part of a standard.”¹⁶

Although disputes may arise as to whether a particular component substantially embodies the inventive elements of an SEP, it is indisputable that any standard implementer that infringes an SEP by virtue of its product’s compliance with a standard is entitled to obtain a license to that SEP. For example, a chipset manufacturer whose chipset practices a standard essential patent could be sued by an SEP holder for infringing the SEP, which it must practice in order to comply with a relevant standard. The FRAND concept, which as a matter of antitrust law does not permit the exclusion of competitors through the adoption of an industry standard, therefore requires that the opportunity to obtain an SEP license be extended to the chipset manufacturer.

The Federal Circuit’s *Ericsson* decision raised the possibility that the smallest saleable unit requirement might be merely an evidentiary rule to avoid misleading juries, whose members may be improperly influenced by references to the value of a finished product, rather than a substantive requirement of patent law for determining patent damages.¹⁷ However, the court’s subsequent *CSIRO* decision made it clear that the rule had two independent bases, one of which is the fundamental risk that a larger royalty base will compensate patentees for unpatented features.¹⁸

III. SSU, FRAND AND INCENTIVES FOR INNOVATION

Both the *ex-ante* principle, which has been recognized by multiple courts and antitrust enforcement agencies, and the SSU rule have been the subject of ongoing debate whether patent holders that make FRAND commitments are over- or undercompensated for their inventions.¹⁹ This debate has been fierce in the SEP context, and particularly in relation to the

¹⁴ *VimnetX, Inc. v. Cisco Systems, Inc.*, 767 F.3d 1308, 1327 (Fed. Cir. 2014).

¹⁵ *Ericsson, Inc. v. D-Link Systems, Inc.*, 773 F.3d 1201, 1227 (Fed. Cir. 2014).

¹⁶ *Id.* at 1232-33.

¹⁷ *Id.* at 1226-27.

¹⁸ *Commonwealth Scientific and Industrial Research Organisation v. Cisco Systems, Inc.*, 809 F.3d 1295, 1302 (Fed. Cir. 2015).

¹⁹ See, e.g. *Ericsson*, 773 F.3d at 1233 (“the royalty for SEPs should reflect the approximate value of that technological contribution, not the value of its widespread adoption due to standardization”); *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297, 309, n.4 (3d Cir. 2007) (FRAND requirement seeks “to preserve the competitive benefits of *ex ante* technology competition”); FTC, *Evolving IP Marketplace*, at 23 (“Courts should cap the royalty at the incremental value of the patented technology over alternatives available at the time the standard was chosen”); European Commission, *Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements*, ¶ 289 (FRAND rate may be determined by “compar[ing] the licensing fees charged by the company in question for the relevant patents in a competitive environment before the industry has been locked into the standard (*ex ante*) with those charged after the industry has been locked in (*ex post*)”); Case COMP/38.636 – *Rambus* (2009), § 32 (forcing licensees “to accept higher licencing fees than those which could have been negotiated ... before the adoption of the standard” represents “bad faith”).



interpretation of the FRAND rules that ultimately conduce to the benefits of all stake-holders, including the consumers who purchase the standard-compliant products.

It is obvious that whether patentees are over- or undercompensated depends both on the rate and the base to which the rate is applied, as well as the benchmark against which such compensation is to be gauged. It is by now reasonably well established that a patentee that has made a FRAND commitment should be constrained in the rates that it can collect on a per-unit basis by the incremental contribution that the innovation makes to the value of the standard, as compared to what the value of the standard would be absent its inclusion. As the Federal Circuit has noted, “[w]hen a technology is incorporated into a standard, it is typically chosen from among different options.”²⁰ This is confirmed by observations of significant participants in the wireless telecommunications standardization activities, including the former chair of the European Telecommunications Standards Institute’s Technical Committee Special Mobile Group, who has attested that “[i]n nearly all cases, ETSI can choose between alternatives with comparable performance.”²¹

The availability of alternatives before standardization is the principal reason for the adoption of the *ex-ante* approach to SEP royalties. Some advocates have expressed a concern that this approach, which appropriately focuses on the incremental contribution of a given SEP to the value of the standard, will generally “undercompensate” the patentee because the patentee has already expended the necessary resources to innovate and thus can be subjected to a reverse hold-up by the potential licensors. While such reverse hold-up cannot be ruled out as a theoretical possibility, hold-up of potential implementers by the owner of a SEP (or portfolio of SEPs) is far more likely. Indeed, the potential for hold-up (and other strategic action) is the *raison d’etre* for the FRAND regime.²²

One way in which SEP holders may attempt to circumvent their FRAND commitment is by charging royalties based on the price of complete finished products for patented technology (SEPs) that read on individual components that sell for a small fraction of the price of the finished products.²³ While the issue can, and does, arise in all types of patent litigation, hold-up by a patent holder that extracts value not directly stemming from its patented technology is of particular concern with respect to SEPs because standardization creates an additional value for the SEP holder by compelling entire industries to implement SEPs and thereby eliminating competition for the SEPs. Because of lock-in stemming from standardization, unless constrained by a FRAND commitment, the patentee may extract not only the incremental value of its innovation relative to the alternatives that are available

²⁰ *Ericsson* 773 F.3d at 1233.

²¹ Expert Report of Friedhelm Hillebrand, Dkt. No. 359-2, *Nokia Corp. v. Qualcomm Inc.*, Case No. 09-cv-791 (D. Del. May 16, 2011) at ¶11. Similarly an SEP licensor that has been active in the same standard-setting activities has stated that standard-setting participants “typically” reach a consensus-based decision after considering “multiple proposed solutions to the same technical problem.” *Ericsson on FRAND and SEP Litigation*, submission to the International Telecommunications Union at 1 (Oct. 10, 2012), http://www.itu.int/dms_pub/itu-t/oth/06/5B/T065B0000340007MSWE.docx.

²² FTC, *Evolving IP Marketplace* at 22-23; Carlton & Shampine, *Economic Interpretation*.

²³ For a detailed treatment of this issue, see Joseph Kattan, *The Next FRAND Battle: Why the Royalty Base Matters*, CPI Antitrust Chronicle, March 2015 (1).



before standardization, but also the additional value that flows directly from the inclusion of the SEP in the standard. Because, by definition, the standard-essential patents cannot be avoided in standard-compliant products, the SEP owner can extract that incremental value, which it would not be able to do in a market environment outside the SEP context.

Advocates for SEP holders with patent monetization programs have argued that there is no risk that holders of FRAND-encumbered SEPs would be overcompensated after standardization. For example, Richard Stark²⁴ cites a price difference between a \$249 32GB iPod Touch (which lacks LTE cellular capability) and a \$649 32 iPhone 5C (which has such capability) as evidence that the \$400 price difference is attributable to specific SEPs. He argues that the \$400 is attributable entirely to the iPhone's LTE capability and that SEP holders therefore should be able to impose a royalty on the entire price difference and, in fact, on the price of the entire iPhone.

This type of argument not only misses the point and is flawed as a matter of economics, but actually demonstrates the importance of concerns about hold-up. To the extent that any part of the price difference is in fact attributable to LTE technology, it is attributable to that technology as a whole, and not necessarily to any individual SEP holder's patents. Thus even assuming that the price difference is attributable to LTE technology and not to other factors, unless the SEP holder can show that the difference is attributable specifically to its SEPs and, if so, to the advantages that its SEPs conferred over technologies that were offered for standardization *ex-ante*, it is seeking to appropriate value that is not attributable to the incremental value that its SEPs provided over available alternatives. As a result, this price gap is not at all informative as to the incremental value that should accrue to any individual SEP holder. The relevant question is not how much higher a price is charged because of the presence of LTE, but whether there would be any difference in price if the version of LTE used an alternative to the patented technology. That is, some version of LTE would likely still exist if the particular SEPs at issue were not present in the standard, but that version of LTE would use alternative technology.

To illustrate, if an alternative technology would have resulted in a version of LTE that is valued one dollar less per handset (whether because of a minor technological inferiority or a higher implementation cost), the included SEPs would have commanded at most one dollar per handset in license fees *ex-ante*. Importantly, the same maximum fee would likely be negotiated independently of the base: that is, whether the fee would be paid on the per handset basis or per chipset basis. This is because if the chipset is the smallest saleable unit that substantially embodies the SEP-holder's SEPs, that chipset could command a price premium relative to chipsets that would have implemented the alternative technology that was available *ex-ante*.

Put another way, even if the price difference between two handsets with and without LTE may be quite large because end-users value LTE cellular capability generally, it is not generally likely (or even plausible) that all of that difference can be uniquely attributed to a given SEP-holder's SEPs. This is not to say, of course, that some SEPs may not command significant premiums relative to all the viable alternatives even before the standard is put in

²⁴ Richard Stark, *Debunking the Smallest Saleable Unit Theory*, CPI Antitrust Chronicle, July 2015, at 5.



place. But such substantial license fees would be properly attained under the *ex-ante* approach. That is, truly innovative technology that brings great value relative to alternatives can and should command high royalties under the *ex-ante* framework. However, SEP holders that seek higher royalties based on a claim that products that implement a standardized technology are more valuable because they implement a standard should be required to prove that the value difference is attributable to their contributions rather than presume, as Mr. Stark and other advocates for his position do, that the entire value difference is attributable to any particular SEP holder's SEPs. Indeed, this misplaced focus on the incremental value of the whole standard can create the erroneous perception in factfinders' minds that the demanded royalty is FRAND compliant when, in fact, it is nothing of the sort.

The conclusion that the SSU-based royalty could potentially generate a low absolute per unit royalty rate is not in any way evidence that the innovator is undercompensated. In fact, the opposite can be the case. First, the rate of return on investment in the pertinent SEPs (or on a more broadly defined R&D program) depends both on costs associated with the relevant SEPs and on the revenues generated by the investment, all appropriately adjusted for risk. There is no evidence with which we are familiar that the investments associated with the developments of the SEPs in the telecommunications field are especially large, sunk or risky. In fact, such investments are often undertaken by manufacturers that benefit from their R&D investments both directly (*via* their market presence) and indirectly (*via* licensing or cross-licensing).

Having an SEP incorporated into a standard can confer enormous benefits on SEP holders by expanding demand for patents to every manufacturer of the product covered by patents for which otherwise no demand may exist. That is, in the context of standards that achieve broad commercial adoption, an SEP, unlike a typical patent, cannot be replaced by a superior (or cheaper) patent unless and until such time as the relevant standard is superseded by a new standard. There is no evidence that we have seen that shows that the voluntarily agreed to constraints on license royalties from FRAND restrictions have a greater value than the undisputed benefits that an SEP holder derives from the inclusion of its patents in a standard and the concomitant flow of revenues (including the reduction in licensing expenses by means of cross-licensing). In particular, in industries such as wireless telecommunications, SEP holders gain a guaranteed pool of licensees for their intellectual property that otherwise may not have used the patents at all.²⁵ In a market in which a nearly billion and a half standard-compliant handsets are sold annually, this is a hugely valuable benefit.

The fact that many telecommunications standards are highly successful does not demonstrate that the frequently noted concerns with hold-up, royalty stacking and market eviction though injunctive relief (and hold-up achieved with the threat of market eviction) have not had some adverse consequences in the relevant markets. The appropriate benchmarks here are the levels of market performance that would have been realized absent these potential distortions in the licensing domain. For example, if the value of a standard

²⁵ See Joseph Kattan and Chris Wood, *Standard-Essential Patents and the Problem of Hold-Up* at 3, available at: <http://ssrn.com/abstract=2370113>.



(not of the patented technology, but of the standard itself) is \$10 per unit to an implementer, SEP holders can hold up the implementer for up to \$10 and the implementer will still participate in the market, even if SEP holders could only obtain royalty rates of \$1 per unit if competition from alternatives present prior to standard setting were still present. That hold-up acts like a random tax and discourages downstream innovation. The fact that wealth is transferred to SEP holders does not mean that incentives for upstream innovation are increased in any economically efficient fashion. The additional windfall is one not contemplated in the patent system, can generate inefficient rent-seeking activity (e.g. firms engaging in activities to ensure their patents are included in a standard in order to extract supra-competitive rates later) and will decrease returns to downstream innovation, because the SEP holders can effectively tax returns on downstream innovation.

This example also illustrates the fallacy of the argument, often made on behalf of companies that aggressively monetize their SEPs, that declining prices of standard-compliant products evidences the absence of hold-up. Assuming that the cost of manufacturing electronic products declines in accordance with Moore's law, one would expect the non-licensing costs to decline by roughly 50 percent every two to three years. Over a four- to six-year period, this would mean that costs would decline by 75 percent. Consequently, a phone which costs \$300 to manufacture at the beginning of such a period may cost as little as \$75 to produce a few years later. Thus, even with a substantial overcharge by the SEP holder (\$9 in the example above), the cost of the phone will decline by \$225, and its price will decline as well, depending on the extent of industry-wide pass-through rate.

In summary, the FRAND requirement is designed to prevent holders of FRAND-encumbered SEPs from extracting value associated with the standard itself rather than the incremental contribution of the patented technology to the standard. The SSU rule is intended to prevent patent holders generally from extracting value associated with other aspects of a product. The two are closely related and, indeed, a standard-compliant product will frequently incorporate aspects of a standard unrelated to the particular patented technology in a litigation, as well as a great deal of other unrelated functionality and technology.²⁶ The SSU rule is not only appropriately applied in a FRAND context, but is of particular importance in that context, as the risk that SEP holders will extract value unrelated to their patented technology are higher in the FRAND context as a result of the elimination of competing options through the standard setting process.

²⁶ For example, it is estimated that a contemporary smartphone incorporates as many as 250,000 patents. See RPX Corp., Amendment No. 3 to Form S-1, Apr. 11, 2011, at 59, <http://www.sec.gov/Archives/edgar/data/1509432/000119312511101007/ds1a.htm>; Steve Lohr, *Apple-Samsung Case Shows Smartphone as Legal Magnet*, N.Y. Times, Aug. 25, 2012, <http://www.nytimes.com/2012/08/26/technology/apple-samsung-case-shows-smartphone-as-lawsuit-magnet.html>.