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The Economic Approaches Used to Determine FRAND Royalty Rates in *TCL v. Ericsson*

On November 8, 2017, Judge James Selna of the US District Court in the Central District of California issued a decision (published later on December 21st) in *TCL v. Ericsson* determining fair, reasonable, and non-discriminatory (FRAND) royalty rates for Ericsson's standard essential patent (SEP) portfolios for the 2G, 3G, and 4G cellular standards. Not only does this decision establish the FRAND royalty rate for a major licensor's cellular SEP portfolios, but it also lays out an economic framework for determining FRAND royalty rates that may be used by manufacturers, SEP holders, and courts in future FRAND rate-setting contexts. In this article, we unpack how the Court arrived at the FRAND rates, highlight a few key takeaways, and provide our own view on some of the relevant issues.

Overview of Judge Selna's Decision

The Court first assessed whether during the course of the negotiations, Ericsson met its FRAND obligation and whether Ericsson's final offers prior to litigation were FRAND. Although the Court decided that Ericsson negotiated with TCL in good faith, it determined that Ericsson's royalty offers were not FRAND, and therefore assessed FRAND royalty rates for Ericsson's SEP portfolios.

Edgeworth Economics consulted for TCL in the case discussed in this article.

The Court relied upon two approaches to determine the FRAND rates: a "top-down" approach and a comparable licenses approach.[1] An important aspect of the Court's approach is that it found that the strength of Ericsson's portfolio varied substantially by standard and by region, and took the varying portfolio strengths into account, resulting in the following FRAND royalty rate schedule for Ericsson's SEPs:

Standard	**2G**	**3G**	**4G**
US	0.164%	0.300%	0.450%
Europe	0.118%	0.264%	--
ROW	0.090%	0.224%	0.314%

Top-Down Approach: Accounting for Relative Portfolio Value, and Adjusting for Essentiality, Expirations, and Regional Differences in Portfolio Strength

Judge Selna begins his assessment with a top-down approach, an approach that was also adopted by Judge Holderman in *In re: Innovatio* to determine a FRAND royalty rate for Innovatio's Wi-Fi SEP portfolio. The top-down approach begins with an appropriate aggregate royalty burden (ARB) for a standard as a whole, and then divides that royalty among SEP holders, so that the FRAND rate for a given SEP holder's portfolio can be expressed as:

FRAND Rate = Aggregate Royalty Burden × Ericsson's Share of the Value of SEPs

In assessing the ARB, the Court noted that Ericsson had long endorsed the concept of a maximum aggregate royalty burden: in 2002, it advocated a "modest single digit level" for 3G-WCDMA and then in 2008, Ericsson stated that it expected "a reasonable maximum aggregate royalty level" to be between 6% and 8% for 4G. Judge Selna noted that these statements held special importance in a FRAND context because the statements were made prior to or around the time the respective standards were being set, and moreover, at the time Ericsson was both a licensee and a licensor for handsets, and therefore had an incentive to "strike a reasonable balance" with respect to how FRAND rates should be set.[2] A number of other SEP holders and implementers made similar statements at the time.

Economists have long recognized that a hold-up problem can arise in the context of standard-setting: once a standard is set and implementers are locked-in to the standard, licensors have the incentive to charge rates in excess of the inherent value of the underlying SEPs. Judge Selna noted that Ericsson's statements reflected the "*ex ante* expectations of what a reasonable aggregate royalty burden should be before the standard was adopted and manufacturers are locked-in."[3] The Court further noted that Ericsson's statements were important in the context of competition between LTE and other potential standards, and in particular were "endorsements of a conceptual approach that sought to have LTE adopted as the 4G standard instead of two competing standards, UMB and

[1] The Court rejected a third approach, Ericsson's "ex-Standard" approach because it "lacked fundamental credibility." TCL v. Ericsson, SACV 14-341 JVS(DFMx) & CV 15-2370 JVS(DFMx) (C.D. Cal. 2017), p. 54.

[2] p. 19.

[3] p. 19.

WiMAX."[4] In this context, the Court interpreted Ericsson's statements as a "pledge to the market" to limit the ARB in order "to entice manufacturers to invest in LTE over WiMAX and UMB."[5] From an economic perspective, raising the ARB above this amount after the standard had been set and widely adopted would constitute hold-up.

Ultimately, based on these statements, the Court adopted 5% as the ARB for 2G and 3G,[6] and specified a range of 6% to 10% for 4G, consistent with Ericsson's statements.[7] It is worth noting that Judge Selna's embrace of Ericsson's public statements in setting the ARB stands in stark contrast to UK High Court Judge Colin Birss's dismissal of these statements in *Unwired Planet v. Huawei* as "self-serving," "not tak[ing] into account what implementers and SEP holders have actually been content to agree in the intervening years," and "hav[ing] little value in arriving at a benchmark rate today."[8]

The Court then turned to determining Ericsson's appropriate share of the aggregate royalty burden. The Court noted that the aggregate royalty burden should be apportioned across SEP holders according to the relative values of their respective portfolios.[9] It is widely accepted among economists that patent values vary widely, and the Court acknowledged that "many [SEPs] are relatively trivial, while some are key features of the standard."[10] TCL had presented a technical analysis of Ericsson's patents that attempted to measure the "contribution" and "importance" of Ericsson's SEPs. While the Court found certain flaws in the technical analysis, it nevertheless concluded that the technical analysis provided "some value" in showing that "Ericsson's patent portfolio is certainly not as strong or essential as it has claimed."[11] TCL's economics expert also presented a forward citation analysis of Ericsson's portfolio. However, although a number of empirical economic studies have shown a relationship between patent value and forward citations[12] and other courts have endorsed this form of analysis[13], the Court was not convinced to rely on forward citation analysis to assess the value of patents. The Court effectively concluded that the relative strength of the Ericsson SEP portfolio was reasonably approximated by its share of the total number of all SEPs, which is equivalent to concluding that the average Ericsson SEPs had value equal to the average SEP.

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4 p. 23. The Court noted that at the time, "WiMAX had a substantial head start because two US carriers had already launched WiMAX networks, while LTE would not be commercially launched for another eighteen months. The joint press release was designed to entice manufacturers to invest in LTE over WiMAX and UMB by promising them that Ericsson and others would use this approach with these expected LTE royalty rates."

5 pp. 23-24.

6 p. 21.

7 The Court noted that the range consistent with Ericsson's statements was from 6% or lower, to no more than 10%, the upper bound of a "single-digit" rate. *See* p. 24.

8 Unwired Planet v. Huawei (2017) EWHC 711 (Pat), April 5, 2017, ¶¶ 269-270.

9 p. 14.

10 p. 38.

11 p. 43.

12 *See*, e.g., D. Harhoff, et al., "Citations, Family Size, Opposition and the Value of Patent Rights," *Research Policy* 32(8) (2003): 1343-1363; D. Harhoff, et al., "Citation Frequency and the Value of Patented Inventions," *Review of Economics and Statistics* Vol. 81(3) (1999): 511-515; Adam Jaffe and Manuel Trajtenberg, "Patents, Citations and Innovations: A Window on the Knowledge Economy" (Cambridge: MIT Press), 2002; Mark Schankerman, "How valuable is patent protection? Estimates by technology field," *RAND Journal of Economics*, Vol. 29(1) (1998): 77-107; and Manuel Trajtenberg, "A Penny for Your Quotes: Patent Citations and the Value of Innovations," *RAND Journal of Economics*, Vol. 21(1) (Spring 1990): 172-187.

13 *See*, e.g., Daubert Order, Better Mouse Company, LLC. v. Steelseries Aps, et al., Case No. 2:14-cv-198-RSP, January 4, 2016; Memorandum, Comcast Cable Communications, LLC, TV Works, LLC, Comcast MO Group, Inc. v. Sprint Communications Company, LP, Sprint Spectrum, LP, and Nextel Operations, Inc., November 21, 2016.

The numerator of the Court's relative value calculation is the number of Ericsson SEPs. TCL and Ericsson differed in their assessment of the number of Ericsson's SEPs. The Court performed alternative calculations based on each party's estimate since, in the Court's view, "this more accurately reflects the reality faced by parties in a licensing negotiation who each have different views [of] how many SEPs the licensor owns."[14] Importantly, the Court considered evidence that Ericsson's SEP portfolio may grow over time (since FRAND licenses typically cover patents issued during the term of a license), as well evidence of Ericsson's patents that have expired and would expire over the term, noting that "by removing expired SEPs from only the numerator [...] the Court therefore apportions their value from the still patented features of the standard."[15] Accounting for expired patents has the largest impact on Ericsson's older 2G SEP portfolio.[16]

The denominator in the Court's relative value calculation is the total number of all SEPs. The Court started with the number of SEPs declared to ETSI, then adjusted downwards to count for potential over-declaration of essentiality based on the TCL experts' calculations.[17] The Court further adjusted the total count for patent expiration as well as the number of new SEPs that will be added to the standard during the course of the license. The Court noted that expired patents, which belong in the public domain, should be included in the denominator even after expiration.[18]

The Court also noted that Ericsson's portfolio is weaker outside the United States, and adopted TCL's economic expert's estimate of Ericsson's regional portfolio strength ratios in arriving at separate FRAND rates for different regions.[19] Using the top-down approach, the Court arrived at the following two sets of rates, depending on whether TCL's or Ericsson's estimate of the number of Ericsson's SEPs are used:

Based on TCL's estimate:

Standard	**2G**	**3G**	**4G (6% ARB)**	**4G (10% ARB)**
US	0.164%	0.103%	0.283%	0.472%
Europe	0.118%	0.091%	--	
ROW	0.090%	0.077%	0.198%	0.329%

Based on Ericsson's estimate:

Standard	**2G**	**3G**	**4G (6% ARB)**	**4G (10% ARB)**
US	0.164%	0.129%	0.451%	0.753%
Europe	0.118%	0.114%	--	
ROW	0.090%	0.097%	0.315%	0.525%

14 p. 33.
15 p. 36.
16 p. 36.
17 The Court applied a factor of 11.4% to the total SEP count in each standard to adjust it downwards. *See* p. 32.
18 p. 36.
19 pp. 43-46.

Comparable Licenses: Identifying "Similarly Situated" Firms, Calculating One-Way Rates, and Unpacking by Standard

As a second approach, the Court calculated the effective royalty rates paid under "comparable" licenses. Although TCL expressed some concerns that the licenses produced in the case were, in fact, "fair and reasonable,"[20] the Court found that "by looking at an array of licenses, concerns about FRAND compliance of any particular license, asymmetric information, and litigation pressures are substantially diminished."[21] This suggests that comparable licenses will continue to be an important consideration in both licensing negotiations and litigation.

A preliminary matter before the Court was determining which of Ericsson's licensees were "similarly-situated" to TCL. Here, the Court noted that, "[the] extremely dynamic [nature of the] handset market over the last decade" required the Court to "broadly interpret" who was similarly situated to TCL,[22] concluding that a comparable analysis "should include all firms reasonably well-established in the world market."[23] The Court in particular noted this should include the largest firms in the market since excluding them "would have the effect of insulating them, and further contributing to their dominant positions, by imposing a barrier in the form of higher rates for those not at the top end of the market."[24] In assessing whether a given licensee was similarly-situated to TCL, the Court found geographic scope, the particular cellular standards licensed by the licensee, and a "reasonable sales volume" to be relevant factors, while the "overall financial success or risk, brand recognition, the operating system of their devices, or the existence of retail stores" should not have any bearing on the comparability of a license.[25] Based in part on these criteria, the Court excluded certain regional manufacturers, while specifically including Apple and Samsung, two of the largest handset manufacturers, along with Huawei, LG, HTC, and ZTE in the set of similarly-situated licensees.

The Court then calculated the effective one-way royalty rates for the Ericsson SEP portfolios from these licenses, taking a number of factors into account. First, for cross-licenses, the Court adopted a relative portfolio strength measure to "unpack" Ericsson's one-way rates in a license. Here, the Court specifically rejected Ericsson's "contribution" measure, i.e., the number of proposals each party submits during the standard setting process that are "approved" by the working group of the standard, as a measure of relative portfolio strength, finding an absence "of any evidence that it corresponds to actual intellectual property rights."[26] The Court instead measured relative portfolio strengths of the parties to the license using their estimated number of essential SEPs.[27]

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[20] p. 109.

[21] p. 110.

[22] p. 57.

[23] p. 56.

[24] p. 57. The Court also noted that "ETSI contemplates facilitating competition in the market, particularly from emerging firms" and that "permitting Ericsson to define similarly situated very narrowly by picking and choosing criteria with no relation to its SEPs or the FRAND commitment would effectively allow Ericsson to read the non-discrimination prong out of the FRAND commitment." *See* pp. 56-57.

[25] p. 58.

[26] p. 75. The Court also noted that this contribution measure was unable to account for transferred or expired patents, and thus did "not reflect the roughly two hundred U.S. patents that Ericsson has divested over the last decade."

[27] This was based on TCL's expert's assessment of the various licensees' portfolio strengths. *See* p. 75.

Second, for licenses with lump-sum payments, the Court made certain assumptions necessary to convert these payments to effective running royalty rates, including apportioning between releases for past sales and royalties for future sales, apportioning among multiple standards covered under a given license, projected future sales revenues of covered products, and the discount rates at which future cash flows should be discounted to present value. Although Ericsson had developed "business cases" for certain licenses, the Court expressed concern that "they represent nothing more than after-the-fact attempts to model certain projections."[28]

Third, in calculating Ericsson's effective royalty rate for each license that would then be used as a potential comparable, the Court concluded that it was appropriate to use a percentage royalty rate, specifically rejecting Ericsson's claim that the royalty rate should be assessed on a per-unit basis or that per-unit floors or caps should apply.[29]

The Court then computed the implied royalty rates from a set of comparable licenses, deriving worldwide rates for Ericsson's 3G and 4G SEP portfolios. While the Court found a wide range of rates across licensees for both the 3G and 4G standards, it found that the rates that Ericsson asked TCL to pay were substantially outside this range. Although the Court acknowledged that its unpacking was subject to some imprecision, it found that "by any measure" Ericsson's offers were "radically divergent from the rates which Ericsson agreed to accept from licensees similarly situated to TCL."[30] Based on this assessment, the Court determined that Ericsson's offered rates were discriminatory and did not meet FRAND terms.

Calculation of FRAND Royalty Rates for Ericsson's SEP Portfolios

Having found that Ericsson's offers were not FRAND, Judge Selna then set out to calculate the appropriate FRAND royalty rates for Ericsson's 2G, 3G, and 4G SEP portfolios. The Court first analyzed the range of rates from both the top-down and comparable licenses approaches,[31] noting that the two approaches "act as a reasonable check on each other"[32] and then narrowed down the range by eliminating the highest and lowest rates and selecting a data point in between the remaining rates as the final FRAND rate. Specifically, for 4G, the Court discarded the top two and bottom two results, and finding the remaining rates "largely congruent," selected a 0.45% US rate in this range. This

[28] p. 64.

[29] The Court cited four reasons for rejecting per-unit rates and the caps and floors that Ericsson had claimed, including (1) per-unit rates were "at odds with industry practice generally and specifically Ericsson's own past licensing practices"; (2) a "percentage-based royalty better aligns the incentives of the SEP-holder and the licensee than a dollar-per-unit royalty"; (3) Ericsson "itself has repeatedly reaffirmed that royalties should be a percentage running royalty"; and (4) there was "no support in the record that a package of SEPs has a fixed determinable value which would justify a fixed dollar-per-unit rate or a percentage rate as modified by floors or caps." *See* p. 69.

[30] p. 94.

[31] Given that the comparable licenses were global rates, the Court performed an additional step of converting the global rates from the comparable license analysis to US versus rest-of-world rates, in order to compare them against the rates calculated from the top-down approach. *See* p. 95.

[32] p. 98.

rate was nearest the effective rate from the top-down approach with a 6% ARB and using Ericsson's own patent counts as the basis for Ericsson's share.[33] The Court then made a downward adjustment for Ericsson's rate in the rest of the world, calculating a FRAND rate of 0.314%.

For 3G, the rates from top-down approach turned out to be much lower than the rates derived from comparable licenses. In the end, the Court selected a 0.30% rate as a FRAND rate for the US. It is notable that this rate is substantially less than the US rates derived from the comparable licenses, which ranged from 0.390% to 0.849%.[34] The Court then made downward adjustments for Ericsson's rates in Europe (0.264%) and the rest of the world (0.224%).

For 2G, the Court noted that it could not reliably unpack 2G rates from any comparable licenses, thus it adopted the results from the top down approach.[35] It calculated a rate of 0.16% for the US, 0.12% for Europe, and 0.09% for the rest of the world.

When thinking about how the Court's approach may be applied in future licensing negotiations or other litigation contexts, we note that in many situations, relevant comparable licenses likely would not be available. For example, in a licensing negotiation, the full set of relevant licenses likely would not be available to both parties due to confidentiality clauses in the licenses. Similarly, in patent litigation in jurisdictions without robust discovery procedures, the parties may not produce all relevant comparable licenses may not be available to the Court. Indeed, those licenses that are made available by a party may represent the result of "self-selection" and thus not be representative of the full set of the party's licenses. In these situations, the top-down approach may deserve greater weight than a comparable license approach, or indeed it may be the only feasible approach.

Conclusion

The decision provides two practical approaches that can be used by implementers and SEP holders, as well as other courts, to assessing a FRAND royalty rate. The decision also provides guidance regarding how to account for certain factors such as essentiality, differences in regional portfolio strength, and patent expiration. ■

[33] p. 99.
[34] p. 101.
[35] p. 103.

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