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The Importance of a Fair and Reasonable Aggregate Royalty in SEP Licensing

Introduction

The landscape for licensing standard essential patents (SEPs) is extremely complex. Many standards are covered by thousands of patents, which are held by hundreds of different owners. As part of the collaborative standard-setting process, patent owners voluntarily commit to licensing their patents on fair, reasonable, and non-discriminatory (FRAND) terms. FRAND royalties promote widespread standard adoption and affordable prices for consumers. But the current framework of SEP licensing negotiations is subject to severe frictions and inefficiencies. In particular, if SEP holders demand outsized, non-FRAND royalties, they can create an excessive aggregate royalty burden for a standard – also referred to as a royalty stack or a cumulative royalty – that can drive up prices and drive down choices for consumers. This is not a hypothetical concern: a significant body of evidence shows how real-world demands have resulted in aggregate royalty burdens that would make using standards uneconomical. For example, as explained later in this paper, a study on 5G SEP licensing found an aggregate royalty burden of 164% of the price of a smartphone from just the licensing demands of “patent privateers” – entities that acquire patents solely for monetisation. The lack of information that businesses have about the size of the aggregate royalty burden for a standard when considering whether to adopt it creates high levels of uncertainty. That uncertainty can discourage investment in innovation and manufacturing, especially by SMEs.

For these reasons, predictable and consistent approaches that arrive at an understanding of a fair and reasonable aggregate royalty for a standard would be an important input when parties negotiate licensing terms for FRAND-committed SEPs and when they make investment decisions. If licensing negotiations hit an impasse, leading the parties to file legal action or engage in some form of dispute resolution mechanism to determine FRAND licensing terms, it is equally critical that decision-makers consider what would be a fair and reasonable aggregate royalty for all of the SEPs needed to support the standard at issue.

Making more information available on the size of fair and reasonable aggregate royalties for standards would support innovation and broad adoption of the standards incorporated into high-tech products, including critical and emerging technologies. A procedure that brings together multiple stakeholders and facilitates the gathering and review of relevant evidence from numerous sources will help generate reliable information concerning aggregate royalties for standards.

1. FRAND Licensing Requirements Are Intended to Prevent Hold-up

Many modern electronics or mechanical products require compatibility with and among devices, components, and infrastructure manufactured by multiple companies. Standard-setting organizations develop technical standards to facilitate this compatibility and allow for the widespread adoption and interoperability of various consumer products. Consumers benefit from increased choice and lower prices for devices that incorporate standards, stimulated by competition. Standard setting is a collaborative process, with many companies who otherwise compete in the market voluntarily contributing technology to the development of a given standard.

Standardisation also carries a risk to competition, however. Once a particular standard has been widely adopted, adherence to the standard can often be effectively required for a product to succeed in the market. Any product that complies with that standard must practice the patented technology of the patent holders whose inventions have been incorporated as mandatory features of that standard during the standard-setting process. Companies providing innovative products which need to be compliant with the standard therefore often become “locked-in” to the standard, which creates the opportunity for patent holders to engage in “hold-up” by demanding royalties beyond the value of their inventions, often under threat of injunction. In large part to avoid this situation, many standard development organizations (SDOs) require those that voluntarily contribute their technologies into the standard to make an irrevocable agreement to license their SEPs on FRAND terms.

2. The SEP Landscape Is Complex

While the requirement to license SEPs on FRAND terms and conditions is intended to support straightforward, widespread standards adoption by product innovators, in reality the landscape for licensing SEPs is incredibly complex.¹ There are a number of reasons for this complexity, one of which is simply the enormous number of global patents that may be essential to a given standard. Studies indicate that there are currently more than 125,000 patent families which are potentially essential to one or more key cellular, Wi-Fi, and video coding standards, more than five times the number from ten years ago.²

Adding to this complexity is that there are often multiple standards providing overlapping functionality. For example, cellular, Wi-Fi, and Bluetooth all provide wireless connectivity, and AAC, Opus, AVC, HEVC, and VVC all provide audio and/or video encoding and decoding.³ Often solely to support backwards compatibility, modern devices frequently support multiple standards, as well as multiple generations of the same standard (e.g., Wi-Fi 5, Wi-Fi 6, and Wi-Fi 7)⁴, most of which may require licensing thousands of potential SEPs.⁵

¹ See, e.g., Tim Pohlmann & Knut Blind, *Landscaping Study on Standard Essential Patents (SEPs)*, IPlytics GmbH: Technical U. of Berlin, 17 (2016).

² See Tim Pohlmann, *Who is Leading the 5G Patent Race?* at 7 (2025); Tim Pohlmann, *Who is Leading the Wi-Fi 6 Patent Race?* at 7 (2024); Tim Pohlmann, *Who is Leading the VVC Patent Race?* at 6 (2024).

³ *Id.*; see also Gary J. Sullivan, *Video Coding Standards Progress Report: Joint Video Experts Team Launches the Versatile Video Coding Project*, 127 SMPTE Motion Imaging J., 94-98 (Sept. 2018) (discussing efforts to conform video coding standards used to compress video files).

⁴ See Nizar Abdelkafi & Rudi Bekkers *et al*, *Understanding ICT Standardization: Principles and Practice* at 10 (ETSI, 2d ed. 2021) (noting that by 2010, at least 251 interoperability standards were used for a laptop computer).

⁵ Justus Baron & Tim Pohlmann, *Mapping Standards to Patents using Databases of Declared Standard-Essential Patents and Systems of Technological Classification*, at 18 (2015).

The number of companies holding SEPs has also increased significantly. In 2021, more than 260 companies held at least 10 declared SEPs, more than 2.5 times the number from a decade earlier.⁶ Product innovators therefore need to negotiate a higher number of licenses covering more patents in order to support each standard. Many of the same patents are licensed multiple times for the same devices because they cover multiple standards. For certain standards there exists a database of declared SEPs, which at least provides a starting point for understanding the patent landscape – i.e., who owns what patents. However, such databases do not provide any information regarding which patents are actually essential. For most standards, however, no such database containing specific patent information is available, meaning that there is a lack of clarity about which patents are potentially required to be licensed and who owns them. Additionally, an initial SEP owner may transfer the rights to certain of its SEPs to other companies, including Patent Assertion Entities, who often request licensing fees that are disproportionate compared to the size of the portfolio they acquired.⁷ When all of the demands by all of the licensors are combined, they typically result in a cumulative royalty stack for a standard that is commercially not viable. The fact that it is common for standards to be developed by participants distributed across the globe further adds to this complexity by requiring companies to negotiate licenses with patent holders based in jurisdictions such as Europe, the United States, Canada, China, Korea, and Japan, among others.⁸

3. Royalty Stacking Can Decrease Implementation of a Standard, Raise Prices, and Discourage Investment and Innovation

Taken together, the result of this complex SEP landscape is that creators and producers of products incorporating standards face a high number of licensing demands and negotiations for every product. These companies often must pay royalties to many different SEP owners, which can result in a total royalty burden for licensing all the essential patents covering a standard – the SEP “royalty stack” – that is so large that it discourages adoption of the standard and the development of further innovations by product manufacturers. This harms not only those manufacturers, but also consumers and other SEP holders.⁹ Without an upper bound on the total royalty burden, SEP owners will seek to independently maximise their licensing royalties without regard to the overall SEP royalty stack for a standard.¹⁰ Sometimes licensing demands are so inflated that, as one court observed, no licensee “could stay in business” if they paid these rates for the entire patent stack.¹¹ One study found that the program rates demanded by some licensing entities implied an aggregate royalty for 5G just from “patent privateers” – non-practicing entities that have obtained patents solely to monetise them – that would exceed 164% of

⁶ COM(2023) 232 Final SWD(2023) 124 Final at 8.

⁷ See European Commission Impact Assessment Report at 70, available at https://single-market-economy.ec.europa.eu/document/download/a009816a-3b24-46c8-9c3c-fd8bd89a1380_en?filename=SWD_2023_124_1_EN_impact_assessment_part1_v4.pdf.

⁸ See *id.*

⁹ See Jason R. Bartlett & Jorge L. Contreras, *Rationalizing FRAND Royalties: Can Interpleader Save the Internet of Things*, 36 Rev. Litig. 285, 295–96 (2017) (explaining that combining the rates in five published decisions on Wi-Fi SEPs, covering thirty-five adjudicated patents, would account for 4.5% of a hypothetical fifty-dollar router – suggesting that an aggregate royalty rate for 3000 essential Wi-Fi patents would be orders of magnitude larger); Ericsson’s Response to FTC’s Request for Comments, Standards Setting Workshop at 6, Project No. 9111204 (2007) (“if the royalty levels for a standard are cumulatively too high, they will adversely impact and may negate the economic benefits of standardization”).

¹⁰ See Thomas F. Cotter, *Patent Holdup, Patent Remedies, and Antitrust Responses*, 34 J. of Corp. L. 101, 119 (Dec. 10, 2008) (“[S]eparate owners of complementary inputs each demand[ing] what is (for them) the individually profit-maximizing price . . . will result in a price for the end product that is higher than the social optimum.”).

¹¹ *Optis v. Apple* [2023] EWHC 1095 (Ch) at 467(iv).

the price of a smartphone.¹²

The complexity of the SEP licensing landscape and the potential for outsized SEP royalty stacks create an additional problem for companies that design and manufacture products incorporating standards: uncertainty. When SEP owners attempt to negotiate licenses individually with every implementer while keeping the terms of their other licenses confidential, the total royalty burden for a standard can become impossible to predict and plan for. This forces manufacturers of standard-supporting products to make business-critical decisions without information on a substantial input cost.

One such decision is how much to invest in creating new products. Manufacturers of standard-supporting products typically make significant investments in creating innovative, differentiated product features that extend far beyond the standard. A 2022 study found component and product manufacturers accounted for 95% of smartphone R&D, while upstream SEP holders accounted for only 5%.¹³ Outsized aggregate SEP royalty demands can place these downstream investments and innovations at risk. For instance, it has been reported that laptop manufacturers are disabling decoding of video streams encoded using the HEVC codec on some products, possibly because the license cost is not of value to some consumers of such products.¹⁴

Another decision product manufacturers are forced to make with almost no information on aggregate royalty costs is whether to invest the large amounts of money necessary to enter a product area in the first place. Such decisions are particularly challenging for SMEs, who can be discouraged from entering a market due to the high uncertainty of the royalty burden. It is not surprising that a study by the European Commission revealed that, among entities that manufacture standard-supporting devices, there is universal agreement on the importance of knowing the total royalties for a product.¹⁵ When manufacturers decline to enter a market due to unknown royalty risk, consumers have fewer choices and may pay higher prices due to less competition in the marketplace. It is important to acknowledge that, in addition to knowing the royalty stack for a standard before or after entering a market, it is critical to ensure that the royalty rates are FRAND by appropriately valuing the SEPs in a portfolio.

4. A Fair and Reasonable Aggregate Royalty Should Be Considered when Evaluating FRAND Licensing Terms

An important solution to deal with the uncertainty and excessive cost of the SEP royalty stack is the availability of public information about the fair and reasonable aggregate royalty for all of the SEPs needed to comply with a particular standard. That aggregate royalty can then be apportioned among the various SEP owners based on the size and strength of their individual portfolios, which results in FRAND royalty

¹² Stout, *Standard Essential Patent Privateer Report* at 10 (Jan. 30, 2023), available at <https://www.stout.com/en/insights/article/standard-essential-patent-privateer-report>.

¹³ Raphael De Coninck et al., *SEP Royalties, Investment Incentives and Total Welfare* at 3 (2022), available at <https://fair-standards.org/wp-content/uploads/2023/04/SEP-Royalties-Investment-Incentives-and-Total-Welfare.pdf>.

¹⁴ Anton Shilov, *Dell and HP disable hardware H.265 decoding on select PCs due to rising royalty costs — companies could save big on HEVC royalties, but at the expense of users*, available at <https://www.tomshardware.com/pc-components/gpus/dell-and-hp-disable-hardware-h-265-decoding-on-select-pcs-due-to-rising-royalty-costs-companies-could-save-big-on-hevc-royalties-but-at-the-expense-of-users>.

¹⁵ COM(2023) 232 final 2023/0133 (COD), at 7, available at https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13109-Intellectual-property-new-framework-for-standard-essential-patents_en.

payments for each SEP holder.¹⁶ This “top-down” analysis lessens the threat of excessive cumulative royalty rates for a standard that may occur when individual SEP rates are set without consideration for all the other SEPs that read on a standard.

Moreover, transparency about the size of the aggregate royalty for a standard gives manufacturers critical business information when planning future investments. Providing the market with early clarity about the aggregate royalty cost to adopt a standard reduces manufacturers’ risks and can help accelerate the standard’s widespread adoption, to the benefit of SEP holders, downstream innovators, and consumers alike.¹⁷ Having information on a fair and reasonable aggregate royalty is also helpful to accelerate licensing negotiations, giving the parties a common understanding in advance upon which they can anchor a negotiation and reach a resolution on the royalty rate, which is otherwise one of the most disputed aspects of the license negotiation process.¹⁸ In the event a negotiation progresses to litigation, reliable, non-binding information on aggregate royalty rates is likely to make proceedings more efficient and cost-effective.

Aggregate royalty information can be particularly important in fields such as medical devices, where regulatory requirements necessitate particularly lengthy product development cycles. Companies in this space need “certainty at an early stage regarding the aggregate FRAND royalty for SEP licenses” and the inability to assess the potential costs of a technology can be a deterrent against adopting widely-used standardised solutions.¹⁹

Similarly, companies developing specialised IoT devices face difficult commercial choices given the relatively low product prices in this segment.²⁰ Unknown license fees can bring two potentially existential threats. Companies that over-estimate their royalty burden can be forced out of the market by lower-priced competitors. However, companies that under-estimate their royalty burden can face the risk of insolvency when faced with demands to compensate SEP holders for past sales.

To account for all relevant SEPs, a fair and reasonable aggregate royalty should be based not only on those patents that have already been asserted, but also on all other SEPs that cover the standard, even if no royalty demand has been made for licensing these other SEPs. Furthermore, the aggregate royalty burden should reflect only the economic value of the patented inventions underlying a standard without accounting for value added through standardisation, and should not be so high as to inhibit uptake of the

¹⁶ Courts have looked to the aggregate royalty to help set FRAND rates between parties. In *TCL Comm. Tech. Holdings LTD v. Telefonaktiebolaget LM Ericsson*, No. 2:15-cv-02370-JVS-DFM, (Mar. 9, 2018), the US District Court for the Central District of California determined a FRAND royalty rate for Ericsson’s SEP portfolio based on Ericsson’s statements of a reasonable total royalty for the standard, the reported total number of SEPs for the standard, and the number and importance of Ericsson’s SEPs relative to the total. In *Unwired Planet v Huawei*, [2017] EWHC 711 (Pat) (Apr. 5, 2017), the UK High Court adopted a similar approach to determine the FRAND royalty rate.

¹⁷ See Jorge L. Contreras, *Aggregated Royalties for Top-Down FRAND Determinations*, 62 Antitrust Bulletin, 690 (2017) (discussing benefits of top-down analysis).

¹⁸ Communication from the Commission, *Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the European Union to Horizontal Co-Operation Agreements* at paragraph 460, (2023/C 259/01) (noting that FRAND rates should “bear a reasonable relationship to the economic value of the IPR” and be independent “of the market success of the products”).

¹⁹ COM(2023) 232 Final SWD(2023) 124 Final at 67–68.

²⁰ See *id.* at 69 (“how are you going to build a business case for a sensor device priced at EUR 15 when you have an unknown license fee?”).

technology.²¹ An aggregate royalty burden that captures the value of standardisation or innovations in products that implement the standard is not consistent with the FRAND commitment and its purpose of avoiding hold-up that can result when industry is locked into using the standard.

Determining a fair and reasonable aggregate royalty for a standard and an individual SEP owner's portion of that aggregate royalty must consider evidence similar to that which courts might consider in other cases where economic considerations play a large role, such as licensing, patent, and antitrust disputes.²² Such evidence can include, among other things:

- the number of SEPs for the standard;
- the marginal value of the particular SEPs included in a standard over alternative technologies available prior to standardisation;
- the value of the SEPs apart from their inclusion in the standard and apart from their combination with other technologies not claimed in the SEPs;
- the cost of the smallest component implementing the SEPs;
- economic and industry reports on the size and strength of relevant patent portfolios;
- where in the value chain licensing should most efficiently occur;
- the number of different standards incorporated into a product and the cumulative royalty burden created by all of those standards;
- the number of different versions of the standard incorporated into a product and the cumulative royalty burden created by all of those versions of the standard;
- any recommendations by SSOs on a cumulative royalty cap;
- public statements by contributors to the standard, including any royalty rate formulations which should be taken as a cap, and by potential licensees; and
- licensing rates charged by relevant patent pools (including, importantly, consideration of the methodology used to arrive at those rates) and the apportioned proceeds paid to pool members, when those proceeds are FRAND.

The resulting aggregate royalty for a standard is not intended to be an exact, binding number. It is instead an estimate and non-binding, and potentially expressed as a range of values, that provides information

²¹ Tim Frain, Director IPR Regulatory Affairs, Nokia Corporation, *FRAND Best Practices* at 1 (Nov. 19, 2008) (noting "there is a need to ensure the total royalty costs remain reasonable. And by 'reasonable' I mean commercially viable. Commercial viability is the yardstick which we can say if the cumulative royalties are reasonable or not," and that "it is important that individual patent owners get a fair slice of the overall royalty pie, without reaping additional value merely because their technology is adopted as mandatory in the standard").

²² See Jorge L. Contreras, *Aggregated Royalties for Top-Down FRAND Determinations* at 696-702 (discussing methodologies for determining an aggregate royalty).

for the ecosystem to support investment in standards development, increase certainty in business planning, and streamline licensing negotiations.²³

5. The FSA Recommends that any Aggregate Royalty Determination Process Satisfy the Following Key Principles

The public availability of information on a fair and reasonable aggregate royalty can provide clarity to companies on the maximum potential royalty cost of implementing a standard before investments are made. This will assist the companies in making informed decisions about which standards to invest in and support. Aggregate royalty information can also provide a key input to any subsequent FRAND determination or negotiation and facilitate licensing rates that support the broad adoption of the standard through the increased transparency it provides.

Existing patent pools do not solve the aggregate royalty problem. Some patent pools may state they consider the aggregate royalty burden for a standard when setting rates for the portfolios they offer for licensing. But patent pools have different approaches to setting royalty rates and the process used by a pool may limit participation to only SEP holders that license through the pool. Thus, the resulting rate, including any aggregate royalty considered, may be self-serving and inflated due to the limited evidence and participation in the process. Additionally, patent pools in which licensors are not also themselves licensees create an issue of imbalanced incentives where licensors are not subject to the royalty demands made by the pool, leading further to excessive royalty demands. Patent pools that are open to participants that own at least one SEP, regardless of whether they are licensors or implementers, or whether they ultimately agree to license their portfolios through the patent pool, are likely to offer a more reasonable aggregate royalty assessment.

Courts have also, albeit infrequently, attempted to assess aggregate royalties for standards, mainly for cellular standards. In the context of litigation, the analysis by a court to determine an aggregate royalty is limited to evidence and arguments made by the parties to the specific case and therefore may lack a complete picture of the SEP landscape for a standard.

To generate reliable information on a fair and reasonable aggregate royalty for a standard, the FSA recommends a process that satisfies key principles addressing the need for sufficient evidence, expertise, and transparency.

- **Open Participation:** An aggregate royalty determination should be open to all interested stakeholders, including holders of SEPs for a standard, and those who currently implement or plan to implement the standard. Stakeholders will be incentivised to participate and have their input considered given their interest in SEP licensing for a standard.
- **Ample Evidence:** With open participation, the process should permit the submission of ample

²³ See Jorge Contreras, *Rate Setting for Standard Essential Patents* at 147, UKIPO (2025) (“if a non-binding rate determination is made by a respected body with relevant expertise that has collected and considered a substantial body of relevant evidence in making its determination, its results will be informative to a court later considering the matter and may even be persuasive”).

evidence by the stakeholders to support the economic assessment of the aggregate royalty determination. Exemplary types of evidence parties may submit are listed above.

- **Expert Panel:** An aggregate royalty determination should be conducted by an impartial, balanced expert panel. Considering the financial assessment involved, such a panel should include persons with experience in economics, FRAND royalties, or patent damages calculations.
- **Public Results:** An aggregate royalty determination should result in a public report that specifies the aggregate royalty as determined by the panel of experts.
- **Transparent Methodology:** The public report resulting from the aggregate royalty determination should transparently outline the panel's approach to making its determination.
- **Non-binding Results:** While providing the SEP licensing ecosystem with guidance on an aggregate royalty for a standard is critical, it is also important to recognise that any such determination will necessarily be an estimate reflecting the best efforts of the panel to assess the evidence and provide a fair and transparent assessment. As such, it is necessary that the outcome of an aggregate royalty process be non-binding.
- **Global Coverage:** SEP licensing is typically a global endeavor, considering SEPs, SEP holders, and products implementing standards spanning the globe. For an aggregate royalty to support this dynamic, it is important that the global patent landscape be considered in the assessment and the results not be limited to any particular country or region.
- **Complementary to, Not in Place of, Bilateral Proceedings on the Merits:** An aggregate royalty determination should be available as admissible evidence by either party in court proceedings. That said, it remains important for SEP licensees to retain the ability to test the strength of relevant SEPs in court in applicable jurisdictions worldwide.
- **Non-static Results:** In the event that new information comes to light that may result in a modification of a previously-determined aggregate royalty, it should be possible to revisit the assessment to consider such information.

Conclusion

SEP licensing is a highly complex area, with the lack of information on licensing costs creating uncertainty for businesses throughout the product development life cycle. Businesses would benefit from having knowledge of the fair and reasonable aggregate royalty for a standard as they make investment decisions on which standards to support in their products and negotiate licensing terms for FRAND-committed SEPs. Aggregate royalty information would also benefit courts as they assess whether a licensing offer is FRAND. The FSA recommends that a procedure for determining and publishing an aggregate royalty for a standard be put into place to meet this need, with key principles that promote robust and reliable results that will support widespread standards adoption around the world.