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Licensing Terms of Standard Essential Patents

A Comprehensive Analysis of Cases

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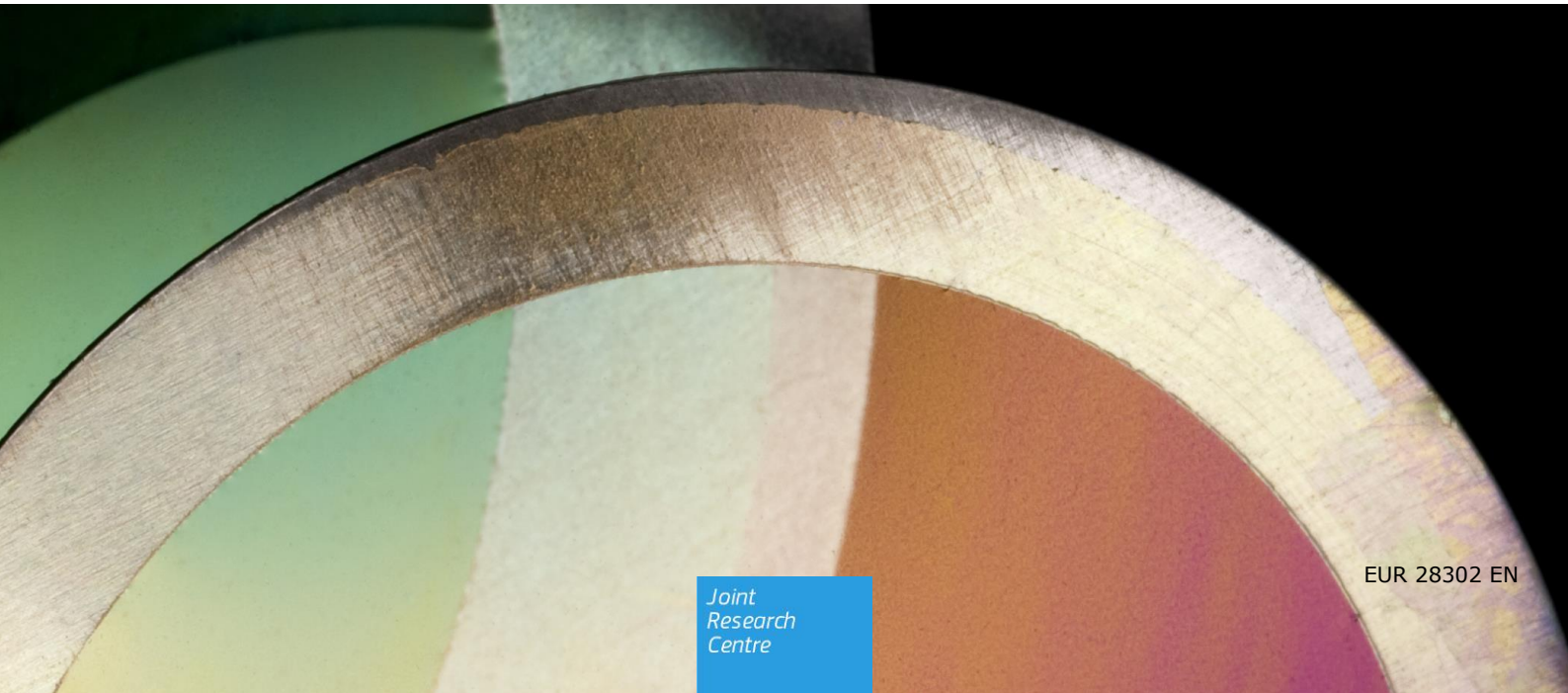

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Abstract
The prospect of licensing patents that are essential to standards on an industry-wide scale is a major incentive for companies to invest in standardization activities. Most standard development organizations (SDOs) have defined intellectual property rights (IPR) policies whereby SDO members must commit to licensing their standard-essential patents (SEPs) on Fair, Reasonable and Non-Discriminatory (FRAND) terms. This study aims to provide a consistent framework for both the interpretation of FRAND commitments and the definition of FRAND royalties. Our methodology is built on the analysis of landmark and significant decisions taken by courts and competition authorities in Europe and worldwide. The purpose of the comparative analysis is to provide a comprehensive overview of how FRAND licensing terms have been defined in the evolving case law, while testing the economic soundness of the concepts and methodologies applied by courts and antitrust authorities.

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PREFACE

This report was prepared in the context of the three-year research project on European Innovation Policies for the Digital Shift (EURIPIDIS) jointly launched in 2013 by JRC and DG CONNECT of the European Commission. This project aims to improve understanding of innovation in the ICT sector and ICT-enabled innovation in the rest of the economy.

The purpose of the EURIPIDIS project is to provide evidence-based support to the policies, instruments and measurement needs of DG CONNECT for enhancing ICT Innovation in Europe, in the context of the Digital Agenda for Europe, of the European Digital Single Market, and of the ICT priority of Horizon 2020. It focuses on the improvement of the transfer of best research ideas to the market.

EURIPIDIS aims to:

- better understand how ICT innovation works, at the level of actors such as firms, and also of the ICT "innovation system" in the EU;
- assess the EU's current ICT innovation performance, by attempting to measure ICT innovation in Europe and measuring the impact of existing policies and instruments (such as FP7 and Horizon 2020); and
- explore and suggest how policy makers could make ICT innovation in the EU work better.

Within EURIPIDIS, the present report undertakes a legal and economic analysis of FRAND in theory and practice and offers a set of policy recommendations at EU level in the context of SEP licensing[1].

[1] More information on the EURIPIDIS project is available at: https://ec.europa.eu/jrc/en/euripidis

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GLOSSARY

3GPP	Third Generation Partnership Project. A consortium of seven SSOs in the field of mobile telecommunication, including ETSI.
ANSI	American National Standards Institute
CCI	Competition Commission of India
CJEU	Court of Justice of the European Union
Disclosure	Also SEP declaration. A statement by which the owner of an IPR informs an SSO that its IPR may be essential to a technology standard developed or under development at this SSO. To be distinguished from ex ante disclosure of licensing terms.
DoJ	United States Department of Justice
DSM	European Digital Single Market
EMVR	Entire Market Value Rule. Rule developed by the Supreme Court of the United States that determines under which conditions a patent owner is entitled to patent infringement damages based on the entire value of a product comprising more than the patented feature.
Essential	See SEP
ETSI	European Telecommunication Standards Institute
Ex ante disclosure	A statement made by a patent owner prior to standard development disclosing the most restrictive terms of the licenses the patent owner is prepared to offer all standard implementers in case the standard is set such that the patent becomes essential to this standard.
Ex ante negotiation	Also Hypothetical ex ante negotiation. Concept used to determine a reasonable royalty by reference to the outcome of a hypothetical negotiation between a patent owner and an infringer that takes place before the beginning of the infringement. In the context of SEPs, the timing of the hypothetical ex ante negotiation is often modified, e.g., set before a standard was developed.
FRAND	Fair Reasonable and Non-Discriminatory. Also Reasonable and Non-Discriminatory (RAND). Concept describes the licensing terms to be offered by the owner of an SEP to standard implementers.
FTC	United States Federal Trade Commission
Georgia-Pacific	List of 15 factors such as licensing royalties, comparable licenses, nature and scope of license, profitability of products, price and profit benchmarks etc. Routinely cited by U.S. courts or applied in a modified form, the Georgia-Pacific factors have been advanced as an analytical framework for assessing FRAND damages.
GSM	Global System for Mobile Communications. An ETSI standard describing the protocols for 2G digital cellular networks used by mobile phones. First deployed in 1991, it

	has become the default global standard for mobile communications.
Hold-out	Opportunistic conduct of a firm infringing on a patent and refusing to enter into a licensing agreement. Term coined in symmetry to the notion of [patent] hold-up.
Hold-up	An opportunistic conduct whereby a party of an agreement exploits vagueness in the agreement to expropriate another party's investment, which is specific to this agreement. In particular, patent hold-up designates an exorbitant royalty request made by a patent holder who led implementers to believe that they would be given more advantageous licensing conditions. The hold-up value is the additional value of the royalty that the patent holder is able to extract after the implementer has made irreversible investments to implement the patented technology.
ICT	Information and Communication Technologies
IEEE	Institute of Electrical and Electronics Engineers. The IEEE Standards Association (IEEE SA), which is part of IEEE, is an important SSO best known for developing the IEEE 802.11 WiFi standard.
Implementation	Production and/or sale of a product or service conforming to the requirements of a technology standard.
Incremental value	Value added by the patented feature to the product implementing the standard, in particular the incremental value over the next best alternative.
IPR	Intellectual Property Right
ITC	United States International Trade Commission. A quasi-judicial federal agency that provides trade policy advice to both the legislative and executive branches. The ITC also adjudicates cases involving imports that allegedly infringe intellectual property rights. It may order an import ban on products infringing patents similar to an injunction with the difference is that it only relates to imports of goods from other countries without affecting vendors who manufacture their products (or have them manufactured) within the US.
ITU	International Telecommunications Union
JFTC	Japanese Fair Trade Commission
KFTC	Korean Fair Trade Commission
LTE	Long-Term Evolution. Standard for high-speed wireless communication for mobile phones and data terminals developed by 3GPP; commonly marketed as 4G technology, although it does not satisfy the technical criteria of a 4G wireless service, as specified in the 3GPP
MOFCOM	Ministry of Commerce (China). The Ministry enforces the merger control regime in China.
NDRC	National Development and Reform Commission (China). The antitrust agency responsible for price-related infringements such as price fixing.

NPE	Non-practicing entity. A company owning patents that does not make or sell products or services practicing the patented technology.
PAE	Patent assertion entity. Company specializing in the assertion of patent rights against infringers. PAE are a special form of NPE.
Patent pool	Licensing instrument offering a single license to complementary patents owned by several patent holders. Patent pools do not own the patents included in the pool license, and typically do not assert the patents against infringers.
Privateering	Transfer of the ownership of a patent or the right to enforce a patent from an operating company to a PAE.
Royalty	Payment in exchange for the license to use a patented technology.
Royalty base	The price of a product or the price of a component of a product that is used to determine the royalty that must be paid to a patent owner for the product's use of a patented feature.
Royalty rate	Percentage applied to the price of a product (or alternative royalty base) to determine the amount of the royalty.
Royalty stacking	Market failure that may result when owners of complementary patents do not coordinate the royalties that they request for the use of their patents. If royalty stacking occurs, the sum of the individual payments requested by the different patent owners is higher than the payment that a single firm would have requested if it owned all the complementary patents.
SAIC	State Administration for Industry and Commerce (China). The antitrust agency responsible for non-price-related infringements.
SEP	Standard-essential patent. A patent that is necessarily practiced by any implementation of a technology standard
SDO (also SSO)	Standard Development Organization (also Standard Setting Organization). Organization that develops (sets) technology standards. Term includes: formal SDOs and informal consortia; organizations like ANSI that do not develop their own standards, but accredit other organizations to develop standards; organizations like 3GPP that develop technical specifications, which are published as standards by other organizations.
SSPPU	Smallest Saleable Patent Practicing Unit. In the US case law, SSPPU refers to a component of a product that can be used as a royalty base.
Standard	Also technical standard or technology standard. Technical document that describes uniform technical requirements.
UMTS	Universal Mobile Telecommunications System. A 3G mobile cellular system for networks developed and maintained by the 3GPP, also a component of the ITU IMT-2000 standard.
USDC	United States District Courts

WiFi	Wireless Fidelity. It is based on the IEEE 802.11 family of standards and is primarily a wireless local area networking (WLAN) technology designed to provide in-building broadband coverage. The 802.11 standard defines an over-the-air interface between a wireless client and a base station or between two wireless clients.

EXECUTIVE SUMMARY

I. RESEARCH QUESTIONS AND OBJECTIVES

The prospect of licensing patents that are essential to standards on an industry-wide scale is a major incentive for companies to invest in standardization activities. However, the exclusive rights conferred by patents on inventors may defeat the objective of making standards available to all for public use. In order to address this tension, most standard development organizations (SDOs) have defined intellectual property rights (IPR) policies whereby SDO members must commit to licensing their standard-essential patents (SEPs) on Fair, Reasonable and Non-Discriminatory (FRAND) terms. These commitments are meant to protect technology implementers while ensuring that patent holders receive an appropriate reward for their investments in research and development.

The rapid evolution of information and communication technologies (ICT), coupled with the need for wider and deeper interconnectivity in view of the Internet of Things (IoT), has led to a variety of SEP owners and implementers with different business models and to greater diversity of licensing practices. As a result, it has become more difficult to identify a consensual interpretation of FRAND licensing principles. In this context, the recent increase in patent litigation in the smartphone industry has sparked controversy with regards to the implications of FRAND commitments, although SEPs actually account for only a small share of litigated patents. The controversy has been further fuelled by a number of economic arguments that question the ability of FRAND commitment to ensure that royalty rates for SEPs are in fact "reasonable." Specifically, the fact that licensing takes place after the setting of a standard raises concerns that FRAND commitments are too loose to effectively prevent SEP owners from unduly leveraging market power once the standard is implemented ("hold-up" argument) or, on the contrary, that they enable implementers to deliberately avoid seeking licenses for SEPs ("hold-out" argument). Moreover, the "royalty stacking" argument contends that the fragmentation of SEP ownership leads to an excessively high royalty stack. However, the strongly polarized public debate around the meaning of FRAND is essentially based on theoretical arguments, and there is a lack of solid empirical evidence on the prevalence of royalty stacking, hold-up and/or hold-out problems.

The present study aims to provide a consistent framework for both the interpretation of FRAND commitments and the definition of FRAND royalties. Our methodology is built on the analysis of landmark and significant decisions taken by courts and competition authorities in Europe and worldwide. The purpose of the comparative analysis is to provide a comprehensive overview of how FRAND licensing terms have been defined in the evolving case law, while testing the economic soundness of the concepts and methodologies applied by courts and antitrust authorities.

II. COMPARATIVE CASE STUDY ANALYSIS

Most cases before courts and competition authorities concerning SEPs are related to patent infringement damages, injunctions or antitrust. A comprehensive comparative analysis of a wide body of case law reveals the following:

Idiosyncrasies of SEP litigation: Complexities in the technologies and licensing practices of SEPs have challenged well-established methodologies and doctrines applicable in the general context of patent infringement. Over time, courts have questioned the "real-world applicability" of existing frameworks and evidentiary rules, leading to modifications and adjustments in the specific context of FRAND.

As a result, courts have introduced economic guideposts into the legal analysis. Moreover, within the context of SEP litigation, different standards have different dispute profiles - with the IEEE 802.11 standards attracting the most litigation across various jurisdictions. Portfolio licensing as an established market practice is also becoming the norm in FRAND litigation. The mix of SEP and non-SEPs (FRAND and non-FRAND-encumbered patents) imposes an additional burden on value apportionment and damage calculation.

Incentive compatibility and fair balance of interests: Across various jurisdictions worldwide, policymakers aim for a definition of FRAND that strikes a balance between the need to make standards available on the one hand, and fairly compensate SEP holders on the other. This approach is motivated by the necessity of protecting the rights and legitimate interests of patent owners and standard users, taking into account the broader public interest and welfare. Policymakers recognize the importance of the FRAND definition for economic incentives, including the incentives to innovate, to participate in standard development, and to rapidly implement and adopt innovative technology standards. Moreover, the risk of hold-up is considered a significant factor for the determination of FRAND royalties, even though its empirical relevance is disputed. US courts require supporting evidence that a party behaved in bad faith before considering hold-up for damages calculation.

Converging practice on injunctions: The decision of the Court of Justice of the European Union (CJEU) in *Huawei v. ZTE* has enhanced convergence across the European national jurisdictions by emphasizing the need for good faith in negotiations toward an actual result over the initial offer of the licensee: injunctions are no longer granted automatically without further consideration of the parties' conduct in the light of their relevant bargaining power. The economic analysis of FRAND licensing highlights the pivotal role of injunctions in mitigating potential harm stemming from bargaining failure and patent hold-up. At the same time, the jurisprudence of the CJEU and national courts in Europe increasingly leverage the award of injunctive relief against unwilling licensees as a means of strengthening bilateral negotiations as the principal forum for determining FRAND licensing terms. The availability of injunctive relief for SEP owners is more restricted in other jurisdictions, including the US, Japan and China. Especially in the US, where injunctions are generally considered inappropriate when a patent owner is committed to licensing his patents, the courts play a more active role in determining the licensing terms when negotiations come to an impasse.

Evaluation of conduct v. emphasis on royalty rates: In the US, reasonable royalties are the most frequent kind of damages awarded in patent cases and comprise a greater share with each passing year. Reasonable royalties aim to award the owner of an infringed patent damages that are proportional to those that the patent owner and the infringer would have agreed upon in a hypothetical negotiation before infringement began. While the guiding principle of the hypothetical negotiation framework is theoretically viable, it is inherently difficult to implement in practice. In order to determine a single royalty rate deriving from a hypothetical agreement of this kind, US courts are methodologically sophisticated when they approach FRAND. In contrast, European courts are more reluctant to define a single royalty rate. Instead, they focus on the conduct of the parties during the bilateral negotiations and assess whether it complies with the specific FRAND commitments made prior to awarding injunctions.

Core principles of FRAND: FRAND does not describe a single rate, but a range of rates. Therefore, courts suggest a specific analysis for the FRAND calculation that extends beyond the apportionment of the value of the infringing product to the infringed patent typical for the determination of royalties in the general context of damages. In addition to preventing hold-up, this specific analysis follows the two core principles of the *ex ante negotiation benchmark:*

i) every judicial analysis of FRAND should take place in the framework of the hypothetical bilateral negotiation set prior to standard development if there is evidence that the patent owner modified its royalty requests in response to the standard adoption, and ii) the incremental value of the patent, i.e., the FRAND royalty rate should be apportioned to the incremental value of the patent.

In the interpretation by the courts, however, the notion of the patent's "incremental value" tends to conflate two concepts, which should be analyzed separately: the stand-alone (intrinsic) value of the patented technology and the value added by the patent to the standard (incremental). Both are relevant for the definition of the FRAND range.

Methodologies for calculating the FRAND royalty: Acceptable methodologies use two sources of observable data, namely the prices of comparable licenses and a royalty base (prices of either the infringing product or a component of this product that practices the patented technology). Although subject to correctives, they reveal useful benchmarks to actual values and established practices and help the courts inform their decisions on the many aspects of royalty calculation. Not measurable directly but approached through proxies, royalty determination has become more technical and fact-intensive, revealing existing evidentiary challenges and data constraints. Related evidence must be reliable and tangible, not conjectural or speculative. There is uncertainty around the appropriateness and sufficiency of submitted evidence (comparable licenses, economic modelling based on market and survey data, etc.). Most royalty determinations establish a FRAND royalty by determining the share of the value of a specific royalty base that is attributable to the patented feature. Regarding the royalty base, the choice between the price of the end product and the price of a smaller component lies at the heart of an ongoing controversy in the US – it should also be remembered that the new IEEE policy chooses the smallest saleable patent practicing unit (SSPPU). Both approaches, however, are not necessarily mutually exclusive, and provide useful pointers for the FRAND determination.

III. OVERARCHING PRINCIPLES OF FRAND

FRAND is a range. There is no accepted methodology for singling out a unique value within the range. The FRAND royalty rate must reflect the following benchmarks:

Ex ante negotiation benchmark: The outcome of a hypothetical ex ante bilateral negotiation between the patent owner and the implementer of the standard practicing the patented feature (or auction);

Incremental value added contributed by the patented feature to the product, which is implementing the standard (in particular, the incremental value over the next best alternative);

Ex ante value of the patented feature, i.e., the intrinsic value of the patented feature excluding any additional value resulting from the inclusion of the feature into the standard;

Incentive compatibility: A FRAND royalty rate preserves the incentives to invent, to contribute patented technology to the standard, and to adopt technology standards including SEPs;

FRAND royalties should account for **royalty stacking and concerns of patent hold-up.**

The above benchmarks describe a (potentially wide) FRAND range. Many different rates may be compatible with the ex ante negotiation benchmark and the economic incentives to develop and adopt technology standards. The incremental

value added by the patent to the standard and the ex ante value of the patent describe different boundaries of the FRAND range.

IV. LEGAL AND ECONOMIC ANALYSIS OF CASE LAW ON FRAND

FRAND is a range

The theoretical concepts behind FRAND and the empirical data that is available to determine FRAND rates for specific patents and products merely allow for the determination of a (potentially wide) FRAND range – not a unique FRAND rate. The FRAND commitment does not determine future licensing rates that will be negotiated between patent holders and standard implementers with scientific precision. In practice, explicit royalty caps or ex ante disclosure of the most restrictive licensing terms play only a limited role in the current landscape for SEP licensing. FRAND continues to be by far the most important regulatory instrument, and policies allowing or requiring more explicit commitments complement rather than replace the role of FRAND. Future policies for SEP licensing will probably continue to confer importance on FRAND commitments. Further developing FRAND as a regulatory instrument for the future of SEP licensing requires that we understand and acknowledge that FRAND, by design and by necessity, defines a range - not a rate.

FRAND is a range that accommodates various approaches regarding its legal nature and economic function

Prevalent legal views are that:

- the FRAND commitment creates an obligation for the SEP owner to offer every potential implementer the right to use the patented technology on reasonable conditions that are negotiated in good faith (*contract law*), or
- non-compliance with FRAND equals an abuse of a dominant position (*antitrust law*).
- In both cases, FRAND allows for a potentially wide range of behaviors and terms that are non-abusive without any rate specifications.

Prevalent economic views on FRAND are that:

- FRAND balances the incentives to contribute to standard development with the incentives to adopt and implement standards including SEPs (welfare maximization), or
- the obligation to FRAND licensing restores the prices that would result from a competitive process in the absence of specific market failures (patent hold-up and royalty stacking).

Both economic theories on FRAND converge, and neither requires or allows the definition of a single FRAND rate.

The determination of the FRAND range is challenging and often error-prone

The boundaries of the FRAND range are determined by a comparison of factual data with counterfactual equilibria such as the development of an alternative standard not including the patented feature, alternative uses of the standard, etc. Product market prices, including the prices of end products and components, may

reveal the implementer's willingness to pay for the patented feature, which constitutes the upper bound of the bargaining range. Comparable licenses indicate some rates that were acceptable to similarly situated parties, thus revealing only individual points out of a potentially wide range of acceptable agreements. The available empirical data thus neither reveal the entire FRAND range nor specify a single FRAND rate. In order to arrive at a single FRAND rate, courts have developed evidentiary rules that place restrictions on the methodologies that can be used for calculating FRAND rates (e.g., EMVR, SSPPU, restrictions on comparable licenses), but these rules are often at odds with the principles of FRAND.

There are limits to what courts can do or should be expected to do

Evidentiary rules and sophisticated methodologies developed by the US courts for the calculation of FRAND royalties are not particularly useful in the European context. These tools are designed to assist the US courts in determining a single FRAND rate. In contrast, in the context of injunctions, European courts have focused on defining the conditions under which the conduct of the negotiating parties is incompatible with their FRAND obligations. Against this background, policies that support market mechanisms and conditions conducive to bilateral negotiations and their proper conduct as early on as possible can enhance clarity around the definition of FRAND and restore legal certainty in the field of SEPs.

V. POLICY RECOMMENDATIONS

The various approaches and divergent outcomes of FRAND disputes across national jurisdictions worldwide – due not so much to fundamental disparities on what constitutes FRAND as to differences in litigation profiles, competition dynamics and political priorities – have a significant impact on the incentives to innovate, implement and participate in standard setting. The interlocking incentive structure of FRAND highlights the need for a specific approach to related policymaking:

Incentive-based approach to FRAND

The need for a balanced framework for negotiations between right holders and implementers of SEPs to ensure fair licensing conditions has been advocated for the European Digital Single Market (DSM). FRAND is a dynamic, commercially viable concept that accommodates various business models while facilitating worldwide access to standard-compliant products and services for millions of consumers and households. However, it needs to reflect the current market diversity and dynamics within an enlarged circle of stakeholders so that innovators receive market-based financial returns and that, at the same time, implementers receive market-based licensing terms. Economically consistent policymaking should take the incentives of both sides into account in order to promote healthy competition at the micro level with beneficial impact at the macro level.

More clarity on FRAND through a common framework

FRAND has the potential to control opportunistic behaviour, enhance competition and evaluate licensing arrangements under a "reasonable" framework. The FRAND principles constitute a powerful tool that could affect norms on a systemic level. By focusing the FRAND analysis on the requirements of willingness in the

context of bilateral negotiations, CJEU jurisprudence has paved the way to a common framework that facilitates negotiations between the licensing parties. Informed policy action should be designed to deepen and expand this common framework by addressing specific types of licensing conduct and clarifying the conditions under which FRAND compliance can be excluded or presumed – the devil is in the details where FRAND is concerned. European policy action should encourage more clarity and flexibility in the definition of FRAND. Articulating a common set of criteria and guidelines for practice – anchored in a clear definition of FRAND – could facilitate private negotiations, enhance due diligence on behalf of the parties, limit the need to seek a third-party determination of a FRAND rate and, in the case of litigation, help courts set convergent standards while allowing for flexibility on a case-by-case basis. To that end, policy guidance pertaining to the various aspects of FRAND should focus on identifying behavior and rates that clearly fall outside the FRAND scope (i.e., define what is not FRAND), rather than supporting economic guideposts and evidentiary rules that isolate a single rate. After the courts, antitrust authorities play a significant role by sanctioning conduct that is incompatible with firms' patent rights or FRAND obligations. However, the implementation of the FRAND range in practice should not aim to calculate a single royalty rate – an effort that has proven to be at odds with economic considerations and the diversity of established legal traditions across the various jurisdictions. Against this background, the European approach, which ties FRAND compliance to the conduct of the negotiating parties, is more likely to result in economically efficient royalty rates. It encourages parties to do their due diligence, and to negotiate licenses as early as possible by avoiding delaying tactics and opportunism.

Governance in the 5G markets

SDOs are encouraged to increase their efforts towards a common framework for FRAND licensing through enhanced clarity and predictability. The impact of the IEEE policy update on the governance of standardization is significant, even though its counterpart organizations, including major European standardization bodies such as ETSI, have decided not to emulate its example and, instead, leave the determination of FRAND rates to the negotiating parties. Nevertheless, the development and deployment of 5G means that SDOs will have to work in tandem. In view of the next generation of mobile standards, standard setting on a global scale and market-led (rather than business-led) SDO policies will determine the success of innovation. Considering the increased influence of societal groups and vertical industry players (transportation, life sciences, energy, etc.) involved in standard setting, a well-coordinated relationship between 5G players and these actors will confirm the viability of standard setting governance and render 5G infrastructure a booster for vertical markets.

Complementing FRAND with other instruments

The complex issues at the interface of IPR and standardization and a proper balance between the interests of the manifold parties involved cannot be achieved through a single instrument. SDOs and other actors have various means at their disposal to further support the bilateral process of licensing negotiations. In particular, SDOs can make a significant contribution by increasing patent transparency in standardization working groups. According to the outcome of the Public Consultation on Patents and Standards held by the Commission from October 2014 to February 2015, there is broad support for early patent disclosure during standard setting. Such transparency-enhancing measures would help SDOs and their technical committees make informed choices and notably avoid situations where adopted standards cannot be implemented for lack of necessary

licenses. In addition to requiring IPR disclosure and licensing commitments, several SDOs have adopted policies to encourage patent pool formation. Patent pools are often regarded as a promising solution to several of the perceived or real market failures in SEP licensing, and in particular the risk of royalty stacking. However, their role in the SEP licensing market remains limited.

Advocacy at global level

The incentives that drive today's ICT markets and portfolio licensing practices are established globally. In this context, FRAND obligations are subject to reasonable access to increasingly important standards related to 5G and Internet of Things technologies that amplify the benefits for competition and consumers globally. While competition and antitrust policies will continue to be shaped at a regional level, global advocacy and the ongoing dialogue between European policymakers and their counterparts in the US, China and the rest of the world could counteract the potentially distortive effects of domestic policies by exploring common ground and identifying best practices that safeguard the interests of society as a whole.

1. INTRODUCTION

1.1. BACKGROUND OF THE STUDY

The area of standardization is a rapidly changing and complex environment characterized by complementary technologies with high functionality, short lifecycles, Intellectual Property Rights (IPR) intensity, market deregulation, fierce competition and litigation. Information and Communication Technologies (ICT) standards are perceived as the foundation of interoperability and the success of new products that interact seamlessly with existing devices, platforms and ecosystems. Consensus building among the various stakeholders is therefore an essential determinant of standard-setting processes, a platform critical to ensuring wide market distribution and acceptance of innovative services and applications. The presence of network externalities and the strong public interest dimension of standardization processes spur a highly dynamic field of intricate structures and far-reaching policy implications. The business landscape around standardization spans a vast array of industries in telecommunications, computers, and audio-video consumer electronics. It is a heterogeneous landscape where the various specificities of these industries render it often difficult to align the conflicting interests of upstream and downstream players with those of research-based players.

EU policies and scientific evidence indicate clearly that ICT are important for growth and productivity. On the one hand, technological progress in ICT-producing sectors is an important driver of growth, as evidenced by its role in the productivity acceleration observed in the late 90s in the US. On the other hand, ICT-enabled innovation in ICT–using sectors has provided the base for permanent and widespread growth-enhancing effects of ICT adoption throughout the economy.

The Digital Single Market (DSM) is one of the ten priorities of the European Commission (EC). The seamless functioning of the DSM is expected to generate up to EUR 250 billion of additional growth in Europe before 2020. In the digital economy, the EC has recognized the importance of standard-essential patents (SEPs), patents on technologies that are necessary for every implementation of a standard, as an increasingly important feature in standardization and an important element of the business model for many industries in terms of asset monetizing and return on R&D investment.[2]

The complexity of standards in ICT creates tension where there should be an effort to strike a balance between the importance to reward innovation and the high stakes in enabling wider access to these technologies.

Standards are ubiquitous in ICT industries due to the strong need for interoperability in this field. Many of them are "formal" standards that are set on the basis of consensus among industry stakeholders who are members of Standard Development Organizations (SDOs). These standards facilitate the deployment of new technologies on the largest possible scale and create a level playing field for competition in related product markets. They are usually complex technology platforms that include a large number of patented inventions contributed by the participants.

The prospect of licensing patents that are essential to standards on an industry-wide scale plays an important role in companies' incentives to invest in

[2] COM(2015)192 of 6.05.2015: A Digital Single Market in Europe; available at http://eur-lex.europa.eu/legal- content/EN/TXT/?uri=CELEX:52015DC0192.

standardization activities, besides other motivations such as directing the standard development towards technological solutions where the respective company is strong and can offer specific services or infrastructure. However, the exclusive rights conferred by patents on inventors may defeat the objective of making standards available to all for public use. In order to address this tension, most SDOs have defined IPR policies whereby SDO members must commit to licensing their SEPs on Fair, Reasonable and Non-Discriminatory (FRAND) terms.[3] These commitments are meant to protect technology implementers while ensuring that patent holders receive an appropriate reward for their investments in research and development. The EC has led numerous public events and published related reports in the context of FRAND licensing terms. The most recent reports underline the importance of evidence-based policy making and point out the need for additional insight in well-specified areas within the evolving landscape of IPR markets and standardization – to include the clarification of FRAND licensing terms (e.g., Bekkers et al., 2014; Ménière, 2015; Pentheroudakis, 2015; EC Public Consultation Report, 2015).

As a consequence of increasing technology sophistication, implementers now need to use a growing number of standards with a larger number of SEPs per standard. Moreover, IPR policies used to be defined at a time when standards were developed and implemented by a limited number of similar companies who used to cross-license their patent portfolios. In contrast, there are now more SEP owners and implementers with different business models and a larger variety of licensing practices. The increased number of SEPs owner, implementers, and practices can be linked to the evolution of even more complex technologies, the multifunctional integration of different technologies and the development of specific services and applications that go beyond initial purpose functions such as communication. As a result, it has become more difficult to identify a consensual interpretation of FRAND licensing principles. In this context, the recent increase in patent litigation in the smartphone industry has sparked controversy regarding the implications of FRAND commitments, although SEPs actually account for only a small share of litigated patents.[4]

The controversy has been further fuelled by a number of economic arguments that question the ability of FRAND commitment to ensure that royalty rates for SEPs are in fact "reasonable." The "royalty stacking" argument contends that the fragmentation of SEP ownership leads to an excessively high royalty stack. Moreover, the fact that licensing takes place after the setting of a standard raises concerns either that FRAND commitments are too loose to effectively prevent SEP owners from unduly leveraging market power once the standard is implemented ("hold-up" argument) or, on the contrary, that they enable implementers to deliberately avoid seeking licenses for SEPs ("hold-out" argument). The hold-up problem, in particular, is central to the public debates where it provides a consistent framework for both the interpretation of FRAND commitments and the definition of FRAND royalties. It also qualifies the SEP holder's behavior as an abuse of dominant position, thus opening the door to the intervention of competition authorities in matters of FRAND licensing.

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[3] The precise language of the licensing commitment varies by jurisdiction. In the United States, participants in a standard-setting organization may commit to licensing patents that are essential to a standard on "reasonable and non-discriminatory" (RAND) terms, whereas in Europe and other jurisdictions, they may commit to licensing such patents on terms that are "fair, reasonable, and non-discriminatory" (FRAND). For purposes of this paper, "FRAND" refers to FRAND and RAND commitments.

[4] Gupta & Snyder (2014) find that "less than one-third of the patents involved in smart phone litigation can be characterized as SEPs."

1.2. OBJECTIVES AND METHODOLOGY

The present debate on FRAND is strongly polarized. In this context, the absence of verifiable, publicly available information on negotiated royalty rates is accompanied by a lack of solid empirical evidence on many of the concerns underlying the FRAND debate - in particular, royalty stacking, hold-up and/or hold-out. Given the limitations of the available information, the debate has essentially focused either on theoretical legal and economic arguments or on the analysis of specific FRAND disputes.

Additional clarity on a common framework for FRAND licensing would benefit industry stakeholders and consumers alike. Responding to this need, the present study is the first to review the existing body of case law on FRAND and achieve a comprehensive overview of the ways FRAND licensing terms for SEPs are determined by courts and competition authorities in Europe and worldwide. Despite significant differences in practice, we detect an emerging consensus around specific concepts used for the definition of FRAND and the determination of a FRAND rate in specific disputes. We rely on the legal and economic literature to interpret these concepts and propose a unified framework. In other words, we bridge theory and practice based on a comparative case law analysis, while testing the economic soundness of the methodologies applied by courts and antitrust authorities. In doing so, we do not invoke theoretical concepts or economic analysis to argue for a particular interpretation of FRAND, or to suggest how FRAND should be defined in order to achieve specific public policy objectives. Instead, we offer an interpretation of the concepts applied in the case law and - with reference to extensive legal and economic literature - evaluate whether the adopted empirical methodologies achieve the judges' stated objectives for the FRAND determination.

Our joint (legal and economic) assessment of the different solutions in the various jurisdictions to common legal problems seeks to infuse greater clarity in the meaning of SEP licensing terms as well as mitigate legal uncertainty through a common framework for FRAND. By "common framework" we mean a set of interconnected patterns and fundamental principles that claim wide applicability without undermining the importance of ex post contractual flexibility as a source of economic value.

The study is divided in four parts:

- *Theories of FRAND.* We begin with a systematic overview of how economic and legal literature has interpreted FRAND and SEP licensing terms. The theoretical considerations of subject-matter experts and scholars serve as a springboard for the subsequent analysis of case law.
- *Comparative case study analysis.* We perform a comparative analysis of recent FRAND disputes, including court decisions, antitrust cases and the new IEEE policy (cf text box page 167). The scope of the case studies is global with a focus on Europe and the US. Cases are selected according to pre-established criteria in order to ensure wide coverage of judicial practices and the various interpretations of FRAND.
- *Comprehensive analysis of FRAND licensing.* We provide a comprehensive overview of SEP licensing terms and combine the concepts used in the case law for the determination of FRAND rates into a consistent framework. We argue that this framework defines a potentially broad range of FRAND rates. We discuss how the theoretical concepts defining FRAND have been implemented using empirical data, and we critically assess the merits of specific evidentiary rules conceived to facilitate the practical implementation of FRAND.
- *Public policy analysis.* We recast FRAND in the broader policy context and provide relevant policy recommendations at the European level. The public

policy analysis will look at the implications of SEP licensing in the European policy framework by bridging the theoretical underpinnings, case studies and the comprehensive analysis of SEP licensing terms.

2. THEORIES OF FRAND

In this section, we discuss the prevalent theories of FRAND in the economic and legal literature. The purpose of this section is to kick off our research with a scholarly view of FRAND before delving into a comparative case law analysis of FRAND in Part 3. Furthermore, we will show in Part 4 that our own analytical approach to FRAND is not only in line with the case law on FRAND, but also accommodates the dominant theories regarding the economic function and the legal nature of the FRAND obligation.

Section 2.1. analyzes the economic function of FRAND. The economic literature on the role of FRAND can be divided into two different streams of research: first, one body of research analyzes the implications of FRAND licensing terms for economic incentives to develop and contribute standardized technologies. Second, another body of research analyzes specific market failures in the determination of royalty rates; and in particular the risks of royalty stacking and patent hold-up. This literature attempts to formulate an interpretation of FRAND, which minimizes the impact of these market failures and restores the licensing terms, which would result from a competitive technology market.

Section 2.2. draws on a growing body of legal scholarship regarding FRAND commitments in the standard-setting context. It approaches the nature of FRAND commitments through the lens of various legal doctrines and demonstrates how questions of patent, contract and competition law intersect. Against the background of an apparently fractured licensing system, it presents how courts and enforcement authorities weigh in to define the meaning of FRAND and how the incentives of different legal and regulatory regimes impact that process.

2.1. THE ECONOMIC FUNCTION OF FRAND

2.1.1. FRAND and incentives to contribute to standard development

On the supply side, FRAND licensing terms define the incentives to contribute to development. These incentives comprise two different aspects: first, the incentives to develop new standard-essential technology, and second, the incentives of the owners of existing technologies to participate in standard development and make their technologies available for integration into a standard.

2.1.1.1. FRAND and incentives to develop standard-essential technology

Industry standards are generally intended for use by an entire industry, and the benefit of innovative technology standards accrues to large numbers of actors (Kindleberger, 1982). Nevertheless, the effort of developing the technology to be included in standards is often borne by only small numbers of firms voluntarily contributing to standard development in SDOs. Studying 3GPP, a particularly important SDO with more than 450 member companies, Baron & Gupta (2016) find that between 58% and 75% of all contributions are submitted by only 10 firms. The wide discrepancy between the number of standard users and the number of active contributors to standard development is a potential problem, because firms may have insufficient incentives to contribute to the standard,

when the benefits, albeit not the costs, of these efforts are shared with other firms.

SEPs may allow their owners to generate economic profits, and can therefore play an important role in incentivizing research and development (R&D) that produces standard-essential technology. From a theoretical point of view, the incentives to innovate provided by SEPs can be stronger or weaker than the incentives provided by the patent system in other contexts. On the one hand, SEPs may be particularly effective at inducing R&D, because the inclusion of a patented invention in standard is likely to generate additional demand for licenses to this patent. Rysman and Simcoe (2008) find that the number of citations to a patent increases if the patent is declared essential to a standard, and argue that their findings reflect an increase in the use of the patented invention due to its inclusion in the standard. On the other hand, SDO policies often require owners of SEPs to license these patents on FRAND terms, which prevent them from charging excessive royalties or excluding competitors from using their technology.

Overall, the remuneration of SEPs – even when it is regulated by FRAND terms – appears to be attractive. Many SEPs are found to generate substantial economic revenues, e.g., through licensing (Stasik, 2010). Pohlmann and Blind (2015) find that firms owning SEPs achieve higher returns on assets than firms owning other patents. The highest returns on assets are achieved by firms owning a mix of declared SEPs and other, non-essential patents. Hussinger and Schwiebacher (2015) study the effect of patents on the market value of a firm's stocks, and find that the number of declared SEPs correlates with a firm's market value, also if controlling for the number of patents in general. These studies suggest that SEPs can generate higher economic returns for their owners than other patents.[5]

This economic return on SEPs determines the incentives to develop technologies that could become part of a technology standard. Baron et al. (2014) study patent-driven innovation for technology standards and find evidence for both over- and underinvestment in patenting standard-essential technology. This suggests that, depending on the characteristics of the standard, the economic return to SEPs could be either excessive or insufficient to induce the socially desirable level of innovation. R&D coordination between innovating firms can mitigate either type of inefficiency.

SEP owners also have incentives to invest resources in the improvement, maintenance, or promotion of the standard including their technology to insure that industry implementers keep using the standard. Studying a sample of SDOs which all practice a FRAND licensing policy, Baron et al. (2016) find that standards including SEPs are revised more regularly and survive longer than other, comparable standards issued by the same SDOs. This is particularly true if the SEP ownership is concentrated within a few firms.

Several authors voice the concern that FRAND remuneration of SEPs not only incentivizes firms to invest in the development or improvement of a standard, but also to engage in rent-seeking with no value contribution to the standard. Dewatripont and Legros (2013) argue that if the contribution of a patented invention to the value of a standard is difficult to observe, FRAND licensing policies induce an over-investment in patenting with respect to the social optimum. Bekkers and West (2008) document a strong increase in the number of patent declarations over time and argue that the obligation to license SEPs on FRAND terms has proven insufficient to limit this "proliferation" of patents. Some authors claim to provide evidence for opportunistic strategies, through which

[5] These studies do not establish a causal effect of essentiality. In particular, it is possible that the correlation between essentiality and value is due to reverse causality, because more valuable patents are more likely to be declared essential.

firms obtain a larger number of SEPs without increasing their contribution to standard development. Berger et al. (2012) document that many applicants at the European Patent Office (EPO) amend their patent applications, while a standard is under development, in order to match the claims of their patents with the content of the future standard. Bekkers and Kang (2015) find that patent applications are often filed "just in time" before standardization meetings. It is however unclear how these criticized opportunistic strategies differ from legitimate efforts to secure ownership over patentable inventions.

2.1.1.2. FRAND and incentives to participate in SDOs

The attractiveness of FRAND licensing terms for patent owners also determines the incentives of the owners of existing proprietary technologies to contribute to standard development. Owners of existing patents may choose to keep their patented technology out of the standard in order to maintain full freedom over the licensing terms. The standard may, consequently, not include the most efficient technology available at the time of development. FRAND licensing terms must therefore provide sufficient incentives for the owners of existing patents to contribute their technology to standard development.

Layne–Farrar et al. (2014), for instance, argue that a rule which limits the remuneration of SEPs to the incremental value added by the patent over the next-best alternative provides insufficient incentives to the owners of existing patents to participate in the standard development effort. Empirically, Stoll (2015) has shown that a rule change at an SDO from FRAND terms based licensing to royalty-free licensing induced firms owning patented technologies to leave the SDO. Contreras (2011) analyzes the effects of a less dramatic policy change at two SDOs, namely the adoption of a policy, which encourages patent owners to disclose their most restrictive licensing terms before a standard is set such as to include the patented technology. This study finds no evidence that this policy had a negative effect on contributions to standard development.

Opponents of strict licensing requirements thus argue that such a policy could disincentivize patent owners to participate in the SDO. Based on a similar argument, Lerner and Tirole (2006) formulate a model of forum shopping, in which SDOs compete with other SDOs to attract owners of patented technologies. They predict that owners of more valuable inventions select into SDOs with less stringent licensing restrictions. Chiao et al. (2007) empirically test the implications of this model. They confirm that SDOs more oriented to technology sponsors make greater concessions to patent owners, and show that the significance of this relationship depends on the intensity of competition between SDOs. Lerner and Tirole (2015) elaborate on the policy relevance of these arguments, arguing that competition between SDOs to attract technology sponsors forces SDOs to adopt overly permissive licensing polices. They conclude from these findings that free competition between SDOs will fail to produce socially desirable licensing policies and thus argue for tighter regulatory oversight to impose stricter licensing policies.

The empirical relevance of the arguments regarding forum shopping is disputed. Tsai and Wright (2014) review rule changes in a sample of SDOs. The authors find that the licensing policies of SDOs appear to be responsive to risks and problems associated with the inclusion of patented technologies. In contrast to Lerner & Tirole (2006, 2015), this study thus suggests that competition between SDOs could result in socially efficient licensing rules and stricter regulatory oversight is unwarranted. Baron & Spulber (2016) review how licensing policies of 40 SDOs have changed over the past 20 years. They find that, overall, licensing and patent disclosure policies have become more restrictive over time at most SDOs. In particular, they find that four SDOs adopted royalty-free or non-

assertion policies for some or all of their standards after practicing a less restrictive rule, and two SDOs introduced new requirements of mandatory licensing assurance from members.

2.1.2. FRAND and market failures in SEP licensing

2.1.2.1. General

The second perspective on FRAND in the economic literature is to consider the role of FRAND commitments in addressing specific market failures in SEP licensing: the anti-commons and royalty stacking issues induced by the fragmentation of patent ownership, and the hold-up and hold-out problems that may result from the ex post timing of FRAND negotiations. We present each of these issues by exposing first the underlying theoretical arguments and their limitations, before reviewing existing available evidence as a second step.

It is important to keep in mind that all these concepts are mainly theoretical. It should also be recalled that since the theoretical approach to FRAND licensing is based on the mathematical modelling of a limited number of stylized facts, it often fails to account for the actual variety and complexity of SEP licensing arrangements. Moreover, the lack of transparency on actual FRAND licenses makes it difficult to properly isolate relevant stylized facts.

Anand & Khanna (2000) show that licensing contracts in the ICT field (including FRAND ones) usually take place on an ex post basis (i.e., the implementer is already using the patent invention when negotiations start) and on a non-exclusive basis. We shortly present below a number of other characteristics of FRAND licensing arrangements that can be important in practice, but are generally overlooked in the economic literature (Bekkers et al., 2014):

Caveats for the application of theoretical models of SEP licensing

- Theoretical models usually consider one-way licenses with running royalties between vertically separated SEP owners and implementers. In contrast, implementers are often SEP holders in practice, and they frequently strike cross-licensing agreements (Shapiro, 2001). Such agreements may involve the two-way payment of running royalties, but also partial cancellation of these royalties and/or the payment of a lump sum fee.
- Theoretical models often assume that the SEPs are unambiguously identified, and that licensing contracts concern only these SEPs. However, it is often difficult to properly identify SEPs, and non-essential patents may be tied to SEP licensing contracts. It is also possible that one licensing arrangement actually encompasses SEPs relating to several different standards.
- Many theoretical models assume that the SEPs are ironclad patents, conferring their owners with a full-fledged monopoly power to set the royalty rate. In practice, the SEP holder's ability to impose a given rate may depend on its ability to enforce the related patent in court, and thus on parameters such as the size of the portfolio, the legal strength of the patents, the parties' capacity to incur the (possibly high) costs of litigation, and the courts' interpretation of FRAND commitments.

2.1.2.2. Patent hold-up

i) Definition

The notion of "patent hold-up" has been pivotal for several years in both economic literature and policy debates related to patents and standardization. At the origin, it is meant to describe the shift of bargaining power that occurs in

favor of the patent holder when licensing negotiations take place ex post, that is after the patent user has already sunk irreversible costs in the infringing activity (Scotchmer, 1991).[6] By extension, the same terms have been used to qualify the abusive use of the market power conferred to patent holders by the essentiality of the standard (Shapiro, 2001; Lemley & Shapiro, 2007).

In this particular case, ex post market power stems from the combination of various factors (Farrell et al., 2007). On the one hand, the essentiality of patents irrevocably ties them to the standard, and therefore obliges any implementer to take a license. On the other hand, implementers are already locked into the standard when FRAND negotiations begin: they have sunk investments (e.g., in R&D and/or manufacturing equipment) in standard related equipment/knowledge before licensing-in the SEPs, and they cannot realistically envisage the development of an alternative standard at this stage. The SEP holder is therefore able to leverage a position acquired as a result of the standard setting process to negotiate royalty rates higher than the technology would have been worth ex ante when competing with other alternatives.

An important consequence is that the risk of hold-up can undermine ex ante incentives for implementers to adopt and invest in standards, which is also detrimental for patent holders who seek to promote the wide adoption and market success of the standard (Lévêque & Ménière, 2016). Hold-up may furthermore amplify the royalty stacking problem when the ownership of SEPs is fragmented, which again generates opportunity costs for implementers as well as licensors (Lévêque & Ménière, 2011; Lerner & Tirole, 2015).

Once again, it is worth emphasizing that the literature on patent hold-up in the context of standards has been mostly theoretical so far, so that the actual magnitude of this problem remains questionable in the absence of solid empirical evidence. It must be noticed in particular that the type of ex post licensing negotiations that could generate a risk of hold-up are common practice in ICT, as opposed to other sectors (Anand & Khanna, 2000). It is therefore necessary to establish what is a hold-up as opposed to normal licensing practices, and whether these criteria differ in the case of standard-essential patents.

ii) Patent hold-up and SEP licensing

A first interpretation of hold-up as deceptive conduct related to patent disclosure has emerged in the wake of a few emblematic litigation cases (see, e.g., Lemley & Shapiro, 2007; Farrell et al., 2007). In these so-called "patent ambush" cases – such as Dell v. FTC in 1996 and Rambus, Inc. v. FTC in 2005 – the SEP owners were accused of deliberately concealing the existence of patents during the standard setting process in order to induce other companies to adopt and implement standard-infringing specifications, and eventually claim royalties on standard compliant products.

Another interpretation of hold-up refers to the breach of the FRAND licensing commitment. It corresponds to situations where a patent holder, once implementers are "locked in" by adopting a standard, tries to charge a significant

[6] More precisely, this notion refers to situations where a firm finds out that it has to negotiate a license for a patent that it unwillingly infringed. If the infringer has already incurred sunk costs, it may then be forced to accept licensing terms that it would not have deemed acceptable prior to the investment (Scotchmer, 1991). The notion of patent hold-up has especially been used to qualify the aggressive enforcement strategies of patent assertion entities, and more generally the instrumental use of legally weak patents to extort substantial settlement fees from alleged infringers under the threat of injunction (see, e.g., Shapiro, 2001; Reizig et al., 2007).

higher licensee fee (ex post) then it could have asked for its technology before such a lock-in occurred (ex ante). In *Broadcom v. Qualcomm*[7] as well as in subsequent cases, the SEPs were clearly identified, and implementers contended that the royalties claimed by SEP owners constituted a breach of FRAND commitments because they exceeded the level that the SEP holder had led them to expect. As a result, arguments about the reality of hold-up ultimately depend on the definition of a FRAND royalty benchmark.

The latter interpretation of hold-up as a breach of the FRAND licensing commitments has finally been extended in recent years to encompass the abusive use of injunctions. Since an injunction can impose a large on-going loss on the implementer, wielding this threat may indeed substantially improve the bargaining position of the patent holder (Lemley & Shapiro, 2007; Shapiro, 2010; Scott-Morton & Shapiro, 2015). As formulated in an FTC report (2011), "the patentee can use the threat of an injunction to obtain royalties covering not only the value of its invention compared to alternatives, but also a portion of the costs that the infringer would incur if it were enjoined and had to switch".

This has led a number of competition authorities to take further steps to curb this bargaining power in the context of growing numbers of patent disputes in the smartphone ecosystem (Ohlhausen, 2015). In the US, the FTC has used its Section 5 authority to challenge owners of FRAND-encumbered SEPs that try to enjoin willing licensees. The European Commission adopted in 2014 a decision that Motorola had abused its dominant position by trying to enjoin certain Apple products using alleged SEPs subject to FRAND terms, and in 2015, the Court of Justice of the European Union (CJEU) in turn held in *Huawei v. ZTE* that an SEP holder's refusal to license on FRAND terms may, in principle, be an abuse of dominance in violation of Article 102 TFEU. In all these cases, the abusive use of injunction proceeds from the attempt to enjoin implementers who are willing to take a license on FRAND terms. It therefore raises again the question of the definition of FRAND terms, but also of the negotiation process from which that definition emerges.

The trend towards a broader interpretation of hold-up and the resulting restrictions put on the SEP holders' bargaining power have recently raised the reverse concern that the balance of interests may have tilted too far against the interests of licensors, in fact depriving them of the benefits and incentives that SEPs are meant to generate in the first place. The concept of "patent hold-out" reflects this concern. Unlike the hold-up concept, it does not originate in the economic literature, but rather from industry stakeholders and from judges and lawyers involved in FRAND litigation (Geradin, 2010; Jacob, 2013).

As compared with ordinary patent owners, SEP holders cannot easily threaten to refuse a license because they are bound by their commitment to concede a license. Against this backdrop, the worst possible outcome for an infringer is to be sued and obligated by a court to pay the same FRAND rate that would have been charged for licensing in the first place. The licensor, however, will miss the timely availability of royalties. Knowing this, some implementers may engage in "hold out" or "reverse hold-up", not only by using essential technology without a license but also by deliberately choosing not to seek a license. Typically, hold-out practices are combined with the challenge of validity and essentiality of SEPs in front of a court. If this happens, patent "hold out" can induce royalty losses for SEP holders. Since SEP holders have also sunk R&D investments in the standard when FRAND negotiations take place, the prospect of such hold-out may moreover significantly reduce their ex ante incentives to invest in the development of standards.

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[7] *Broadcom Corp. v Qualcomm*, 543 F.3d 683 (Fed. Cir. 2008).

iii) Empirical evidence

There has been little evidence so far of the magnitude of the hold-up problem in the standardization area. The policy debate on patent hold-up has emerged in the wake of a few emblematic litigation cases, where the qualification of hold-up was one of the key disputed question. Hold-up situations can be easily recognized in a few "patent ambush" cases[8], or when injunctive relief is sought before any negotiation. However, in many cases the existence of a hold-up problem is ambiguous, as it ultimately depends on the interpretation of what should be a reasonable FRAND royalty offer. It is also unclear whether, e.g., an attempt to obtain a preliminary injunction without any serious prior negotiation effort should be considered as evidence of hold-up if the court actually refused to grant that injunction (Jacob, 2013).

Scott-Morton & Shapiro (2015) argue that patent owners increasingly turned to the International Trade Commission (ITC) during the past decade, because the "ITC process is significantly faster, and an exclusion order issued by the ITC is far more costly to the target firm than the most likely remedy in Federal court, the awarding of damages to the patent holder equal to reasonable royalties". Using data from Lex Machina, Scott-Morton & Shapiro find that patent holders prevail 49% of the time when asserting SEPs before the ITC, compared with only 29% of the time in the US Federal court.

At the same time, there is - as far as we know – no empirical study that specifically seeks to identify and measure the magnitude of the hold-out. Because of this absence of empirical evidence, it is not possible to draw clear-cut conclusions on the existence of hold-up and/or hold-up, or on the prevalence of one of these two problems in practice.

As far as we know, the most systematic piece of evidence available is a study focusing on the active litigation activity that took place in recent years in the smartphone ecosystem (Gupta & Snyder, 2014). The study reviews 2,746 cases, filed in the United States District Courts (USDC) during 2001-2013 or in the International Trade Commission (ITC) at any time, and involving twenty smartphone manufacturers that were active in the U.S. from 2000-2012. It shows that a minority of cases involved SEPs. More precisely, 31% of the cases involved one or more patents plead as SEP (see Table 1), and 144 (36%) of the unique patents asserted in all the cases reviewed were pleaded as or declared to an SDO as a potential SEP. The majority of the cases had a request for an injunction associated with them. However, injunctions or exclusion orders have been granted for a total of only eight cases and sixteen asserted patents in these cases, of which none was an SEP. An exclusion order has been granted (by the ITC) for only one patent alleged to be an SEP (in Samsung-Apple case no. 337-TA-794), but it was later overturned by the Obama Administration.

[8] See, e.g., *Dell v FTC* in 1996 and *Rambus, Inc. v FTC* in 2005.

Table 1: *Summary of smartphone litigation 2000 – 2012*

	Total	USDC	ITC
No. of cases filed	111	83	28
No. of pending cases	22	16	6
No. of concluded cases	88	57	31
Settled	20	9	11
Trial verdict	10	1	9
Dismissed	45	34	11
Other (e.g, administrative closing)	13	13	0
No. of cases with patent(s) found infringed	7	1	6
No. of cases granted an injunction	8	2	6
No. of cases granted damages	1	1	0
No. of cases with some form of adjudication	14	5	9
No. of cases with Markman hearing	20	9	11
No. of cases with one or more patents plead as SEP	35	26	9

Source: Gupta & Snyder (2014). The table is based on the exhaustive list of the twenty smartphone manufacturers that were active in the U.S. from 2000-2012. The authors examined over 2,746 cases filed in the United States District Courts (USDC) during 2001-2013 and in the International Trade Commission (ITC) at any time.

iv) Hold-up and the definition of FRAND

As we have seen, FRAND licensing is intimately connected to the objective of preventing hold-up. FRAND commitments can indeed be interpreted as commitments to non-engaging in hold-up, thereby removing the threat thereof to the benefit of both SEP holders and implementers. Conversely, this interpretation of SDO IPR policies provides a definition of hold-up as a breach of ex ante commitments.

From an ex ante perspective, hold-up can harm implementers as well as those SEP owners who seek to promote the standard (Lévêque & Ménière, 2016). Accordingly, the risk of hold-up provides an economic rationale for the requirement of FRAND licensing commitments, and provides an analytical background against which to interpret the meaning of the FRAND commitment.

Swanson & Baumol (2005) argue that the role of FRAND commitments is to tie the remuneration of SEPs achieved after standard development to the remuneration that patent owners could have achieved ex ante, i.e., before the standard was set. In order to assess whether a licensing term is compliant with FRAND terms, the authors suggest simulating an ex ante auction in which different patent owners offer their competing patents for inclusion into the standard. The remuneration of the winning patent will thus represent the incremental value of the patent over the next-best alternative.

Several scholars support the view that a "reasonable" royalty rate is one that the vendor and the patent holder would have negotiated in a market-driven arm's-length negotiation prior to the market adoption of the standard (Farrell et al., 2007; Lemley & Shapiro, 2007). They argue that private, bilateral negotiations

are likely to result in efficient royalty rates and other terms for SEPs, particularly if they are conducted prior to the adoption and lock-in of a standard.

Carlton & Shampine (2013) stress the non-discrimination part of the FRAND commitment to address the patent hold-up problem in situations in which implementing the ex ante auction model would be prohibitively complicated. Their argument is that a patent owner charges different prices to different users of the standard partly because some users make more valuable use of the standard. By charging a higher price to the user making better use of the standard, the patent holder is in fact opportunistically appropriating part of the ex post value created by the standard implementer. According to Carlton and Shampine, a FRAND licensing policy should require patent holders to charge the same royalty rate to all implementers that ex ante expect to create the same value by using the standard. A patent holder should not be allowed to increase the rate in response to value created ex post by the implementer, i.e., resulting from investments made after standard development.

The interpretations of FRAND reviewed in this section tie the FRAND obligation to the notion of hold-up and view the FRAND commitment as a safeguard against any increase in royalties as a consequence of the adoption of the patented feature into a standard. In contrast, Sidak (2014) argues that it is erroneous to tie the ex post remuneration of the patent owner to conditions of the ex ante situation before the standard is set. He argues that the FRAND royalty must exceed the hypothetical ex ante benchmark in order to compensate the patent holder for the additional costs and risks entailed by standard development. In Sidak's view, a FRAND royalty is bound only by the individual rationality constraints of licensees and licensors. This means that the royalty rate charged by a patent owner to a standard implementer must be such that given the royalty rate, participating in the standard is more profitable to both sides than what they could have achieved by not participating in the standard. In the case of standards including multiple patents, the aggregate royalty burden must be such that using the standard is still profitable to the implementer.

2.1.2.3. Anti-commons and royalty stacking

i) Theoretical arguments

Anti-commons and royalty stacking arise in situations where an enabling technology embodies patent-protected components belonging to several patent owners. Although patent encumbered standards are a typical example of such situations, concerns related to fragmented patent ownership exist in many other cases, including ICT in general, but also other technological fields such as diagnostic kits or genetically modified organisms (Heller & Eisenberg, 1998). The problem is further amplified when a final product embodies a number of enabling technologies (e.g., standards) that are all characterized by patent fragmentation.

The concept of anti-commons refers to the transaction costs induced by the fragmentation of patent ownership (Heller & Eisenberg, 1998). The transaction costs (i.e., the search, negotiation, and enforcement costs) of patent licensing can indeed dramatically increase with the number of patent owners and/or implementers in the market. In a vertically integrated industry where the patent ownership of an enabling technology is distributed between, say, four patent-holding implementers, a total of twelve one-way licenses or, more probably, six cross-licensing contracts must be put in place to secure freedom to operate for all implementers. If there is now vertical separation between four patent holders and four implementers, a total of sixteen licensing contracts must be established. The costs of searching for relevant patent owners and negotiating contracts may also

further increase if there is a high patent density and/or ambiguity concerning the actual validity and essentiality of patents in the field.

The concept of royalty stacking (or "double-marginalization", or "Cournot effect", in the academic jargon) means that fragmented patent ownership induces patent owners to charge excessive royalties to implementers, thereby creating an inefficient royalty stack for the whole enabling technology or standard (Shapiro, 2001). Intuitively, each licensor can be expected to seek a high royalty rate, ignoring the fact that stacking such high royalties would hamper the demand for standard compliant products. Economic theory predicts that royalty stacking then leads not only to excessive prices for users but also profit losses for licensors.

As already mentioned, this theoretical argument relies on a number of simplifying assumptions. We discuss below the implications of the main assumptions that are commonly made in this strand of literature:

Patent owners are not active downstream in the implementation of the standard. This assumption is strong since separation between licensors and licensees is not systematic in practice. Vertically integrated patent owners may be able to bilaterally fix the royalty stacking issue by striking broad cross-licensing agreements, whereby they reciprocally cancel out (part of) their respective royalty costs (Shapiro, 2001). In the latter case, the royalty stack disappears for vertically integrated SEP holders, but remains a difficulty for other implementers who own no or less SEPs.

Each patent owner enjoys a full monopoly position, and can therefore freely impose any royalty level. Lerner & Tirole (2004, 2014) relax this assumption by showing that the licensor's power to charge excessive royalty rates may be (partly) disciplined by the implementer's ability to circumvent patents or patent bundles. A number of recent papers (Choi & Gerlach, 2015; Bourreau et al., 2015; Gupta et al., 2015) show, in turn, that the patent holder's ability to charge royalties ultimately depend on its ability to enforce the patent(s) in court, so that only strong portfolio owners actually enjoy full monopoly power vis-à-vis implementers, while the royalty rate charged by small patent owners is bound by their portfolio strength.[9] However, these limitations of market power are not sufficient to eliminate the royalty-stacking problem.

Patent owners charge a uniform per unit royalty to all implementers. Ménière and Parlane (2010) relax this assumption by considering the case of multiple licensors using either fixed fee or two-part-tariff contracts. They find that both contracts induce a form of inefficient royalty stacking when they are subject to a non-discrimination requirement. Spulber (2015) conversely argues that royalty stacking would disappear if each patent owner had the possibility to issue a limited number of licenses, thereby controlling the number of implementers in the market.

ii) Empirical evidence

There is no direct evidence of the cost of anti-commons and royalty stacking in the field of standards, but the rising number of both declared SEPs and SEP-declaring entities in past years provide indirect evidence of the growing challenge of organizing the licensing of standard-essential patents.

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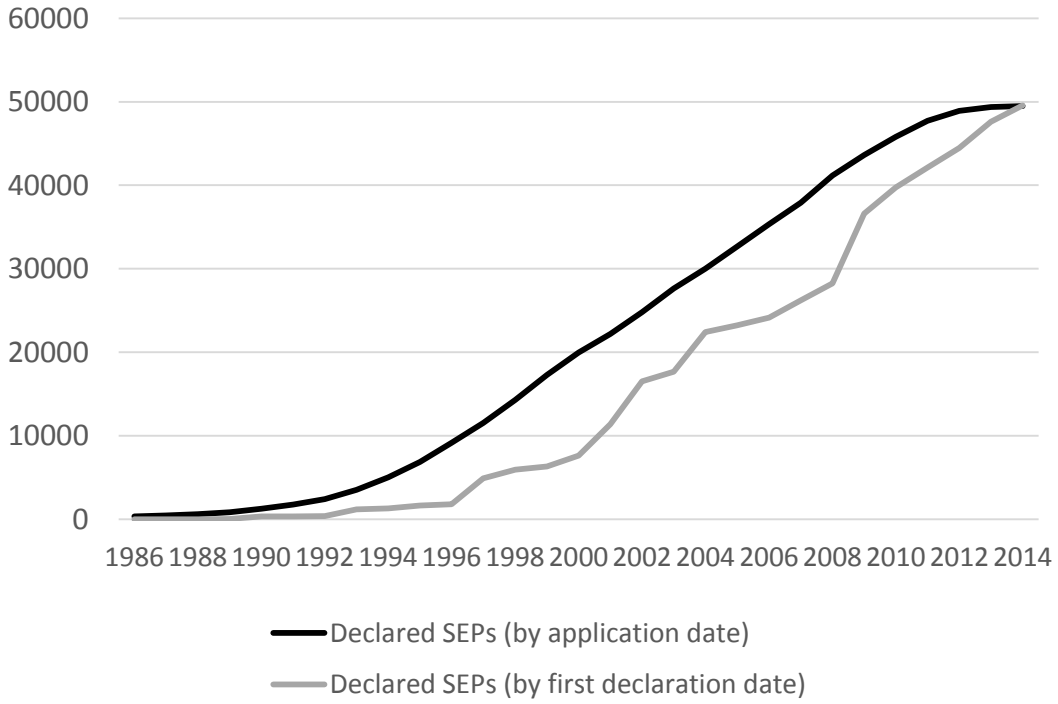
[9] Another interesting implication of both papers is that extra patents become useless when portfolios are already strong enough, so that large portfolio owners are better off selling part of their patents. Such divestitures can be observed in practice and are known as "privateering". Because they create or strengthen smaller licensors, they actually tend to worsen the royalty-stacking problem.

The large number of SEPs reflects the technological complexity of ICT standards[10], and also the companies' attempts to systematically file patents in order to license them or obtain freedom to operate through cross-licensing agreements (Blind et al., 2009). As shown in Figure 1, the cumulative number of SEP declarations at various SDOs steadily increased between 1990 and 2014. The increase in the number of SEP declarations has been documented in various independent studies (Bekkers et al., 2016; Baron & Pohlmann, 2016). The number of SEPs declared to ETSI is much larger than the number of SEPs declared to any other SDO. This is partly due to the technological complexity of wireless communication standards and also to the fact that ETSI participants make blanket statements much less frequently than in other SDOs. Since all potentially essential patents must be declared during the standard setting process, one must also emphasize that their number significantly exceeds the number of patents that turn out to be truly valid and essential once the standard specifications have been adopted.[11]

***Figure 1**: Cumulative number of declared SEPs by application and first declaration date*



Source: Baron & Pohlmann, 2016[12]

[10] This trend goes also back to the evolution of even more complex technologies, the multifunctional integration of different technologies, the need to preserve backward compatibility with past standards, and the development of specific services and applications that go beyond initial purpose functions such as communication.

[11] Various studies on wireless communication standards suggest, for instance, that truly essential patents may actually account for 40% to 80% of all patents declared essential at SDOs (Goodman & Myers, 2005; Cyber Creative Institute, 2011).

[12] Counts of declared SEPs may vary between different databases or studies depending on the underlying definitions. The presented graph is based on SEP declarations made to 17 different SDOs, and patents are counted by patent application number (different published patent documents relating to the same application are not counted as different patents).

SEP-holding entities are also increasingly diverse and specialized. Back in the 1990s, standard setting involved fewer companies – all from industrialized countries – that were usually the main SEP holders and implementers at the same time. The pattern has changed over the last decade with the entry of new actors. The increasing complexity of standards brought in a number of R&D-oriented companies, while new manufacturers – many of which were from developing Asian countries – entered at the same time on other end of the industry. The ETSI database of SEP declarations for the LTE standard reveals, for instance, that 104 patent holders had declared SEPs for this standard in 2014 (versus 36 in 2011). Of the top twenty contributors in terms of number of SEPs, twelve only had already been involved in the development of GSM, the main second generation standard for wireless communication. An increasing number of technology standards has become subject to SEPs declared by a large number of firms. Baron and Pohlmann (2016) find that 325 technology standard documents are subject to SEP declarations by more than 25 firms each.

Although these evolutions can be expected to accentuate royalty-stacking issues, there is no direct evidence that could confirm that prediction. Using public license demands and information from patent disputes, a recent study estimates the potential patent royalty stack on a hypothetical $400 smartphone at $120 – which approximately equals the cost of the components (Armstrong et al., 2014). However, even such a high figure does not prove that the stack is actually excessive and inefficient.

iii) Royalty stacking and the definition of FRAND

The earliest formal interpretation of the FRAND commitment (Swanson & Baumol, 2005) focuses on the threat of ex post opportunism (hold-up) and abstracts from the challenges induced by the complementarity of patented features incorporated into a standard. More recent formalizations of the definition of FRAND take the complementarity of patents into account, and indeed view the need to address the risk of royalty stacking as one of the crucial functions of FRAND. In particular, in order to be effective in incentivizing standard adoption, a FRAND licensing policy must guarantee the overall reasonableness of the aggregate royalty burden in addition to the reasonableness of single royalty requests for individual patents.

Layne-Farrar et al. (2007) extend the Swanson-Baumol proposal to standards including multiple patents. If each patent were remunerated by the value that the inclusion of the patent contributes to the standard, the entire value of the standard would not be sufficient to remunerate all included patents. The reason is that part of the value that a patent contributes to a standard results from its combination with other patents. Let a standard include two components A and B, which respectively contribute value a and b, while the combination of A and B in addition generates value c. The value contributed by A to the standard (the difference between a standard including A and a standard excluding A) is thus a+c, whereas the value contributed by B is b+c. The sum of these incremental value contributions exceeds the total value of the standard a+b+c. Layne-Farrar et al. (2007) suggest dealing with this problem by reference to the Shapley value. The Shapley value distributes the value generated by the combination of inputs among the different contributors according to their average incremental contribution to alternative combinations of contributions.

2.2. A LEGAL VIEW OF FRAND

In the following sections, we examine how the nature and enforceability of FRAND commitments have been approached by theory and practice as a matter of legal doctrine.

2.2.1. Contract law

Each SDO sets its own terms for a FRAND commitment, which could be phrased as an offer to negotiate a license on fair and reasonable terms – it is not a commitment to negotiate a contract at a set rate. The FRAND commitment typically arises either as a function of the SDO's by-laws/IPR policies or as a separate explicit agreements such as the IEEE "letters of assurance". For instance, Section 6.1. of ETSI's IPR policy (ETSI Directives Version 36, June 2016) provides that when essential IPR is disclosed, ETSI will request - but not oblige - the owner of the IPR to undertake in writing that it is prepared to grant irrevocable licenses on FRAND terms and conditions, and as such to waive its right to refuse to offer a license to those seeking one.

Pinning down the meaning of the FRAND obligation, Sidak (2015) explains that a primary purpose of a FRAND commitment is to grant implementers *access* to the patented technology and that the SEP holder will be fairly compensated for its contribution to the standard. However, the duty to make a FRAND offer does not ensure that a licensing agreement with a specific implementer will eventuate. The FRAND commitment does not transform an SEP holder into a guarantor of contract formation - the negotiation still might fail. Even though the SEP holder has discharged its contractual duty arising from the FRAND commitment by making a FRAND offer to the requesting implementer, this may not result into a licensing agreement with a specific implementer who might not be willing or able to pay a FRAND royalty for the use of the SEPs.

These inherent ambiguities of a FRAND commitment underpin its nature as an "incomplete" contract. From an economic perspective, incomplete contracts do not signal inefficiency. They are rather a predictable and efficient result given the costs associated with identifying all contingencies that might arise during the life of the contractual relationship. From a legal point of view, however, the incompleteness of FRAND contracts explains the desirability of different legal frameworks and policies to govern *ex post* opportunism in the field of SEP licensing (Tsai & Wright, 2015).

In the case of FRAND-encumbered SEPs, the position that the enforcement of the FRAND obligation is based on the contractual (voluntary) nature of the FRAND undertaking between the SEP owner and the respective SDO is endorsed by several US scholars and courts. According to this dominant approach, the IPR rules of the standard-setting bodies have legal significance only to the extent they are enforceable. Because the IPR policies are at base agreements by members of the SSO to abide by certain rules regarding IP ownership, their enforceability is initially a question of contract law (Lemley, 2002). In other words, the FRAND contract between an SEP holder and an SDO delineates the implementer's rights, as a third-party beneficiary of the FRAND contract, to receive access to the SEP holder's standard-essential technology (Sidak, 2015). After the relevant standard is adopted, the implementer/potential licensee can seek to enforce the patent holder's promise as a third-party beneficiary. However, it remains unclear whether non-members of the respective SDO who use the standards will also be considered third-party beneficiaries of the FRAND commitment – some scholars argue against non-members having enforceable third-party beneficiary rights under U.S. law (cf. Lemley, 2002).

Similarly, the binding effect of the FRAND commitment as a contractual agreement and a preliminary form of a concluded licensing agreement resonates

with European scholars as well as courts. For instance, French law allows enforcement by a third party of a contract by which one of the parties agrees to confer a benefit on third parties. In Germany, this preliminary commitment ("Vorvertrag") takes place under exceptional circumstances insofar as it develops a binding effect prior to the fixation of the specific licensing terms (cf. Burgharzt, 2011; Straus, 2011; Nägele & Jacobs, 2009). With regards to whom this binding effect is addressed, however, the views differ: Some argue that the FRAND commitment is only binding towards the respective SSO (Ullrich, 2007), whereas others extend the binding effect to any potential licensee ("invitation ad incertas personas"; Maume & Tapia 2010). Finally, there is also the view that a FRAND obligation is merely a call to potential licensees to make a licensing offer ("invitation ad offerendum").[13] Recent case law[14] and scholarship (Kühnen, 2017) define the FRAND commitment as a declaratory concretization of the willingness to license, which exists by operation of competition law (Art. 102 TFEU). In the context of patent infringement, a FRAND-encumbered SEP signifies a (self-) commitment of the SEP holder to a specific conduct.

Given that FRAND commitments do not create a license but merely leave open the possibility of a license, the threshold question is whether the FRAND commitment creates a contract or merely prescribes a duty to negotiate or grant a license in good faith. Accepting the contractual basis of a FRAND commitment depends on the various Civil Law and Common Law traditions of contract law and enforcement - the governing law will not be uniform (typically the law of an SDO's local jurisdiction). Where contract law is a possibility, the (subjective) intent of the parties plays a fundamental role on the interpretation of these contracts (Brooks & Geradin, 2010): In agreeing to license on FRAND terms, the IP holder has not agreed to constrain its licensing terms more tightly than the "range of reasonableness". Thus, if an offer has been made and refused, then the only contractual question to be adjudicated is whether the terms offered, taking into account all of the specific circumstances between the parties and prevailing market conditions, fall outside the *range* of reasonableness contemplated by the FRAND commitment.

At the same time - and in order to comply with its FRAND commitment - the SEP holder must make a FRAND *offer* in good faith. Should the SEP holder decide to enter further negotiations with a potential licensee, the question arises whether the construct of a FRAND contract also imposes on the SEP holder to *negotiate* in good faith. Some US district courts have affirmed this obligation during the formation of a contract: Any offer, be it an initial offer or an offer during a back-and-forth negotiation, must comport with the implied duty of good faith and fair dealing inherent to every contract.[15]

Several scholars and courts reject contract law as a general-purpose FRAND enforcement avenue. They either regard FRAND commitments as a mere set of guidelines pertaining to the interaction of the SEP owners with the SSO, its members and third parties[16] or as a form of a "patent pledge" enforceable on antitrust or competition law theories. According to Contreras (2015), patent pledges generally precede formal license agreements and other contracts, but are

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13 Düsseldorf District Court, Decision of 4 August 2011, Az 4b O 54/0.

14 See, e,g., Düsseldorf District Court, Decision of 24 April 2012, 4b O 274/10 - *IPCom v Deutsche Telekom and Vodafone.*

15 Cf. *Microsoft v Motorola*, 864 F. Supp. 2d 1023 at 1038 (United States District Court for the Western District of Washington June 6, 2012); *Apple Inc. v Samsung*, No. 11-cv-01846, 2012 WL 1672493, at *12 (N.D. Cal. May 14, 2012).

16 Cf. U.S. International Trade Commission, Initial determination on Remand issued 27 April 2015, *In the Matter of Certain 3G Mobile Handsets and Components Thereof* (Inv. n° 337- TA-613).

nevertheless intended to induce the market to make expenditures and adopt common technology platforms without the fear of patent infringement. Contreras proposes a novel "market reliance" theory for the enforcement of patent pledges, a theory grounded in the fact that patent pledges are promises, whether or not they fulfil the requirements of common law contract, and promises ought to be enforced.

With regards to the legal consequences of a FRAND, some scholars and courts debate whether, as matter of contract interpretation, the FRAND contract waives an SEP holder's right to seek an injunction. Lemley & Shapiro (2013), for instance, argue that, by making a FRAND commitment, an SEP holder has conceded that damages would suffice to compensate the SEP holder for the infringement of its SEPs; given the availability of monetary damages, the SEP holder will not suffer irreparable harm from the infringement of its SEPs and can thus not meet the requirements for obtaining an injunction, as set out by the US Supreme Court in *eBay Inc. v. MercExchange.*[17] Equally, in *Realtek v. LSI Corp.,* the Northern District Court of California ruled: "In promising to license on RAND terms, defendants here admit that monetary damages, namely a RAND royalty, would be adequate compensation for any injury it has suffered as a result of Realtek's allegedly infringing conduct".[18] In contrast, Sidak (2015) finds no evidence of such an implicit waiver: Unless the waiver of the statutory right of requesting injunctive relief is clearly and unambiguously included in the FRAND commitment, an SEP holder may seek and enforce an injunction against an implementer without breaching the SEP holder's FRAND contract with the SSO, including the SEP holder's commitments to the contract's third-party beneficiaries.

While contract law normally relies on damages as an exclusive remedy, several US district courts will grant injunctive relief, compelling a defendant to perform a contractual obligation if damages would be an inadequate remedy. These courts seem to confirm that a request for injunctions does not violate the contractual obligations of the SEP holder arising from a FRAND commitment.[19] Other courts, however, determined that any form of injunctive relief against infringement is arguably a remedy inconsistent with the licensing commitment. In *Microsoft v. Motorola,* the request for preliminary injunctions was deemed improper because, in light of its commitment to license on FRAND terms, the SEP holder failed to show it had suffered an irreparable injury or that remedies available at law were inadequate: "Whatever the appropriate method of determining the RAND licensing rate, it could well be that retrospective payment at the rate ultimately determined and a determination of the future rate, not an injunction banning sales while that rate is determined, is the only remedy consistent with the contractual commitment to license […] standard-essential patents."[20]

2.2.2. Competition and antitrust law

At the interface of contract and competition law, the prevention of hold-up is perceived as the primary purpose of a FRAND commitment. This view has found several supporters in theory and practice (Farrell et al, 2007; Contreras, 2013; Keele, 2015; *Microsoft Corp. v. Motorola, Inc.,* 696 F.3d 872 at 876 (9th Cir.

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17 *eBay Inc. v MercExchange, L.L.C.*, 547 U.S. 388 at 391 (US Supreme Court 2006).

18 *Realtek Semiconductor Corp. v LSI Corp.*, 946 F. Supp. 2d 998 at 1006-07 (N.D. Cal. May 20, 2013).

19 Cf. *Apple v Samsung,* No. 11-cv-01846, 2012 WL 1672493 (N.D. Cal. May 14, 2012); *Realtek Semiconductor Corp. v LSI Corp*., 946 F. Supp. 2d 998 at 1007 (N.D. Cal. 2013).

20 *Microsoft Corp. v Motorola*, Inc., 696 F.3d 872 at 885 (9th Cir. 2012).

2012). On the opposite end, Sidak (2015) argues that the very possibility for an implementer to sue the SEP holder for breach of contract and seek adjudication of a FRAND royalty in court renders patent hold-up improbable, if not impossible. From the perspective of contract interpretation, Sidak has not found any factual evidence that the *raison d'être* of a FRAND contract is to prevent patent hold-up.

Competition concerns and economic theories on patent hold-up and royalty stacking have "infiltrated" the approach of several courts to FRAND. In particular, courts have recognized in hold-up and royalty stacking a potentially significant factor affecting the adoption of technical standards and the pricing of consumer products and therefore used them as "economic guideposts" for royalty determination. Furthermore, antitrust authorities use their competition expertise and enforcement role to help rein in any potential harm to both consumers and innovation. On the US side, Chairwoman Edith Ramirez of the Federal Trade Commission (FTC, 2014) underpinned the significance of antitrust intervention in SEP licensing cases:

"[W]hen a patentee voluntarily agrees to license its technology on FRAND terms as a condition of winning a place in the standard, antitrust enforcers are legitimately concerned with a breach that reintroduces the risk of patent hold-up. In particular, a breach may raise antitrust concerns if it threatens to deprive consumers of the pro-competitive benefits that legitimize the standard-setting enterprise under the antitrust laws. […] A dispute with a willing licensee over royalty terms that does not take place under the threat of an injunction is not likely to create the undue leverage that is the source of the competitive problem in the standard-setting context."

Equally, the US Department of Justice (DoJ) and the US Patent & Trademark Office (USPTO) have addressed antitrust concerns in the context of standardization in a Joint Policy Statement on Remedies for Standards–Essential Patents Subject to Voluntary F/RAND Commitments (2013).

On the European front, the issue of injunctions takes centerstage in the context of seminal antitrust cases. In *Motorola Mobility*[21] and *Samsung*[22], the European Commission prohibited injunctive relief on the premises that it would provide the SEP holder with the leverage to extract hold-up, resulting in an imbalance between parties. It was deemed an abuse of a dominant position prohibited by EU antitrust rule to seek injunctions on the basis of SEPs. While recourse to injunctions is a possible remedy for patent infringements, such conduct may be abusive where SEPs are concerned and the licensee is willing to take a license on FRAND terms. In these circumstances, the seeking of injunctions may distort licensing negotiations and impose unjustified licensing terms on patent licensees, with a negative impact on consumer welfare.[23]

At the intersection of antitrust enforcement and litigation, former UK Court of Appeal Justice Robin Jacob (2013) scrutinized the EC's stance to prevent SEP holders from going to court for injunctive relief as a breach of two major principles: the right of a party's access to the courts contained in Art. 6 of the European Convention of Human Rights (ECHR) and the principle of sincere co-operation as set out in Art 4(3) of the Treaty on European Union. In his view, the EC ignores the fact that litigation is a way of bringing things to a head. The pressure of a date in court is not a pressure to do a non-FRAND deal, but a pressure to do a FRAND deal - litigation is a continuation of negotiation by other means. Furthermore, the EC treats an application for an injunction as if it were an

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21 DG Competition, Decision of 29 April 2014, C(2014) 2892 final.
22 Commitment Decision of 29 April 2014, C(2014) 2891 final.
23 EC Press Release in the case of *Samsung v Apple,* 31 January 2012; EC Press Release in the case of *Motorola v Apple,* 6 May 2013.

injunction. When the court comes to make its decision it will have evidence from both sides and can decide what to do. Finally, It assumes that a declared SEP is in itself market dominant. However, a declared SEP may not be essential at all– many are not. Even an SEP, once essential, may cease to be so because ways around have been devised.

More recently, the Court of Justice of the European Union (CJEU) handed down a decision in 2015, which, at its core, endorsed that it is the patent owner's obligation to alert the infringer and to provide a FRAND offer prior to seeking an injunction.[24] In *Huawei v. ZTE,* the CJEU addressed a series of questions and provided guidance on how both patent owners and standard users should consider competition law implications during pending patent infringement proceedings as well as during FRAND negotiations.

2.2.3. Patent law

The legal frameworks of contract and competition law interact closely with patent law, offering working solutions to patent problems. This complementarity is particularly evident in the area of patent licensing and supports the transition to a more balanced, more efficient system. Under the confluence of the various sets of rules, doctrines or defenses such "equitable estoppel" or "implied license" operate in many contexts and in patent law, in particular. The Anglo-Saxon patent legal system recognizes both doctrines that may apply for the enforcement of a FRAND commitment when a patent owner fails to comply with SSO rules. Which doctrine is most applicable depends upon which obligation the patent owner is accused of violating: disclosure or reasonable and non-discriminatory licensing:

- *Equitable estoppel* comprises three basic elements: 1) conduct constituting a representation or concealment, 2) that is relied upon by the other party, 3) to the other party's detriment. As a rule, equitable estoppel applies when there is inconsistency of behavior or contradictory conduct by the opponent. It may also apply if the SEP owner's conduct was misleading and the potential licensee demonstrates both reliance and material prejudice. According to Lemley (2002), this renders equitable estoppel particularly well-suited to cases where SEP owners fail to comply with the SSO obligations for disclosure, but not in the case of a commitment to license on fair and reasonable terms – the FRAND commitment per se is not misleading, but rather affirms the intent of the patentee to enforce its patent.
- The doctrine of *implied license* involves a different type of conduct, namely the conduct of the IP holder in the marketplace: If an IP owner declares its willingness to license SEPs on FRAND terms, users of the standard may assume that they are free to use that standard as long as they pay a reasonable royalty – despite lack of express license between them and the SEP holder. Unlike equitable estoppel, the doctrine of implied license is only applicable outside the SSO context because it relies on the beliefs and expectations of the parties to the sales transaction. As a policy matter, Lemley (2002) suggests to construe a FRAND commitment as the grant of a license itself, rather than merely a contract with the SSO – with the following advantages: First, it ensures that all users of the standard benefit from the license, even if they would be unable to sue for breach of the SSO contract itself. Second, it sharply narrows the scope of the issues that must be litigated in these cases (i.e., license scope and royalty rate versus injunctions, damages and attorneys' fees) and, relatedly, makes it possible for the SSO to resolve those issues ex ante. Third, and most importantly, the implied-license

[24] CJEU, Case C-170/13, Decision of 16 July 2015, *Huawei v ZTE.*

approach reduces opportunism by SEP owners because they have already licensed their patents. It may also reduce the need for the courts to rely on mechanisms like antitrust and fraud to deal with opportunistic behavior such as hold-up.

As we observed above under Section 2.2.1., the contractual approach is theoretically questionable and not optimal for solving the issues related to FRAND enforcement. At the interface of property and contract, Kesan & Hayes (2013) follow a middle path and apply property law to FRAND commitments. They namely recognize that the FRAND commitment is an enforceable contract that pertains to the treatment of intellectual property. As a prelude to license, the FRAND commitment can be characterized as contractually created property interests in covered patents. A FRAND commitment is not a license, but when a patent owner makes a FRAND commitment, this acts as a conditional covenant not to sue, whereby the patent owner promises to not sue standard implementers for infringement unless and until good faith attempts at negotiation fail. According to Kesan & Hayes, the treatment of patents in the standard-setting context is a fifth area where the rights cannot be characterized as solely *in rem* or solely *in personam*. When a patent is declared essential to a standard, the patent owner has in rem rights which the law must protect against a large and indefinite class of potential infringers, and all of the adopters of the standards have a duty to respect the IP rights of those who own SEPs. When a patent owner enters into a license with a standard adopter, this creates an in personam relation with affirmative obligations exchanged between defined parties. This perception of the FRAND commitment as a hybrid that bears the qualities of both property and contract is especially apparent when a patent, which is subject to a FRAND commitment, is then transferred - the class of potential licensees still has a negotiation right, but the patent owner against whom these rights may be asserted is unknown, giving the transfer traits of a quasi-multilateral relation and the FRAND commitment a servitude that runs with the patent.

Beyond the doctrinal standpoint, introducing policy analysis into the litigation framework allows for patent infringement remedies and patent case law constructs to serve as a framework for the negotiation of FRAND licensing terms - parties bargain over licensing terms "in the shadow of the law" (Sidak, 2015, with further references). In the US jurisprudence, this intersection of statutory and private law is reflected not only in the context of preliminary injunctions where the availability of an injunction influences how an SEP holder and an implementer negotiate, but also in the context of FRAND royalties where the relevant determinations are similar to those that arise when calculating damages in the general context of patent infringement.[25] For instance, US jurisprudence has extended the application of evidentiary rules that stem from the general context of patent infringement damages (e.g., the *Georgia-Pacific* factors) to FRAND

[25] Moreover, the intersection of statutory and private law is closely tied to the issue of the appropriate appellate jurisdiction when requesting damages in FRAND cases as opposed to damages from patent infringement. In a contract case on failure to negotiate a FRAND royalty, contract law would provide the measure of damages and no determination would be made of patent validity. In the example of the US legal system: Whereas the Federal Circuit has exclusive jurisdiction for all appeals arising under patent law, the Ninth Circuit held that the review the judgment on Microsoft's breach of contract claim for damages fell under its jurisdiction as a matter of contract law regardless of whether the contract is a patent license. The mode of calculating appropriate royalty amounts in contractual patent license does not "morph" the case into one requiring the determination of a "substantial question of federal patent law" (cf. *Microsoft v Motorola, Inc.,* 795 F.3d 1024 at 1037 (US Court of Appeals for the Ninth Circuit 2015) *(Microsoft II)*. Contrary to the US, courts in Europe have very few cases on damages in the context of FRAND licensing.

cases in order to frame the hypothetical negotiation and accomplish the apportionment task.

In contrast, the European concept of FRAND is injunction-centric whereby damages play only a secondary role. In this setting, injunctive relief is the presumptive remedy for patent infringement – more or less an entitlement. FRAND is a defensive procedural tool in the course of patent infringement proceedings, which – when successful – allows for exemptions from the general principle. The recent CJEU decision in *Huawei v. ZTE* and its application by the European national courts have inversed the trend towards a more conservative approach to the grant of injunctive relief. The result is a shift from a defensive setup with the Damocles sword hanging over both the implementer (threat of injunctions) and the SEP holder (threat of abuse) to a carefully balanced approach that takes into account the interests of the parties and those of the general public. Steering clear from the automated grant of injunctions, the emerging jurisprudence applies a negotiation framework over the litigation nexus of patent infringement. This has important implications for the courts, as proceedings become fact-intensive and determined by a holistic assessment of subjective circumstances in private transactions, i.e., interpretation of "willingness", "good faith", "diligence" and "avoidance of delaying tactics" during negotiations.

3. COMPARATIVE CASE STUDY ANALYSIS

3.1. OVERVIEW OF CASES

3.1.1. Case selection criteria

For the purpose of our comparative analysis, the selection of the cases involving SEPs is based on a set of criteria:

- multiple jurisdictions worldwide (Europe/US/Asia)
- recent time frame
- parties and industry involved
- standard-related technology involved
- variety of FRAND issues addressed by the court/competition authority
- significance and wider application of the decision and its reasoning
- methodology and tools applied by the court/competition authority

Particular emphasis is put on landmark cases from the wireless and mobile technology industry, in which the courts pin down core principles of FRAND or apply a distinct methodology for the determination of FRAND royalties. Several decisions are rich in content, addressing multiple aspects of SEP licensing, and therefore broken down thematically in the respective sections. Most cases involve FRAND disputes that were litigated in the past five years – a few older decisions from the general context of patent infringement complement our selection, highlighting the evolution of case law against a background of increased technological complexity and shifting market dynamics. In order to serve the comparative purpose of the analysis as widely as possible, we have chosen to cover major jurisdictions in Europe, the United States and the emerging SEP markets of China, Korea, Japan and India – the convergence or divergence of doctrine and applied solutions across the different legal traditions help us distil cross-country emerging issues and policy trends.

From a procedural perspective, many cases circle around the SEP portfolios of major corporations that often litigate in both roles, i.e., as claimant in one case and as defendant in another. The litigating parties include Motorola, Apple, Ericsson, Realtek, Samsung, Qualcomm, Sony, Nokia, Huawei. On the implementer side, the defendants are Microsoft, Motorola, Apple, D-Link, LSI, LG, ZTE, Huawei, Samsung, InterDigital. Further parties to litigation proceedings include non-patent assertion entities (Innovatio, IPCom, Core Wireless), R&D institutions (CSIRO), distribution channels (Deutsche Telekom, Vodafone), patent pools (Sisvel, One Blue) or privateers (Unwired Planet, Vringo). The technology scope spans from wireless technology (IEEE 802.11, 2G (GSM), 3G and 4G (LTE)) and cellular technology such as touch screen commands over to video compression (AVC H.264), audio and video streaming, DRAMs and Blu-Ray.

A substantial body of selected cases stems from the US district courts, where "litigation is the endgame that influences a patent licensing negotiation" (Cary et al, 2014). Here, landmark cases and evolving trends in the FRAND jurisprudence have been subject in-depth analysis (or under sharp scrutiny) in the US scholarship. Despite strong arguments on both sides, there has been little consensus so far on how courts should best address the determination of FRAND licensing terms and which methodology best serves the calculation of reasonable royalties.

On the European front, national courts deal predominantly with the issue of injunctions and do not directly engage in considerations of the monetary aspects

of FRAND as their US counterparts do. This is partly due to the different legal traditions and procedural idiosyncrasies of the national jurisdictions. For instance, it is common practice in the UK that parties involved in high-stake litigation opt for arbitration or out-of-court settlement. In Germany, the distinction between patent infringement and a case of damages has a different impact: whereas the plaintiff in patent infringement proceedings may enforce through a request for injunctive relief, in the case of damages it merely asks the court to issue a declaratory judgment on the defendant's liability - if the court holds that the contested embodiment is infringing and this judgment becomes final, the parties will mostly seek a solution for the apportionment of damages outside the court system. Although the German legal system offers the possibility of separate proceedings on the amount of damages, this is rarely the case in practice.

We conclude our analysis by addressing competition and policy aspects of FRAND based on arguments and guiding principles laid out in seminal antitrust cases from the European Union, the United States, China, Korea and India. Albeit technically not a case, the recent IEEE policy update is part of the broader discussion – an SDO perspective on what FRAND should be.

3.1.2. List of cases by country – background and legal context

UNITED STATES

Georgia-Pacific Corp. v. United States Plywood Corp., 318 F. Supp. 1116 (S.D.N.Y. 1970)

In this seminal decision that addresses the general context of damages and not FRAND in particular, the district court reasons that a "hypothetical negotiation," between a "willing licensor" (the patent owner) and a "willing licensee" (the infringer), at the time the infringement began, may be used to determine reasonable royalty damages. For the purpose, it lists fifteen factors of evidentiary value, which had already been considered in other leading cases. In most cases, the Georgia-Pacific methodology attempts to set a percentage royalty rate, which is then multiplied by the dollar amount of infringing sales to calculate the dollar amount of "reasonable royalty" damages (case cited on pages 59, 60, 64).

eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388 (2006), US Supreme Court

Online auction site eBay used MercExchange patents in its online auction technology, including a US patent that covers eBay's "Buy it Now" function - over 30% of the company's business. When eBay abandoned negotiations to outright purchase MercExchange's online auction patent portfolio, MercExchange sued eBay for patent infringement and prevailed in 2003 before the District Court of Virginia, which found eBay had willfully infringed the MercExchange's patents and ordered a payment of nearly $30 million in damages. However, the district court denied MercExchange's request for injunction against eBay. The United States Court of Appeals for the Federal Circuit reversed the district court in 2005, stating that there was a "general rule that courts will issue permanent injunctions against patent infringement absent exceptional circumstances." Following the reversal, eBay took its case to the Supreme Court, where it prevailed. The Supreme Court unanimously determined that an injunction should not be automatically issued based on a finding of patent infringement, but could be denied simply on the basis that the plaintiff does not practice the patented invention. Instead, a federal court must still weigh what the Supreme Court described as the four-factor test traditionally used to determine if an injunction should issue (case cited on pages 35, 81, 83).

Lucent Techs., Inc. v. Gateway, Inc., 580 F. 3d 1301 (Fed. Cir. 2009)

Lucent had originally sued Gateway for infringement of its Day Patent, which claimed a method of entering information into fields on a computer screen without using a keyboard. In the course of litigation, however, Microsoft intervened and the evidence at trial focused on whether Microsoft's manufacture and sale of its popular products "Microsoft Money," "Microsoft Outlook," and "Windows Mobile" infringed the Day Patent. The underlying technology was pertinent to the operation of Microsoft Outlook's calendar tool, the so-called "date-picker" tool, which allows users to enter dates when preparing a record of appointment by scrolling through days, months, and years and entering those dates in an appointment form. At the jury trial, Microsoft unsuccessfully defended Lucent's infringement claims and Lucent was awarded $358 million in damages. On September 11, 2009, the United States Court of Appeals for the Federal Circuit set aside the jury verdict on the grounds that it was not supported by substantial evidence at trial and was therefore based on speculation or guesswork. The decision of the appeal court is noteworthy, particularly with regards to the discussion of two theories of damages commonly employed in patent infringement litigation (lost profits and royalty calculation) as well as the nature of proof required to obtain and sustain a jury verdict under those theories (case cited on pages 55, 88 - 89).

Cornell University v. Hewlett-Packard, 609 F. Supp. 2d 279 (N.D.N.Y. 2009)

The decision was the first of the recent cases that applied the Entire Market Value Rule (EMVR) to royalty bases, thereby setting up more stringent requirements for computing the royalty base in patent infringement damages calculations. Specifically, the court found that the EMVR must be met in order to use the entire unit as the royalty base. Cornell University issued an infringement suit against HP. The patent at issue covered an "instruction issuing mechanism" that enabled computer microprocessors to work faster by executing multiple instructions simultaneously rather than one at a time. The patent read on one component of the instruction reorder buffer (IRB), which was part of a computer processor (i.e., the smallest saleable patent-practicing unit), a number of which go into a CPU module, which goes into a CPU brick, a number of which go into a cell board, which is inserted into a server. Concluding that the royalty base should be only the processor because it "was the smallest saleable infringing unit with close relation to the claimed invention", the court then calculated damages to be $53 million, based on $7 billion in processors at a 0.8% rate (case cited on pages 91, 140).

Uniloc USA, Inc. and Uniloc Singapore Private Limited v. Microsoft Corp., 632 F. 3d 1295 (Fed. Cir. 2011)

In this case, the Court of Appeals for the Federal Circuit rejected the so-called "25 percent rule" for calculating infringement damages as a fundamentally flawed tool for determining a royalty rate in a hypothetical negotiation. Uniloc sued Microsoft for infringement of its US patent directed to a software registration system to deter software copying. The system allowed software to run without restrictions in a "use mode" only if the system determined that the software installation was legitimate. The Federal Circuit reversed the district court's grant of non-infringement and remanded the case for proceedings (case cited on pages 64, 89, 147).

Microsoft Corp. v. Motorola, Inc., 854 F. Supp. 2d 993 (W.D. Wash. 2012); Microsoft Corp. v. Motorola Inc., 696 F.3d 872 (US Court of Appeals for the Ninth Circuit 2012)

See detailed summary on page 56 (case also cited on pages 34 – 35, 55, 62, 64, 82, 84 – 86, 95 – 98, 101, 105, 107 – 111, 130, 136).

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

In this decision, the US Court of Appeals of the Federal Circuit raised the bar for the application of EMVR. LaserDynamics had filed an infringement suit against Quanta regarding its US patent directed to a method of optical disc discrimination that essentially enables an optical disc (ODD) drive to automatically identify the type of optical disc - e.g., a CD versus a DVD that is inserted into the ODD. A jury found for LaserDynamics, which claimed that a reasonable royalty should be 2% of the price of the entire notebook computer containing the drive, and awarded $52.1 million in damages. After a new trial, a subsequent jury awarded LaserDynamics $8.5 million in damages, and LaserDynamics appealed to the Federal Circuit. The latter addressed the proper legal framework for evaluating reasonable royalty damages in the patent infringement context: In holding that the district court properly granted a new trial, the court clarified the standard of proof a plaintiff must satisfy in order to obtain damages under an "entire market value" theory. Specifically, in applying the EMVR in any case involving multi-component products, patentees may not calculate damages based on sales of the entire product, as opposed to the smallest saleable patent practicing unit, without showing that the demand for the entire product is attributable to the patented feature (case cited on pages 55, 58, 88, 91, 108, 143 - 145).

Realtek Semiconductor Corp. v. LSI Corp., 946 F. Supp. 2d 998 (United States District Court, N.D. California (2013))

Realtek, a manufacturer of WiFi chips, asserted that LSI, a holder of two FRAND-encumbered WiFi SEPs, breached its FRAND obligation by seeking an exclusion order against the importation of Realtek's WiFi chips. Realtek sought an order barring LSI from seeking to enforce any injunctive relief against it based on those SEPs. The district court held that LSI's seeking injunctive relief at the International Trade Commission prior to proposing a FRAND license to Realtek was inherently inconsistent with its FRAND obligations. The court granted Realtek a preliminary injunction barring LSI from enforcing any exclusion order that it might obtain against Realtek with respect to the two SEPs. The case was subsequently tried before a jury, which established a royalty of 0.19% of the selling price of Realtek's WiFi chips, or an estimated $0.0019 to $0.0033 per chip, as compared to LSI's initial demand for a royalty exceeding the $1-1.75 price of Realtek's WiFi chips (case cited on pages 35, 82, 87, 96).

In re Innovatio IP Ventures, LLC , 921 F. Supp. 2d 903 (N.D. Ill. 2013)

See detailed summary on page 58 (case also cited on pages 85 – 86, 91, 94 – 96, 99 – 100, 105, 108, 110 – 111, 113, 133).

Apple, Inc. v. Motorola Mobility, Inc., 869 F. Supp.2d 901 (U.S. District Court, N.D. Illinois 2012); Apple Inc. v. Motorola Mobility, Inc., 757 F.3d 1286 (Fed. Cir. 2014)

See detailed summary on page 57 (case also cited on pages 61, 81 – 82, 84, 96, 106, 111, 113).

Ericsson v. D- Link, 773 F.3d 1201 (Fed. Cir. 2014)

See detailed summary on page 63 (case also cited on pages 57, 62, 64, 82, 85, 89, 91, 92, 97, 105, 112 – 113, 134, 141 – 142, 148, 152).

VirnetX, Inc.v. Cisco Systems, Inc., 767 F.3d 1308 (Fed. Cir. 2014)

VirnetX had successfully asserted four of its patents in a verdict against Apple based on infringement by Apple's Facetime and VPN On Demand products. The two accused products involved a videoconferencing platform and a feature used to establish secure virtual private networks, respectively. The jury found the four patents were valid and infringed, awarding damages of $368,160,000. On appeal, the Federal Circuit upheld the jury verdict of no invalidity and infringement as to most of the claims of the patents asserted against VPN On Demand, but reversed the verdict and remanded the case with regards to the disputed claims of the patents asserted against Facetime). In its decision, the Federal Circuit addressed various theories of damage determination relevant to the royalty base, the SSPPU and the Nash Bargaining solution (case cited on pages 64, 91, 148).

U.S. International Trade Commission, Initial determination on Remand issued April, 27 2015, In the Matter of Certain 3G Mobile Handsets and Components Thereof (Inv. n° 337- TA-613)

In September 2007, the International Trade Commission (ITC) had instituted an investigation based on a complaint filed by InterDigital. The respondents in this proceeding were Microsoft and Nokia. In August 2009, the ITC affirmed the finding of no violation and terminated the investigation in October 2009. However, the affirmation was appealed to the US Court of Appeals for the Federal Circuit in 2012, which reversed the claim construction of several claim terms and returned jurisdiction back to the ITC on remand. The remanded issues included briefing the issue of the standard-essential nature of the patents-in-suit, and whether a patent hold-up or reverse hold-up occurred. Administrative Law Judge (ALJ) Essex held that Nokia's 3G mobile handsets infringe the asserted claims of U.S. Patents Nos. 7,190,966 and 7,286,847 owned by InterDigital. The decision stands out in that it considers several FRAND-related issues, including essentiality, patent hold-up and hold-out (case cited on pages 34, 78, 106, 113).

CSIRO v. Cisco, 809 F. 3d 1295 (Fed. Cir. Dec. 3, 2015)

See detailed summary on page 93 (case also cited on pages 61, 90, 92 – 93, 97, 114, 145).

Federal Trade Commission, Robert Bosch GmbH, Dkt No. C-4377 (F.T.C. Apr. 24, 2013)

See detailed summary on page 117.

Federal Trade Commission, Motorola Mobility LLC, No. C-4410 (F.T.C. July 23, 2013)

See detailed summary on page 117.

EUROPEAN UNION

European Commission, Decision of 9.12.2009 relating to a proceeding under Article 102 of the Treaty on the Functioning of the European Union and Article 54 of the EEA Agreement, Case COMP/38.636 – RAMBUS

See detailed summary on page 114.

European Commission, DG Competition, Commitment Decision of 29 April 2014, C(2014) 2891 final, Samsung Electronics Co., Ltd., et. al.

See detailed summary on page 115 (case also cited on pages 36, 78).

European Commission, DG Competition, Decision of 29 April 2014, C(2014) 2892 final, Motorola Mobility Inc.

See detailed summary on page 115 (case also cited on pages 35).

CJEU, Case C-170/13, Decision of 16 July 2015, Huawei Technologies Co. Ltd v. ZTE Corp., ZTE Deutschland GmbH.

See detailed summary on page 66 (case also cited on pages 37, 68 – 72, 79, 83, 99, 156, 164, 165).

GERMANY

Mannheim District Court, Decision of 17 December 2013, Case no 2 O 41/13 – Vringo v. ZTE; Karlsruhe Court of Appeal, Decision of 19 February 2014, Docket No.: 6 U 162/13 – ZTE v. Vringo

In these proceedings involving a patent essential to a cellular standard, the Mannheim District Court found for patent infringement and rejected ZTE's request for a stay of the proceedings in view of the pending referral of the Huawei v. ZTE before the CJEU. On appeal, the Karlsruhe court of appeal dismissed ZTE's request for a preliminary stay of provisional enforcement of the district court's decision. The appellate court held that, pending a decision by the CJEU, the "Orange-Book-Standard" requirements decision still applied and that it was uncontested that ZTE did not meet these requirements in the case at hand (case cited on page 69).

Mannheim District Court, 2 O 103/14, Decision of 10 March 2015 - St Lawrence Communication v. Deutsche Telekom; Karlsruhe Court of Appeal, 6 U 44/15, 23 April 2015 - St Lawrence Communication v. Deutsche Telekom; Mannheim District Court, 27 November, 2015, 2 O 106/14, 2 O 107/14, 2 O 108/14, St Lawrence Communication v. Deutsche Telekom

The Mannheim District Court held that St Lawrence, a patent licensing company and European subsidiary of Acacia Research Group LLC., was entitled to injunctive relief against Deutsche Telekom based on the infringement of one of its patents. St Lawrence's patent was judged to be standard-essential with respect to AMR-WB, a wideband speech-encoding standard whose functions include a greatly improved quality of speech. Several mobile phone manufacturers intervened on the side of Deutsche Telekom, expressing their willingness to take a license. Deutsche Telekom, however, declined to take it. The Mannheim district court held that Deutsche Telekom could not rely on a FRAND defense. Irrespective of the Orange Book Standard, it is the prerequisite of a FRAND defense that the patent infringer is objectively ready, willing and able to conclude a license agreement.

On appeal, the court in Karlsruhe disagreed with the court in Mannheim and suspended enforcement of injunctive relief pending appeal. Later that year, on 27 November 2015, the Mannheim district court used the opportunity to apply the guidance given by the CJEU in Huawei v. ZTE and granted an injunction against Deutsche Telekom. According to the facts of the case, St Lawrence first filed the action and then put Deutsche Telekom on notice. HTC, which participated in the proceedings as intervener in support of Deutsche Telekom, was put on notice indirectly via counsels for Deutsche Telekom shortly thereafter. Therefore, when Deutsche Telekom and HTC were first made aware of the infringement, they were effectively already under pressure due to the filed court action. Furthermore, the FRAND offer was not made by Deutsche Telekom as defendant, but by HTC as supplier of the accused devices. As a mere distributor of the accused devices Deutsche Telekom had refused to take a license itself. The Mannheim district court found that both Deutsche Telekom and HTC had had enough time to consider their reaction and could not make the argument that notice of infringement was given too late (case cited on page 74, 76, 106).

Düsseldorf District Court, Decisions of 3 November 2015 – 4a O 144/14 und 4a O 93/14 - Sisvel v. Haier; Düsseldorf Court of Appeal, Decisions of 13 January 2016 – 15 U 65/15 und 15 U 66/15 – Sisvel v. Haier

In two related cases, the Düsseldorf district court granted Sisvel's motion for an injunction against German and European distribution companies of the Haier group, enjoining them from selling the accused UMTS- and GPRS-compliant smartphones and tablets in Germany. Sisvel runs various patent licensing programs, including a wireless licensing program that includes more than 350 patents originally acquired from Nokia that Sisvel claims have been declared essential to second, third, and fourth generation wireless standards (including GSM, GPRS, UMTS, and LTE). The defendants offer smartphones and tablets in Germany that implement the UMTS and GPRS standards adopted by ETSI. Sisvel informed Haier (the defendants' parent company) of its patent licensing program several times in 2012 and 2013. Negotiations in 2014 ended without an agreement, with defendants rejecting several written license offers by Sisvel without making a counter-proposal. Sisvel continued to offer licenses in 2015 during the pending court proceedings, but the defendants continued to reject all of them without making any counteroffers. The defendants disputed that Sisvel's license offer met FRAND requirements. Specifically, defendants argued that Sisvel's license fees, which ranged from EUR 0.15 to EUR 0.50 depending on volume, were unreasonable and in excess of a royalty of 0.012% that defendants claimed to be FRAND. Defendants also challenged the offer based on the fact that it was only for a worldwide license, with no option to license only the asserted German patent. Finding that the accused products practiced the FRAND encumbered patent, the district court granted injunctive relief (case cited on pages 71 – 72, 98).

Düsseldorf District Court, Decisions of 19 January 2016, 4b O 120/14, 4b O 122/14 and 4b O 123/14 – Unwired Planet v. Samsung

In a series of trials, the German district court held that Samsung and Huawei's LTE and GSM compliant handsets infringe three European patents of Unwired Planet related to cellular technology (respective patent portfolio was acquired from Ericsson in 2013). With respect to the infrastructure equipment, the court found that Samsung and Huawei's products infringe one of two asserted patents covering LTE technology. Huawei and Samsung have filed an appeal against the district court judgment (case cited on pages 104 - 105).

Mannheim District Court, 29 January 2016, 7 O 66/15 - NTT DoCoMo v. HTC

NTT DoCoMO, a major mobile operator in Japan, asserted its patents deemed essential for the Universal Mobile Telecommunication System (UMTS) standard against HTC Germany, which allegedly incorporated the patented technology in its products. Prior to bringing the action, NTT DoCoMo offered HTC a regional license and specified royalty rates for a term of three years. HTC ultimately rejected the offer by submitting a counter-offer eighteen months after the initial offer was presented (six months after NTT DoCoMo sued HTC). Additionally, HTC did not provide security at any time following NTT DoCoMo's rejection of the counter-offer. The Mannheim Court found that NTT DoCoMo did not abuse its dominant position and granted the injunction (case cited on pages 71 – 72, 98).

Düsseldorf District Court, 31 March 2016, 4a O 73/14 - St. Lawrence Communication v. Vodafone; Düsseldorf Court of Appeal, 9 May 2016, I-15 U35/16, 15 U35/16 – St Lawrence Communication v. Vodafone

The dispute concerned a patent in the field of wireless telecommunication, which is part of the AMR-WB standard under the 3rd Generation Partnership Project (3GPP). This standard deals with broadband speech transmission allowing for an improved speech quality. St Lawrence, the plaintiff, is a non-practicing entity offering the patent in suit as well as its other patents in its family in terms of a global portfolio license. Vodafone, the defendant is a network operator distributing various mobile phones, incl. those originating from the intervener HTC as well as cell phones sold under the Vodafone brand. The district court stated the infringement of the patent by the defendant and granted an injunction against Vodafone, which had neither made a counter offer, nor furnished security. On appeal, the Düsseldorf court of appeal affirmed the order of preliminary injunctions (case cited on pages 71 – 72, 98 – 99, 101).

Karlsruhe Court of Appeal, 31 May 2016, 6 U 55/16

The plaintiff had filed a complaint for alleged infringement of a DVD-pool patent against the defendant before the decision in the Huawei v. ZTE case was pronounced. In out-of-court discussions, the asserted patent and its alleged infringement was not pointed out to the defendant; this information was only included in the filed complaint. In the course of the proceedings, the defendant indicated willingness to discuss a FRAND license. The plaintiff provided an offer it considered FRAND, which the defendant disputed before bringing an own offer. The Mannheim district court awarded the complaint and held that the FRAND defense could not be successfully raised. In its decision, it reviewed the disputed FRAND offer of the plaintiff only on a summary basis, checking for evident non-FRAND compliance without going into details of the actual calculation. On appeal, the Karlsruhe court of appeal abated the preliminary enforcement of the first instance judgment, albeit limited to the claims for recall and destruction of the infringing goods – the order on the injunctions was upheld (case cited on page 72).

THE NETHERLANDS

The Hague District Court, Decision of 7 March 2010, Doc. no. 316533/HA ZA 08-2522 and 316535/HA ZA 08-2524 (joint cases) - Philips v. SK Kasetten

The Hague district court held that SK Kasetten infringed several essential patents owned by Philips, relating to CD and DVD technology. SK Kasetten argued – under reference to the Orange Book decision of the German BGH – that it was

entitled to a license under FRAND terms, and that this would preclude Philips from enforcing its patents. The Court of The Hague rejected the application of the Orange Book criteria under Dutch law (case cited on page 73).

The Hague District Court, 10 March 2011, Case n° 389067 / KG ZA 11-269 - Sony Supply Chain Solutions (Europe) B.V. and LG Electronics, Inc.

LG's complaint relates to its European patents on the Blu-ray Disc standard and specifically asserts the following three patents. LG explains that those patents are essential to the Blu-ray Disc standard, and therefore, necessarily infringed by Sony's PlayStation 3 since it comes with a Blu-ray player. LG claims that it was willing to grant Sony a license on FRAND, but Sony allegedly wants to take a license only if LG and Sony also reach an agreement on royalties in entirely different and unrelated technology areas (such as TVs, monitors and mobile phones). In February 2011, LGE was granted a leave to attach Sony's PlayStation 3 devices for the purpose of surrender. That order was granted ex parte by the Breda District Court and was directed against Sony's Dutch affiliate. Based on that Court Order, a substantial number of Sony's PlayStation 3 was seized. In addition, shipments of Sony's Playstation 3 were seized by Dutch customs officers based on the European Regulation 1383/2003. Following Sony's appeal, The Hague District Court ordered that the interim injunction be lifted and the goods seized (case cited on page 73).

The Hague District Court, Decisions 14 March 2012 and 20 June 2012, Cases No. 400367/HA ZA 11-2212 - Samsung Electronics v. Apple Inc. et al.

Samsung sued Apple for infringement of its patents related to 3G-technology. Before discussing infringement and validity, the court denied in its interlocutory judgment Samsung's request for injunctive relief. It held that in view of the negotiations on the terms of a FRAND license between the parties, the request for an injunction by Samsung in light of the circumstances should be seen as an abuse of authority and/or contrary to the pre contractual obligation to negotiate in good faith. The court held that it could not be maintained that Apple was not negotiating in good faith (case cited on pages 73, 99, 109).

The Hague District Court, Decision of 24 October 2014, C/09/470109 / KG ZA 14-870 - ZTE v. Vringo

As of September 2012, Vringo and ZTE have been unsuccessfully engaged in licensing negotiations regarding Vringo's portfolio of SEPs. In April and May 2014, at Vringo's request, Dutch customs seized several shipments of ZTE's goods using UMTS technology. The goods allegedly infringed Vringo's European patent that has been declared essential for UMTS. Subsequently, Vringo made ZTE a last licensing offer on 18 June 2014. ZTE did not respond to this offer and instead initiated preliminary proceedings before the District Court of The Hague to lift the customs seizure and prohibit Vringo from effectuating further seizures on the basis of any of its SEPs. The Court rejected ZTE's request, stating that the customs seizure could not be perceived as Vringo forcing its licensing terms on ZTE (case cited on pages 74, 109).

FRANCE

Paris District Court, Decision of 8 December 2011, no. RG 11/58301, Samsung Electronics Co Ltd, et al. v. Apple France Sar.

Samsung filed a motion for a preliminary injunction against Apple attacking the iPhone4S. Apple argued before the Paris district court that Samsung's claim would constitute an abuse of a dominant position. The court dismissed Samsung's claim and did not address the issue, because it found that after a summary assessment of the facts that there were serious doubts against infringement and that this did not justify the grant of a preliminary injunction (case cited on page 109).

Paris District Court, Decision of 29 November 2013, no 12/14922, Telefonaktiebolaget LM Ericsson v. TCT Mobile Europe SAS and TCT Mobile International Ltd.

The patents in suit were related to three of Ericsson's SEPs for the implementation of the 3G standards (UMTS). Ericsson sought a preliminary injunction against TCT Mobile, accusing TCT Mobile of infringing the French designations of these European patents by marketing product ranges of mobile phones suitable and intended for use on the 3G-network. The district court found that the requested preliminary injunction could be granted for SEPs when the negotiations for a license are ongoing and where the parties agree on the geographical extent and technological scope of the agreement, but disagree only on the royalty rate (case cited on page 74).

Paris District Court, Decision of 17 April 2015, n° 14/14124, Core Wireless v. LG Electronics

Core Wireless and LG failed to reach an agreement regarding the licensing of Core Wireless' portfolio of 1,261 SEPs covering 2G, 3G and 4G ETSI standards. These patents had been acquired from Nokia in 2012. Core Wireless decided not to request an injunction or damages. Instead, it asked the court to set a FRAND rate for the licensing of its SEPs to LG. In its opinion, looking at a "sample" of five SEPs was a proper way to assess that its whole portfolio was essential and that a FRAND license royalty should be set on the said portfolio. However, Core Wireless did not disclose a single document explaining what a proper royalty rate could be, requesting the Court to appoint an expert. LG replied that the patents were invalid or, at least, non-essential to the standards and that such a claim from Core Wireless was an abuse of a dominant position. Leaving aside LG's invalidity defense by LGE, the Paris district court examined the essentiality of the patents at issue. Stating that Core Wireless had not demonstrated that any of the asserted patents was essential to any of the standards, the court rejected its claims (case cited on page 107).

UNITED KINGDOM

Nokia v. Interdigital Technology, UK High Court, Patents Court, Decision of 21 December 2007, [2007] EWHC 3077 (Pat)

This decision was ground breaking in that it was the first to grant a negative declaration regarding the essentiality of patents to an international standard. Specifically, the UK High Court addressed the question whether it had a role to play in deciding whether patents declared to be essential to an international standard were actually essential. Nokia sought to establish that the inventions claimed in a number of InterDigital's patents were not essential to the 3G mobile

telecommunications standard in Europe. The claim originally specified twenty-nine patents, which had been declared to ETSI as essential to the standard, but prior to the exchange of evidence only seven were still in dispute. InterDigital did not ultimately advance any case in relation to three of these, so that merely four patents remained contended by the time the matter came to trial. The underlying technologies related to power control, the use of multiple pilot signals by a single CDMA air interface base station and antennae diversity. Judge Pumfrey held only one out of the four patents essential, but only with regard to the method claims. After evaluating presented evidence and taking into account the substantial size of the UK market, he concluded that the declarations would be useful and that he was right to grant them (case cited on page 107).

IPCom v. Nokia, 18 May 2012, [2012] EWHC 1446 (Ch)

The decision – one of many in a series of cases in which IPCom sues both HTC and Nokia on the same patent - addresses the question to what extent SEP holders may seek injunctive relief. The UK High Court refused to grant IPCom (a non-practicing entity) a request for injunction against Nokia for practicing an IPCom FRAND-encumbered SEP. IPCom confirmed that it was bound by an undertaking given to the European Commission in 2009 to grant a license to Nokia on FRAND terms. Nokia equally confirmed its willingness to take a license on FRAND terms. Under the circumstances, the court concluded that an injunction would be inappropriate (case cited on page 74).

Vringo Infrastructure Inc. v. ZTE (UK) Ltd., UK High Court, Patents Court, Decisions of 6 June 2013, [2013] EWHC 1591 (pat)

Vringo issued two sets of proceedings against ZTE in the High Court for infringement of six patents all of which related to mobile phones and telecommunication systems. These patents were part of a large portfolio of over 500 patents that had been acquired from Nokia – hundreds thereof were declared as standard-essential. Vringo claimed that it had offered ZTE a worldwide portfolio license that complied with any and all contractual and/or competition obligations. Whereas Vringo argued that the court should first address the FRAND issues and then deal with validity and infringement, if necessary, ZTE favored the opposite approach. Birss J stated that there were two different circumstances in which the court could make a determination relating to the rate and terms of a license with different outcomes – that of the willing licensor and licensee in which the decision ends the dispute and that of the parties who will continue to look at the issues of validity and infringement before being bound by the initial finding. Despite being prepared to set a FRAND rate, the court refused the application, noting that it would only be a worthwhile exercise of both parties were willing to be bound by its determination. However, as ZTE did not agree to be bound, the court could not and should not compel or coerce a defendant to be bound by a FRAND decision, thereby losing its entitlement to challenge the validity and infringement of the patents in suit. Accordingly, the judge refused to schedule a FRAND trial before invalidity and infringement had been determined (case cited on pages 75, 108).

IPCom GmbH & Co Kg v. HTC Europe Co Ltd & Ors, UK High Court, Patents Court, Decision of 24 April 2015, [2015] EWHC 1034 (Pat)

In the on-going dispute between IPCom, Nokia and HTC, Nokia sued IPCom in the UK High Court to revoke its European chipset level patent relating to communication channel access control. Nokia also sought declarations of non-infringement in relation to certain handset models. In the first instance, Floyd J had found the patent valid as amended and infringed by certain Nokia products

that are compliant to the UMTS standard. Nokia appealed the decision. With a ruling of 10 May 2012, the Court of Appeal upheld the first instance decision. In parallel opposition proceedings, however, the European Patent Office (EPO) revoked the said patent and the UK Court suspended the patent revocation pending appeal before an EPO Technical Board of Appeal. In September 2012, the parties returned to the court to determine whether IPCom was entitled to an injunction in the UK. The court took the view that it would be inappropriate to grant an injunction, because IPCom was willing to grant a FRAND license in accordance with undertakings given to ETSI and the European Commission, and that Nokia accepted that it would take a license on FRAND terms (at least for the UK designation of the patent). The court therefore found that the only remaining issue in dispute was the determination of FRAND terms. On 6 December 2012, the parties were before the court again, with Justice Floyd hearing applications from both Nokia and HTC for permission to adduce evidence from a technical expert at the trial of the non-technical defenses. Birss J agreed to adduce evidence from a technical expert and comparable licenses, but shortly before the hearing due January 2013, Nokia and IPCom announced that they were close to a settlement and they invited the court to delay determining a FRAND royalty (case cited on page 59).

Unwired Planet International Ltd. v. Huawei Technologies Co, Samsung Electronics Co, Google and others, UK High Court, Patents Court, Decision of 21 July 2015, [2015] EWHC 2097 (Pat)

In November 2015, the UK High Court ruled that Unwired Planet's European patent for an LTE standard (known as 3GPP TS 36.322 release 8 version 8.8.0.), which it had acquired from Ericsson, was valid and infringed by Samsung and Huawei. In context of this litigation, the UK High Court handed down an interim judgment (dated 21 July 2015), which addressed issues relating to the transfer of an ETSI FRAND obligation. In this interim judgment, Birss J struck out arguments brought by Samsung that Ericsson had breached Article 101 TFEU by not ensuring the transfer of an effective FRAND obligation to Unwired Planet in relation to these patents. However, he allowed arguments relating to other alleged breaches of Article 101 TFEU to proceed to trial, on the basis that they might have a real prospect of success. The Unwired Planet litigation is ongoing with one non-technical and three technical trials planned for 2016. The first one is expected to address a wide range of issues relating to the terms of FRAND licensing (case cited on page 103).

CHINA

Huawei v. InterDigital, Judgments of 28 October 2013, Guangdong Higher People's Court of China (Yue Gaofa Minsan Zhougzi Nos. 305 and 306)

See detailed summary on page 76 (case also cited on pages 95, 102, 112, 119).

Chinese National Development and Reform Commission (NDRC) v. Qualcomm, Decision of 10 February 2015

See detailed summary on page 120 (case also cited on pages 90, 119).

KOREA

Seoul Central District Court, 24 August 2012, Case no. 2011 GaHap 39552, Samsung Electronics Co., Ltd. v. Apple Korea Ltd.

In April 2011, Samsung filed a lawsuit in the Seoul Central District Court seeking an injunction against Apple for infringement of patents it claimed were essential to the UMTS cellular standard, and for which Samsung had made FRAND commitments to ETSI. Apple contested infringement and validity of the asserted patents. In August 2012, the court issued a decision in which it found that Apple infringed two of the asserted patents. The court awarded Samsung damages of KRW 40,000,000 (approx. USD 35,500) for Apple's infringement of the two patents and granted Samsung an injunction. Furthermore, the court denied Apple's claim that Samsung had violated the Korean anti-monopoly laws by seeking an injunction for its SEPs. Although SEPs provide the patent holder with a dominant position in the relevant markets, both parties are responsible for their failure to reach an agreement (case cited on pages 77, 157).

Korean Fair Trade Commission (KFTC), Decision of 26 February 2014, Samsung Electronics Co., Ltd.

On April 15, 2011, Apple filed a lawsuit against Samsung with a US district court, seeking an injunction to prohibit infringements on designs and non-SEPs as well as damages. In response to the lawsuit, Samsung filed a lawsuit against Apple with the Seoul Central District Court on April 21, 2011, seeking an injunction to prohibit infringements on four SEPs and non-SEPs related to technology for 3G mobile communications systems, along with damages therefor. Samsung sought an injunction to prohibit Apple from selling four products (iPhone 3GS, iPhone 4, iPad1(Wifi+3G) and iPad2 (Wifi+3G)) based on the alleged infringement of the related SEPs. In response to the Samsung's lawsuit, Apple alleged (i) that Samsung Electronics seeking an injunction constituted an unfair use of patent infringement by a market dominant firm and (ii) that its breach of the obligation of timely disclosure of patent information in the course of standard setting constituted the interference of the competitor's business activities. The KFTC concluded that, because Apple failed to engage in good faith negotiations, Samsung's injunction claims against Apple do not constitute an abuse of dominance or unfair trade practice. In its decision, the KFTC made reference to the commitments Samsung had made to the European Commission, to the findings of the U.S. International Trade Commission that Apple infringed Samsung's patents (which led to an appeal to the Federal Circuit), as well as to the U.S. Department of Justice decision to close its investigation into Samsung for potential abuse of SEPs (case cited on pages 78, 113).

JAPAN

Apple v. Samsung, Japanese IP High Court, Decision of 16 May, 2014, Case No. 2013[Ne] 10043 (This is an appeal case from the Judgment of Tokyo District Court, February 28, 2013 [Case No. 2011 [Wa] 38969])

In this case, the Japanese IP High court considered a FRAND defense for the first time. Samsung had filed a request for a preliminary injunction against Apple with the Tokyo district court. On 28 February 2013, the Tokyo district court rejected Samsung's request for a preliminary injunction against Apple on a patent essential to 3G. With respect to Apple's motion for a declaratory judgment that Samsung did not have the right to claim damages based on infringement allegations, the court found that although Apple's products infringed certain

asserted patents and those patents were valid, Samsung did not have a right to damages. The court held that, under the Japanese civil code, parties in contract negotiations have the duty to share important information and negotiate in good faith. The court ruled that Samsung breached this duty, because it failed to provide information that would support the calculation of its royalty demands. Samsung appealed against the decision to the Japanese Intellectual Property High Court. The latter stated that, once a patent is FRAND-encumbered, the proprietors cannot seek injunctive relief. To the extent that the infringer provides sufficient proof that it has been willing licensees, seeking injunctions against this willing licensee amounts to an abuse of right under Civil Code Article 1 (3) - a fundamental principle of Japanese civil law applied to all areas of private assertion of rights. The court granted damages of 9,955,854 Japanese Yen (approx. USD 83,400.10 at the time). The amount was calculated based on FRAND royalty analogies with existing pool rates (case cited on pages 79, 95, 157).

Imation Corporation Japan v. One-Blue LLC, Tokyo Dist. Ct., Feb. 18, 2015, Case No. 2013 (Wa) 21383

Imation sells Blu-ray Disk products in Japanese retail stores. The defendant, One-Blue, is a patent pool management company, jointly established by Blu-ray related patent proprietors in 2009. The plaintiff had been selling Blu-ray disks in the US without a license from the defendant or individual licensors. On 25 June 2012, the defendant informed the plaintiff about the worldwide licensing program the defendant was offering and requested the immediate suspension of sales of unlicensed Blu-ray disks. The royalties proposed by the defendant was USD 0.1075 per BD-R, USD 0.135 per BD-RE, USD 0.13 per BDXL-R, and USD 0.16 per BDXL-RE. The plaintiff did not consider the proposed royalty to be fair and reasonable, but declared its willingness to pay a fair and reasonable royalty at 3.5% of the sales cost of the bare discs. The plaintiff also requested that the defendant disclose licensing agreements with other parties, including the applied actual royalty rates (including grant back agreements). A week later, the defendant responded that it would not negotiate with individual licensees in order to avoid allegations of discriminatory practices. On 4 June 2013, the defendant sent out a notice to three retailers in Japan, warning them that the sales of Blu-ray discs were produced without a license, constituted an infringement of the patents managed by the defendant, and that the patent proprietor had the right to seek damages and injunctions with immediate suspension of sales. The Tokyo district court ruled that the above notice contained a "false allegation" and was thus prohibited under Art. 2 (xiv) Unfair Competition Prevention Act (case cited on page 80).

INDIA

Telefonaktiebolaget LM Ericsson v. Micromax Informatics Ltd. and Mercury Electronics Ltd., High Court of Delhi at New Delhi, Court order of 12 March 2013, Docket no. C.S. (OS) 442/2013; Telefonaktiebolaget LM Ericsson v. Xiaomi Technology and others, Interim Application No. 24580 of 2014 in Civil Suit (Original Side) No. 3775 of 2014, High Court of Delhi (8 December 2014); Telefonaktiebolaget LM Ericsson v. Intex Techs. (India) Ltd, Interim Application No. 6735 of 2014 in Civil Suit (Original Side) No. 1045 of 2014, High Court of Delhi (13 March 2015)

The High Court of Delhi dealt with issues pertaining to SEPs and their availability on FRAND terms in cases filed by Telefonaktiebolaget LM Ericsson against multiple companies alleging infringement of its patents that were essential to the 2G and 3G standards. In the first suit against Micromax, the Single Bench of the High

Court of Delhi ordered an ex parte interim injunction against Micromax for alleged infringement of eight patents purportedly essential to wireless standards. The court also issued an order authorizing the seizure of documents. The court order, however, did not provide any reason for the prima facie finding of patent infringement. Micromax' appeal to a division bench of the Delhi High Court was dismissed. The order dismissing the appeal did not mention FRAND. Eventually, the interim injunction was lifted following an interim arrangement between the parties, according to which Micromax had to deposit the royalties at the demanded rates. Similarly, injunctions were granted in the other two cases against Xiaomi and Intex. In all cases, the defendants were ordered to pay Ericsson a royalty determined by the court. For the purpose, the court examined relevant cases across various jurisdictions worldwide and relied on information on comparable licenses in order to determine FRAND. Specifically, it used the net sales price of the downstream device as royalty base. In addition to the patent infringement suits, Ericsson filed appeals against various orders passed by the Competition Commission of India (CCI), as reported below. The High Court of Delhi granted interim stay on all these orders (cases cited on pages 80 – 81, 90, 95).

Micromax Informatics, Ltd v. Telefonaktiebolaget LM Ericsson, Case No. 50 of 2013, Competition Commission of India (12 November 2013); Intex Techs. (India) v. Telefonaktiebolaget LM Ericsson, Case No. 76 of 2013, Competition Commission of India (16 January 2014); Best It Worlds (India) Private Ltd. v. Telefonaktiebolaget LM Ericsson, Case No. 4 of 2015, Competition Commission of India (12 May 2015)

Micromax filed a complaint with the Competition Commission of India (CCI), alleging that Ericsson abused its dominant position by imposing exorbitant royalties for the use of its SEPs. Micromax further argued that using the sales price of the downstream product as the royalty base constituted an abuse of SEPs that would ultimately harm consumers. Micromax claimed that Ericsson was using its market position to impose excessive royalties, i.e., Ericsson was the sole licensor for the SEPs necessarily implemented in 2G and 3G Wireless Telecommunication Standards and there were no technical alternatives to the use of these technologies. In its preliminary order, CCI stated that, in the relevant product market, Ericsson was the largest holder of SEPs for mobile communications (2G, 3G and 4G patents used for smart phones, tablets etc.) and thus held a dominant position in the market for devices that implement such standards. Ericsson's royalty rates were deemed excessive and discriminatory, given that they were set as a percentage of the price of downstream products instead of as a percentage of the price of the GSM or CDMA chip. A similar outcome marked the suits of Intex and Best It Worlds (India) (cases cited on pages 90, 122).

3.2. FRAND AS A BILATERAL NEGOTIATION PROCESS

The assertion of patent rights related to FRAND-encumbered SEPs, for example, in the context of injunctive relief and - to a certain extent - during patent infringement, is typically regarded as the result of unsuccessful bilateral negotiations between the involved parties. Courts and competition authorities approach certain aspects of this bilateral context through a different lens, depending on the legal and procedural particularities of the respective jurisdictions. In the following parts of the study, we will focus on how "reasonableness" in the context of FRAND hinges on the willingness of the negotiating parties in the context of patent infringement and the definition of the

bargaining range through the hypothetical negotiation construct; and in the context of injunctions and the requirements attached to a good faith negotiation.

3.2.1. Defining timing and other factors of the negotiation process

3.2.1.1. Ex ante negotiation benchmark

The notions of "hypothetical negotiations" and "ex ante bargaining" are deeply embedded in the US patent law. Central to the calculation of patent damages, the hypothetical negotiation attempts to ascertain the royalty upon which the parties would have agreed had they successfully negotiated an agreement just before infringement began, and necessarily involves an element of approximation and uncertainty.[26] The hypothetical negotiation s necessarily deemed to take place "ex ante", i.e., prior to infringement or at a time when the patented technology was, at least hypothetically, competing with alternative technologies for inclusion in the standard, and not "ex post", i.e., at the time of the infringement or after the patent was locked into the standard. In other words, the basic question posed in a hypothetical negotiation is: if, on the eve of infringement, a willing licensor and licensee had entered into an agreement instead of allowing infringement of the patent to take place, what would that agreement be? This question cannot be meaningfully answered unless we also presume knowledge of the patent and of the infringement at the time the accused inducement conduct began. Were we to permit a later notice date to serve as the hypothetical negotiation date, the damages analysis would be skewed because, as a legal construct, we seek to pin down how the prospective infringement might have been avoided via an out-of-court business solution.[27]

By defining a certain approach to the negotiation process, the hypothetical negotiation construct is tied to a series of undefined or debated assumptions such as the presumed strength of the infringed patent, the timing of the negotiations, and the significance of ex post facts. An area of dispute in implementing the hypothetical negotiation construct surrounds the timing of the negotiation. On the one hand, an early start date of the hypothetical negotiation at the time of the standard lock-in tends to favor the infringer and his ability to avoid investments and to next-best alternatives. On the other hand, a later start of the hypothetical negotiation at the "eve of the infringement" tends to favor the patent holder as it may result in higher royalty rates due to lock-in effects. In the latter case, uncertainty with respect to the precise time of the first infringement can thus result in the hypothetical negotiation being set well after lock-in. Lock-in costs refer to costs that the alleged infringer has usually made between the ex ante hypothetical negotiation date and the infringement, incl. designing technology into products and peripherals, configured production equipment and processes, trained employees etc. In other words, lock-in costs refer to how much more it would cost the infringer to switch to an alternative technology ex post that it would have cost to switch ex ante.

In cases involving infringement of non-SEPs, the start date of the hypothetical negotiation is traditionally set just before the infringement. This is not the case in the context of SEP litigation: the case law on FRAND has added a number of assumptions regarding the circumstances of the hypothetical negotiation, which apply specifically to the FRAND context. In the *Microsoft v. Motorola* analysis, for example, it is explicitly assumed that the bilateral negotiation takes place under

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[26] *Lucent Techs., Inc. v Gateway, Inc.,* 580 F. 3d 1301 at 1324-1325 (Fed. Cir. 2009).
[27] *LaserDynamics, Inc. v Quanta Computer Inc*., 694 F. 3d 51 at 76 (Fed. Cir. 2012).

the FRAND obligation.[28] This assumption can have several implications both for the timeframe of the negotiation and the aspect of essentiality.

Microsoft Corp. v. Motorola, Inc., 854 F. Supp. 2d 993 (W.D. Wash. 2012); Microsoft Corp. v. Motorola, Inc., 696 F.3d 872 (9th Cir. 2012)

This is a pioneer case, the first explicit judicial discussion on the meaning of FRAND. The court makes clear that RAND is to be understood as creating additional obligations on top of "reasonable royalties", in particular to account for the risks of hold-up and royalty stacking. Following core economic principles, Judge Robart set forth the first framework for the determination of RAND royalty rates. Although not a new legal doctrine on the meaning of FRAND, the solution concept is framed as a hypothetical bilateral negotiation ex ante to standard setting. The court proposes a modified list of Georgia Pacific factors to account for the RAND commitment and the asserted essentiality of the patents.

Microsoft sued Motorola in the Western District of Washington for infringement of patents relating to smartphone technology. Later that month, Motorola sent Microsoft two letters offering to license each of two sets of standard-essential patents—one relating to the 802.11 WiFi standard and the other to the H.264 video compression standard—for 2.25% of the selling price of each consumer product incorporating those standards. Both standards were incorporated in Microsoft's Xbox video game console; the H.264 standard was also incorporated into Microsoft's Windows operating system. That the patents were standard-essential was not in dispute. The following month, Microsoft brought a diversity action against Motorola in the Western District of Washington alleging that by sending the two offer letters, Motorola had violated its commitment to license its patents on RAND terms. Although Motorola's commitment was to IEEE and ITU, Microsoft brought the breach of contract claim as a third-party beneficiary of that commitment. Motorola also filed a patent infringement action with the International Trade Commission (ITC), seeking to enjoin Microsoft from importing the Xbox into the United States, and filed suit in Germany seeking to enjoin Microsoft's sales of H.264-compliant products. German action was particularly threatening to Microsoft, as its European distribution center for all Windows and Xbox products was in Germany. In response, Microsoft relocated its distribution center to the Netherlands to protect itself against the possible economic loss it would suffer if the German court were to issue an injunction. It also sought (and obtained) an order from the district court enjoining Motorola from enforcing any injunction issued by the German court.

After holding a bench trial, Judge Robart issued on 25 April 2013 a 207-page opinion on FRAND issues (cited as Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 (W.D. Wash.)). He determined that the RAND rate for Motorola's H.264 patent portfolio was 0.555 cents per end-product unit (with un upper bound of about 16 cents a unit), and that the RAND rate for its 802.11 patents was 3.71 cents per end-product unit (with a range of 0.8 cents to 19.5 cents per unit). Both rates were much lower than the approximately $4 per unit Motorola had sought in its offer letters. The case then proceeded to a jury trial on the breach of contract claim. The jury returned a verdict in favor of Microsoft finding that Motorola had breached its duty of good faith and fair dealing, and awarded Microsoft damages in the amount of $14.52 million, all but $3 million of which was for the cost of relocating its distribution center from Germany to the Netherlands.

[28] *Microsoft Corp. v Motorola, Inc.*, 854 F. Supp. 2d 993 (W.D. Wash. 2012).

On appeal, the Ninth Circuit Court of Appeals affirmed Judge Robart's determination of the RAND rates for each of the two sets of SEPs at issue in the case, and upheld both the jury's and Judge Robart's decisions. With this decision, the Ninth Circuit was the First Appeals Court to Rule on FRAND/SEP Licensing.

The analysis of the timing of the hypothetical negotiation concerning a FRAND license is related to the role of FRAND in preventing patent hold-up. The risk of patent hold-up arises from the possibility that a patent owner increases royalty requests after the standard is set. This risk can be avoided by setting the date of the hypothetical negotiation prior to the adoption of the standard. There is however no general rule that the date of a hypothetical negotiation must be set prior to the date of standard adoption. As the Federal Circuit points out in *Ericsson v. D-Link*, the implementer needs to provide evidence on hold-up in order for the court to adapt the consideration of the timing.[29] In *Apple v. Motorola*, Judge Posner deems the date of the hypothetical negotiation to be the date on which the patent became essential to the standard, rather than the date of first infringement.[30] This sets the hypothetical exercise at the time when the patent was embodied in the standard (ex ante) and not afterwards (ex post).

Apple, Inc. v. Motorola Mobility, Inc., 869 F. Supp.2d 901, U.S. District Court, N.D. Illinois (2012); Apple Inc. v. Motorola, Inc., 757 F.3d 1286 (Fed. Cir. 2014)

The case involved Apple's patents covering heuristics for touch screen commands and a real-time data processing system (live audio and video streaming) as well as Motorola's patent related to a method of cellular communication. For the calculation of damages, Apple's expert attempted to value certain asserted patent claims relating to heuristics for touch screen commands such as vertical scrolling and tap-for-next-page commands.

In lack of data to support the value of those precise features, the expert relied on data valuing a laptop touchpad, asserting that a laptop touchpad was sufficiently technically comparable to a smart phone touch screen to provide relevant evidence of value. Also, the expert discounted the touchpad price for certain features that were not related to the patent, such as its wireless capability. He compared this estimate with royalties paid by Motorola for related touch screen technology and rationalized the differences. With regards to the patent related to live audio and video streaming, Apple's expert estimated the value of its features by estimating the cost of non-infringing alternatives Motorola could have used to design around Apple's patent. The first involved redesigning a microchip already in its phones and requiring application providers to re-design their applications. The second involved replacing the existing chip or adding a new chip. Deeming the first alternative to lack certain practical advantages, the expert relied on one of Apple's technical expert witnesses to identify the replacement chip and estimate its cost to Motorola.

In its summary decision, the district court did not define a FRAND rate and dismissed the case on the grounds that there was no evidence of damages. Judge

[29] *Ericsson v D- Link,* 773 F.3d 1201 (Fed. Cir. 2014).
[30] *Apple, Inc. v Motorola Mobility, Inc.,* 869 F. Supp.2d 901, U.S. District Court, N.D. Illinois (2012).

Posner rejected Motorola's request to enjoin Apple from practicing FRAND-encumbered SEPs owned by Motorola.

On appeal, the Federal Circuit reversed in part the district court's ruling. The appellate decision addressed the injunction issue, but not the level of a FRAND-compliant royalty. The appellate court held that requests for injunctive relief should be evaluated under the framework applicable to injunctive relief in general patent cases based on the Supreme Court's decision in *eBay Inc. v. MercExchange* (2006). Nevertheless, the Federal Circuit affirmed the denial of injunctive relief to Motorola: Through its FRAND commitments, Motorola had agreed to add many market participants that would be willing to pay a FRAND royalty. Dissenting Judge Rader was unconvinced that Apple sufficiently proved its efforts towards negotiating a FRAND license.

This approach is in line with economic considerations suggesting that, to avoid hold-up, the correct date should be the date on which the standard was adopted. For cases involving multiple patents, the Federal Circuit held in *LaserDynamics v. Quanta Computer* that, in each case, there should be only a single hypothetical negotiation date - not separate dates for separate acts of infringement.[31] This goes to the issue whether non-infringing alternatives may include alternatives available at the time that the standard was adopted. According to *In re Innovatio,* the existence of patented alternatives should be considered, but not to drive down the price as much as alternatives in the public domain (reject economic models where competing patent owners price at incremental value over the next-best alternative). Consideration of available alternatives should be limited to the options discussed in the SSO: the court will assume that technology that did not even merit a mention by the IEEE in its deliberations about the standard was not likely to have been a serious contender for adoption into the standard.[32]

In re Innovatio IP Ventures, LLC , 921 F. Supp. 2d 903, (N.D. Ill. 2013)

In re Innovatio stands out as a landmark US case in field of standard-essential patents. It addresses a wide range of issues, from hold-up and incentive compatibility over to the royalty and the overarching principles of FRAND (ex ante negotiation and incremental value).

Innovatio IP Ventures, LLC, a patent assertion entity, sued numerous coffee shops, hotels, restaurants, supermarkets, large retailers, transportation companies and other commercial users of wireless internet technology located throughout the United States, for infringing its portfolio of 19 patents essential to the IEEE 802.11 (WiFi) standard. Reportedly, Innovatio sought royalties in the range of $2500-3000 from each outlet for a license to the patents. Innovatio also began filing patent infringement suits in a variety of federal courts against entities that did not take a license. At the same time, at least five major suppliers of WiFi equipment filed declaratory judgment actions against Innovatio seeking declarations of invalidity and non-infringement of Innovatio's patents. The Joint Panel on Multi-District Litigation (JPML) consolidated these actions for pre-trial proceedings before Judge Holderman in the Northern District of Illinois.

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

32 So Judge Holderman in In *re Innovatio IP Ventures, LLC Patent Litig.*, MDL No. 2303, 2013 WL 5593609, at *20 (N.D. Ill. Oct. 3, 2013) Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

Judge Holderman ruled that all of Innovatio's asserted claims in nineteen (19) of its patents were essential to the 802.11 standard and Innovatio was required to license them on RAND terms based on the prior assurances to IEEE. Thereafter, the parties agreed to a bench trial on the issue of damages in order to assess prospects for early settlement before incurring the expense of a liability trial. Judge Holderman held a six-day bench trial to determine the RAND rate to be applied to manufacturers of WiFi equipment (.56 cents per WiFi chip). Judge Holderman did not consider the RAND rate that should be applied to users of WiFi equipment.

In Europe, Justice Floyd formalized the "ex ante" approach during a hearing dated 6 December 2012 in the case *Nokia v. IPCom* (Lundie Smith, 2013):

"…in the case of a patent which is essential to a standard, it is appropriate to enquire into what license terms would have been agreed between a willing licensor and a willing licensee on the basis of the invention which the patent protects but without knowledge that the patent will be incorporated into the standard. The reason that that is said to be relevant is because the patent forces companies who wish to participate in the standard to make use of it. That fact alone may skew the appropriate royalty rate, which has to be paid. The approach is called the "ex ante" approach to the settling of the terms because it is based on the assumption that the terms are being agreed before the standardization has taken place."

IPCom, Nokia and HTC are on a litigation streak since Floyd J held IPCom's patent in suit infringed by two Nokia devices. [33] IPCom sued both Nokia and HTC on the same patent in separate proceedings, but the parties decided to have their cases heard in a joint trial on the issues of damages as well as on the determination of licensing terms. The "ex ante" approach was reflected in the following issues raised by Nokia and HTC's: i) whether the invention of the patent has been actually used in the UK and if so to what extent, ii) whether other methods of controlling access existed and if so the technical consequences of their use, and iii) the technical behavior of ways of designing around the patent, which at least as between Nokia and IPCom have been held not to infringe. These issues were said to require the input of a technical expert. The judge agreed to adduce evidence from a technical expert and comparable licenses, but shortly before the hearing due January 2013, Nokia and IPCom announced that they were close to a settlement and they invited the court to delay determining a FRAND royalty. [34] Meanwhile, IPCom and HTC have returned to the courts and the Patents Court has already handed down a first judgment concerning issues of validity, infringement and essentiality. [35]

3.2.1.2. Georgia-Pacific factors

The construct of "hypothetical negotiation between a willing licensor and willing licensee on the eve of the infringement", where a "next best non-infringing alternative" is available to the willing licensee, constitutes the theoretical underpinning of the so-called Georgia-Pacific framework. This framework arose from the seminal *Georgia-Pacific Corp. v. United States Plywood Corp*., 318 F.

[33] *IPCom v Nokia,* [2011] EWHC 1470 (Pat).
[34] Cf. case report prior to settlement by Smith, 2013.
[35] UK High Court, Patents Court, Decision of 24 April 2015, *IPCom GmbH & Co Kg v HTC Europe Co Ltd & Ors* [2015] EWHC 1034 (Pat).

Supp. 1116, 1119-20 (S.D.N.Y. 1970), modified and aff'd, 446 F.2d 295 (2d Cir.) and was conceived as an evidentiary list of 15 factors for the assessment of patent damages:

1. Royalties patentee receives for licensing the patent in suit
2. Rates licensee pays for use of other comparable to the patent in suit
3. Nature and scope of license in terms of exclusivity and territory/customer restrictions
4. Licensor's established policy and marketing program to maintain patent monopoly by not licensing others to use the invention
5. Commercial relationship between licensor and licensee, such as whether they are competitors or inventor and promoter
6. Effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales
7. Duration of patent and term of license
8. Established profitability of the products made under the patent, its commercial success and its current popularity
9. Utility and advantages of patent property over old modes and devices
10. The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefit of those who have used the invention
11. The extent to which the infringer has made use of the invention and the value of such use
12. The portion of profit or selling price customarily allowed for the use of the invention
13. The portion of realizable profit attributable to the invention as distinguished from non- patented elements, significant features/improvements added by the infringer, the manufacturing process or business risks
14. Opinion testimony of qualified experts
15. Outcome from hypothetical arm's length negotiation at the time of infringement began

Covering a wide range of aspects related to the nature of licensing negotiations and the surrounding market conditions, the factors include considerations relating to past technology agreements (factors 1, 2), the nature, scope, and duration of the license (factors 3, 7), licensing policy (factor 4), commercial relationship between the licensor and licensee (factor 5), sales of non-patented items (factor 6), sales and profits (factors 8, 11), contribution of the patented technology (factors 9, 10, 12, 13), opinions of qualified experts (factor 14), and the amount that a licensor and licensee would have agreed to in a hypothetical negotiation for a license to the patent-in-suit (factor 15). In the context of expert testimony, each factor is commonly assigned an "up," "down," or "neutral" score - "up" raises the royalty whereas "down" lowers it.

Having provided this non-exhaustive - albeit comprehensive - list of evidentiary considerations, Judge Tenney explained that the manner and extent to which the different factors would be considered was left to the discretion of the fact finder.[36] Hence, the Georgia-Pacific factors were not intended as a test or formula for

[36] *Georgia-Pacific Corp. v United States Plywood Corp*., 318 F. Supp. 1116 at 1120-1121 (S.D.N.Y. 1970).

resolving patent damages, but as a replicable methodology, which allows for flexibility and modifications relevant to the case.

For the last three decades and since the creation of the Federal Circuit in 1982, the Georgia Pacific framework has become the preferred way to compute a reasonable royalty. These factors have been routinely cited by U.S. courts when assessing "reasonable royalty" patent damages and have been advanced as a viable analytical framework for assessing FRAND damages. Grounded in a reasonableness inquiry, these factors are instructive in identifying the quantitative value and normative goals of fair, reasonable, and non-discriminatory royalty rates. Some factors affect the determination of the bargaining range (Factors 1,2, 4, 5, 6, 7, 8, 9, 11, 12, 13); other factors (Factors, 3 and 10) affect the determination of the point royalty within the bargaining range. In other words, the result enables an evidentiary process that will determine a licensor's minimum willingness to accept and a licensee's maximum willingness to pay for the patented technology – the lower and upper bounds of the bargaining range. The ultimate outcome of the Georgia-Pacific framework should divide the surplus between the licensor and licensee according to their relative bargaining power.

In recent case law, the hypothetical negotiation construct has faced some criticism. Some of the concerns regard the vague character of the fifteen Georgia-Pacific factors and the risk of letting them develop into a mandatory checklist for every case. In other words, the said framework poses many potentially relevant questions but does not say how the finder of fact should weight the answers.

In *CSIRO v. Cisco*[37], the Federal Circuit affirmed that the calculations of FRAND rates must discount the royalty for the value accrued through inclusion of the patent into the standard – a requirement non-applicable to other reasonable royalty cases. According to the court, FRAND determination thus entails apportionment going beyond the apportionment that is generally required for reasonable royalty calculations. Applying the Georgia Pacific factors for the calculation of SEP royalty rates may thus not be enough. In this respect, the Federal Circuit did not restrict the relevance of additional apportionment requirement to FRAND-encumbered patents, but extended it to all SEPs.

The utility and economic accuracy of the Georgia-Pacific factors in the RAND context have been questioned further in *Apple v. Motorola*.[38] Reluctant to apply the Georgia-Pacific construct in the specific case, Judge Posner recognized that some factors cover a number of legitimate elements that any fact-based, data-driven assessment of royalties (in or out of FRAND contexts) should take into consideration. For example, the nature and scope of the license (Factor 3) is typically important to valuation: broader rights (more relevant jurisdictions covered or more standards included, for instance) provide more value to the licensee and hence can command higher rates. And other licenses covering the SEPs at issue (Factor 1) can provide market-based data points for how parties actually operating in the industry value the patents-in-suit.[39]

Despite scrutiny, the Georgia-Pacific-Factors construct is not discredited, but continues to provide guidance – albeit to a limited extent. Noteworthy in this direction is the case *Microsoft v. Motorola*. In the first detailed judicial determination of FRAND royalty rates for the 802.11 and H.264 WiFi technology standards, Judge Robart considered the Georgia-Pacific factors as a useful

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37 *CSIRO v Cisco*, 809 F. 3d 1295 (Fed. Cir. Dec. 3, 2015).

38 *Apple, Inc. v Motorola, Inc*., 869 F. Supp. 2d 901 at 911 (N.D. Ill. 2012), affirmed and revised in part by *Apple Inc. v Motorola*, Inc., 757 F.3d 1286 (Fed. Cir. 2014).

39 *Apple, Inc. v Motorola Mobility, Inc.,* 869 F. Supp.2d 901, U.S. District Court, N.D. Illinois (2012).

starting point, and in particular determined the royalty calculations based upon an analysis of the outcome of a hypothetical negotiation. He nevertheless found that many of the Georgia-Pacific factors are contrary to RAND principles. For example, factor four - "[…] the licensor's established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly" - is contrary to the RAND purpose of preventing monopolies. The judge went on to apply the Georgia-Pacific methodology with some significant modifications to account for the circumstances of the RAND commitment and the incremental value of allegedly infringed patents to the overall product offering. In the case at issue, Judge Robart set a judicial example by applying legal-contractual principles to the economic arrangements framing the parties' licensing negotiations. By treating the RAND obligation as a contract, the court adopted an extensive set of legal and analytic principles to deploy in pursuit of a reasonable term[40]:

1. the rates received by the licensor in a patent pool;
2. the rates paid by the licensee for the use of other patents comparable to the patent in suit;
3. the nature and scope of the license;
4. the contribution of the patent to the standard ("Microsoft factor 6") and the contribution of the standard to the product;
5. alternatives to the current patented technology;
6. evidence of the benefit and value of the patent to the owner and implementer;
7. the customary practices of business licensing RAND-encumbered patents, which exclude non-RAND patents; and
8. the impact of the SEP holder's obligation to license its SEPs on RAND terms to avoid hold-up and royalty stacking on what a licensor and licensee would typically have agreed upon in reaching an agreement voluntarily.

The above "modified" version of the Georgia-Pacific factors (also called "contract-law model") stands out as the first effective judicial approach to RAND commitments. It offers a reliable, workable framework to the extent that it takes into account a number of quantitative and qualitative indicators in order to assess the totality of the circumstances surrounding the licensing negotiations. Albeit systematic enough to be extrapolated to other cases, Judge Robart's approach raises interpretative challenges insofar as his ultimate royalty calculation does not favor SEP holders or does not provide adequate compensation in the context of good-faith offers by SEP holders. It has thus been subject to the same criticism as the broader Georgia-Pacific framework it is embedded in (see, e.g., Sidak, 2013; Beach, 2016; Teece & Sherry, 2016).

Motorola filed an appeal against the district court decision, in particular because of the judge's failure to implement the typically cited Georgia-Pacific factors. The Court of Appeal upheld Robart's methodology, thereby clearly limiting the role of the Georgia-Pacific factors for FRAND determinations – a position it reaffirmed later in *Ericsson v. D-Link*.

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[40] *Microsoft Corp. v Motorola, Inc.*, No. C10-1823JLR, 2013 WL 2111217, at *54–65 (W.D. Wash. Apr. 25, 2013). The reference is to the Order of Findings of Fact and Conclusions of Law by Judge James L. Robart, April 25, 2013, No. 10-cv-1823 (W.D. Wash.).

Ericsson v. D- Link, 773 F.3d 1201 (Fed. Cir. 2014)

Ericsson sued D-Link and others in E.D. Texas for infringing patents alleged to be essential to the IEEE 802.11(n) WiFi standard. Intel, who supplied the WiFi chip for the products, intervened. The U.S. District Court for the Eastern District of Texas found D-Link liable for infringement of Ericsson's SEPs related to IEEE 802.11 standard-related technologies and had assessed damages at US$0.15 per infringing device.

On appeal, the Federal Circuit upheld the judgment of infringement but vacated the damages assessment and remanded the case back to the District Court for further proceedings. In doing so, the Federal Circuit noted a number of factors relating how damages should be assessed. Whereas the issues of validity, infringement, and damages were addressed in the jury trial, SEP-specific issues, incl. royalty stacking and Ericsson's entitlement to injunctive relief were left to presiding Judge Davis to decide.

This is a significant decision given its impact on patent damages in general, i.e., clarification on the entire market value rule and the applicability of the Georgia-Pacific factors, as well as the specific impact in litigating royalties for RAND-encumbered patents.

While previous case law insisted on the necessary modifications to the Georgia-Pacific factors in order to account for FRAND commitments, the Federal Circuit decision of 2014 in *Ericsson v. D-Link* went a step further to question the relevance of Georgia Pacific as a starting point for FRAND determination[41]:

"Although we have never described the Georgia-Pacific factors as a talisman for royalty rate calculations, district courts regularly turn to this 15-factor list when fashioning their jury instructions. Indeed, courts often parrot all 15 factors to the jury, even if some of those factors clearly are not relevant to the case at hand. And, often, damages experts resort to the factors to justify urging an increase or a decrease in a royalty calculation, with little explanation as to why they do so, and little reference to the facts of record.[…] We believe it is unwise to create a new set of Georgia-Pacific-like factors for all cases involving RAND-encumbered patents. Although we recognize the desire for bright line rules and the need for district courts to start somewhere, courts must consider the facts of record when instructing the jury and should avoid rote reference to any particular damages formula."

According to the Federal Circuit, the district court's application of the Georgia-Pacific framework in the particular case had led to an erroneous increased royalty award, because the said framework did not account for essentiality. In addition to the implications of essentiality for the royalty analysis, the Federal Circuit held that the trial courts should also consider the patentee's actual FRAND commitment, i.e., the precise language on licensing terms to which the patentee commits. The court did not propose a modified version of the Georgia-Pacific framework, but did highlight the necessity of tailoring the said framework – and any method for determining a reasonable royalty - to the relevant technology and facts of the case. Among others, it questioned inter alia the relevance of Factor 5 ("[…] the commercial relationship between the licensor and licensee"–is irrelevant because Ericsson must offer licenses at a non-discriminatory rate), Factor 8 ("it

[41] *Ericsson v D- Link,* 773 F.3d 1201 at 1235 ff. (Fed. Cir. 2014).

accounts for an invention's 'current popularity', which is likely inflated because a standard requires the use of the technology") and Factor 10 (" […] considers the commercial embodiment of the licensor, which is also irrelevant as the standard requires the use of the technology").[42]

3.2.1.3. Ex ante benchmarks v. ex post considerations?

In order to evaluate and consolidate the information relevant to the Georgia-Pacific factors, US courts require that the expert testimony on patent damages be employed in a coherent, rigorous and replicable economic methodology. They do not consider the parties' quantitative evidence uncritically, but rather engage in a probative inquiry into the value of expert witness testimony and other numerical conclusions.[43]

In the context of hypothetical negotiations, for instance, bargaining theories constitute inadmissible expert testimony if not adequately related to the facts of the case. Specifically, in *VirnetX v. Cisco Systems*, the Federal Circuit criticized an expert's use of the "Nash-bargaining solution" to calculate a reasonable royalty.[44] According to Nash's theory, the bargaining parties would jointly maximize the product of the surpluses generated by a successful bargain. The proposed the 50-50 split was rejected as too detached from the facts of the case. Similarly, in *Uniloc v. Microsoft*, the court ruled that the proposed 25/75 split or so-called "25 percent rule of thumb" is a fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation because it failed to tie a reasonable royalty base to the facts of the case at issue.[45]

Although the ex ante benchmark of the hypothetical negotiation has become the touchstone for patent damages law in the United States, the ex ante paradigm is scrutinized for being out of step with modern technology and licensing practices that typically involve multi-component and cross-licensing of large portfolios (Lee et al. 2016; Belgum 2014). In *Microsoft v. Motorola*, Judge Robart noted that there are practical difficulties in actually doing an ex ante analysis, not the least of which is the fact that SSOs do not actually conduct those kinds of negotiations as part of the standard setting process.[46] Courts have therefore allowed ex post considerations to factor into their analysis.

Against this background, Lee et al. (2016) argue that the hypothetical negotiation has been "contaminated" with ex post considerations such as ex post valuations and lock-in costs. Even certain Georgia-Pacific factors related to comparable licenses and ex post valuation of the patent have been regarded as responsible for the trend: The use of ex post information encompassed by these factors tends to overcompensate the patent holder due to the confluence of two elements. First, patent holders are more likely to assert patents when they claim technologies used in commercially valuable products than when the products in which they are used have little value. Second, just as royalties agreed to ex post are likely to be larger than those agreed to ex ante, so the Georgia-Pacific factors imply greater value at a later time, when the commercial prospects of the

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42 *Ericsson v D- Link,* 773 F.3d 1201 at 1230-1231 (Fed. Cir. 2014).

43 In detail, *Georgia-Pacific Corp. v United States Plywood Corp*., 318 F. Supp. 1116 at 1127-1228 (S.D.N.Y. 1970).

44 *VirnetX, Inc.v. Cisco Systems, Inc.*, 767 F.3d 1308 (Fed. Cir. 2014).

45 *Uniloc USA, Inc. and Uniloc Singapore Private Limited v Microsoft Corp*., 632 F. 3d 1295 (Fed. Cir. 2011).

46 *Microsoft Corp. v Motorola, Inc.*, Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 at para 77 (W.D. Wash.).

products using the patented technology seem assured, than ex ante, when the commercial prospects are uncertain.

Whether the continued reliance on the hypothetical negotiation construct of the Georgia-Pacific factors is likely to achieve the ultimate goal of reasonable royalty damages - namely, to provide the patent holder with fair and adequate compensation for the unauthorized use of a patented invention – is equally questioned by scholars:

According to Layne-Farrar and Wong-Ervin (2014), merely invoking the name "Georgia Pacific" is not enough for a pass: the factors should be used with available data, the comparability of licenses should be defended, and all calculations should be explained.

Geradin (2014) cautions against potential pitfalls of applying the Georgia-Pacific framework, given that that licensing agreements are often "highly relationship-specific and thus agreements will be hard to compare." Geradin discusses the practice of comparing the rate offered ex post standardization by SEP holders with the rate offered for the same patents ex ante standardization. Though many are inclined to treat the ex ante rate as a "safe harbor" against any claim of opportunism, Geradin finds that there is little reason why licensors should be prohibited from charging higher rates ex post than ex ante. Not only may ex post contracts be more efficient in the way they incorporate a clearer understanding of the technology and the market, but also forcing SEP holders to charge similar ex ante and ex post rates deprives SEP holders of giving preferential terms to early adopters of their technology.

Jarosz and Chapman (2013) argue that the use of the hypothetical negotiation construct introduces unnecessary and unproductive questions and conflict into the determination of reasonable royalty damages. Their first concern is that the said construct tends to frame the problem of patent infringement as a contracting problem by suggesting that infringement is the result of failed negotiations and that the solution is the retroactive negotiation of such a contract, under appropriate assumptions. The second caveat is that the circumstances of a real-world negotiation and a hypothetical negotiation differ in that many of the uncertainties and motivations that drive real-world negotiations simply do not exist in a hypothetical negotiation. Effectively, the evolution of the reasonable royalty damages along the lines of the Georgia-Pacific factors has reversed the proper relationship between damages and tools to estimate those damages. As an alternative, Jarosz and Chapman propose an asset valuation approach based on a direct and objective assessment of a patent's 1) incremental benefits, 2) licensing comparables, and 3) design-around costs, considering all relevant evidence. Their approach promises to eliminate the distractions and distortions that consideration of a hypothetical bargaining process can introduce while remaining consistent with the original purpose of reasonable royalty damages, the fundamental teachings of Georgia-Pacific, and the recent line of cases on reasonable royalties.

3.2.2. Evaluating the parties' conduct in the context of injunctions

The question of availability of injunctive relief has a powerful incentive-related impact on the bargaining positions of the parties. The various jurisdictions have approached the issue of injunctions in the SEP context in different ways. In particular, courts and antitrust authorities have focused on the scenario where, typically after efforts to conclude a license fail, the SEP owner seeks to enforce its patent rights by filing an infringement claim that includes a request for an injunction as a remedy. In this context, questions arise whether injunctive relief is a legitimate remedy for patent infringement in major jurisdictions; whether

availability of injunctive relief is subject to certain limitations; what defines a "willing licensee" under specific circumstances; whether seeking an injunctive relief could amount to a violation of competition law.

3.2.2.1. Legitimacy of injunctive relief and the concept of the "willing licensee"

In its seminal decision *Huawei v. ZTE*, rendered on 16 July 2015, the Court of Justice of the European Union (CJEU) provided a framework for the negotiation dynamics between the prospective licensor and licensee in cases where they are competitors and the licensor holds a dominant market position[47]:

First, it is up to the SEP holder to alert the alleged infringer by specifying the patent and the way it has been or is being infringed.

Second, if the alleged infringer has expressed a willingness to conclude a license agreement on FRAND terms, the SEP holder must present a specific, written offer for a license on FRAND terms to the alleged infringer. This offer should specify, in particular, the royalty and the way in which it is calculated.

Third, the alleged infringer must diligently respond in good faith to the offer made by the SEP holder, and observe recognized commercial practices in the sector. Good faith must be established on the basis of objective factors and implies that there should be no delaying tactics. If the alleged infringer does not accept the initial offer, it must promptly submit a written counteroffer on FRAND terms to the SEP holder. If the SEP holder rejects the counteroffer, the alleged infringer should provide appropriate security for the payment of royalties and render accounts of its past and current use of the SEP in question.

Court of Justice of the European Union, Case C-170/13, Decision of 16 July 2015, Huawei Technologies Co. Ltd v. ZTE Corp., ZTE Deutschland GmbH

The background for the decision is a request for a preliminary ruling by the Düsseldorf District Court concerning the availability of remedies (primarily, but not only injunctive relief) to holders of FRAND-committed SEPs prevailing in patent infringement actions. The court referred five questions to the CJEU owing to the divergent approaches being taken by German courts and the European Commission (in its press release of 21 December 2012 announcing the Statement of Objections against Samsung) on the conditions under which a claim for injunctive relief for FRAND-encumbered SEPs can be sought and enforced without infringing EU competition law:

The first question referred by the German court to the CJEU focuses on whether the principles in the Orange-Book case are to be applied, or whether it is sufficient for the potential licensee to be willing to negotiate a license on FRAND terms in order to avoid injunctive relief.

The second question focuses on what is needed for a potential licensee to be regarded as a "willing licensee", in particular, whether there are specific requirements for said willingness to negotiate in substantive and/or chronological terms.

[47] CJEU, Case C-170/13, Decision of 16 July 2015, *Huawei Technologies Co. Ltd v ZTE Corp., ZTE Deutschland GmbH.*

The third question focuses on whether there are requirements to the offer to be made (e.g., does the offer have to set forth all of the commercial terms? Can the offer be conditioned upon actual use and/or validity of the SEP?

In the fourth question, the Düsseldorf court has requested clarification on whether there are particular requirements with respect to a pre-contractual fulfilment of obligations arising from the requested license (e.g., does the potential licensee have to pay pre-contractual royalties? Can an obligation to pay pre-contractual royalties also be fulfilled by giving security payment or putting money into escrow?).

The fifth question, is asking whether the presumption of abuse of a dominant market position by an owner of an SEP also applies to other remedies for patent infringement (rendering of accounts, recall of infringing products from distribution channels, damages).

In essence, the Düsseldorf District court is asking the CJEU whether the requirements established by the German Federal Supreme Court in the so-called "Orange Book Standard case" are in compliance with Article 102 of the Treaty on the Functioning of the European Union (TFEU). It is important to note that, at the time of the referral, the European Commission was also investigating a possible abuse by way of asserting SEPs in two parallel proceedings, which ultimately resulted in the Commission's decisions in the cases of Samsung and Motorola, respectively.

Specifically, the CJEU decided that the following conditions must be satisfied before a dominant SEP licensor can validly bring an injunction against a party infringing an SEP, without acting contrary to Article 102 TFEU:

1) Response to a FRAND offer: The SEP holder must present to the alleged infringer a specific, written offer for a license on FRAND terms, in accordance with the undertaking given to the relevant standardization body. In particular, this written offer must specify the amount of the royalty and the way in which that royalty is to be calculated. If the alleged infringer is deemed to be using delaying tactics once a FRAND offer has been presented by the SEP holder, e.g., if the alleged infringer causes any undue delays in the negotiations, this may point towards its "unwillingness" to license and prevent it from using Article 102 TFEU in a counterclaim against the SEP holder. The CJEU judgment also states that the alleged infringer "cannot be criticized" for challenging the validity of the SEP and/or its essential nature. If the alleged infringer wishes to submit a counter-offer, it must do so promptly and in writing, and in compliance with FRAND terms. If the alleged infringer continues to use the patent in question and has not diligently responded -either by accepting the FRAND offer or by submitting a FRAND counter-offer -, the SEP holder may seek an injunction stopping the infringement or seek the recall of products made using the SEP without risking Article 102 TFEU scrutiny.
2) Security: According to the CJEU, if the alleged infringer has already been using the SEP without a license, it must provide appropriate security, e.g., though a bank guarantee or the placing of funds in a deposit account, from the point at which the counter-offer is rejected. If the parties are unable to agree bilaterally on the details of the FRAND terms following the counter-offer by the alleged infringer, the parties "may" request that the amount of the royalty be determined by an independent third party.

In essence, the CJEU embraced the guidance of the Advocate General: The SEP-holder should: i) alert the implementer in writing, with reasons, specifying the

alleged infringement of the relevant SEP before commencing proceedings; and ii) present the implementer with a written license offer on FRAND terms, specifying all relevant terms including the royalty. In return, the implementer "must respond in a diligent and serious manner" to the offer and, if it disagrees with the offer, must "promptly" submit a reasonable counter-offer. A "purely tactical and/or dilatory and/or not serious" conduct would be deemed insufficient.

The above framework within which the SEP-holder and infringer must negotiate for the infringer to avoid the risk of injunctive relief is intended to strike a balance between the SEP-holder's rights to intellectual property and access to the courts on the one hand, and the implementer's freedom to conduct business and undistorted competition on the other. In this sense, the CJEU promotes diligent bilateral negotiation as the means of reaching a FRAND agreement. Hence, emphasis is added to diligence and timeliness on the part of the alleged infringer. In order to avoid injunctions, an infringer must demonstrate that it is objectively ready, willing and able to conclude such a licensing agreement by acting promptly, diligently, in good faith and in accordance with recognized commercial practices in the field to obtain necessary FRAND licenses. Furthermore, a potential licensee who challenges validity, essentiality, or infringement is not per se unwilling.

The *Huawei v. ZTE* ruling reflects the European Commission's earlier efforts in the Samsung and Motorola Mobility cases to create a pro-licensee "safe harbor" from SEP injunctions, under which a licensee can show that it is "willing" by agreeing that a court or an arbitrator shall determine the FRAND terms in case the parties fail to do so bilaterally. The rationale here is that a licensee acting in good faith should be protected against a dominant SEP holder may be abusing its position of dominance by preventing other companies from entering the market. Although - the legitimacy of the injunction reaffirmed - the SEP holder maintains its right to seek injunctive relief, recourse to injunctive relief against a willing licensee may amount to an abuse of a dominant position according to Article 102 TFEU. Although the CJEU does not specify the criteria for determining "willingness" within the context of injunctions, it does make clear through the above "ping-pong" that both sides have to take concrete steps before injunctions can be enforced.

It is thus left to the national courts to decide on the exact criteria of "willingness" and on a case-by-case basis. An abuse of dominance could be established after examining the conduct of both the SEP-holder and the implementer.

3.2.2.2. Assessing abusive conduct in German case law post-*Huawei v. ZTE*

German patent law does not provide a basis for an infringer to avoid an injunction based on a FRAND defense. This is why the FRAND defense is also referred to as a "compulsory license defense". Some jurisdictions, but not all, allow a defendant/implementer in patent infringement proceedings to raise an "antitrust defense", claiming that an injunction based on patent infringement is unwarranted as the SEP holder would be required, under competition law, to grant a (compulsory) license to the implementer on FRAND terms. Such an antitrust defense is available under the so-called "Orange Book" case law, but only if a number of conditions are fulfilled.

According to the case law of the German Federal Supreme Court [48], the enforcement of the claim to an injunction constitutes an abuse of a dominant market position and breach of good faith, if the prospective licensee made a binding, unconditional offer to conclude a license on customary terms. Such offer cannot be rejected by the patentee without violating competition law, and provided that the potential licensee behaves as if licensed. The defendant's "dolo-petit plea" based on antitrust law will only be successful if he is a "willing licensee" acting in good faith. This requires the following conditions to be cumulatively met:

- An offer that the patentee must not reject. The party seeking a license must have made, and remain bound by, an unconditional offer to conclude a license contract, which cannot be rejected by the patentee without infringing antitrust law. The offer has to be serious, i.e., include concrete terms and conditions, and be ready for acceptance. An offer to conclude a license agreement, subject to the condition that the court holds for infringement, is not unconditional and therefore not sufficient.[49]
- A license seeking party that acts like a licensee. The defendant has to behave as if the license had already been granted. If the party seeking a license has already started to use the subject matter of the patent before the patent holder has accepted the offer, the prospective licensee must then comply with those obligations that the license contract to be concluded imposes on the use of the licensed subject matter and anticipate its duties under the agreement.

Following the strict Orange Book standard, German courts have traditionally taken a more favorable position towards the patentee, ruling that an alleged infringer can be subject to an injunction even if willing to take a license, unless it has conducted itself in every way as a dutiful licensee should do, including paying royalties (into escrow if necessary) and abiding by other terms of a regular commercial license.[50] Prior, to the CJEU decision in *Huawei v. ZTE*, the FRAND defense had only been successfully tested in two known cases before the Mannheim District Court.[51]

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[48] German Federal Court of Justice, Decision of May 6, 2009, Case no. KZR 39/06 – *Orange Book*.

[49] The *Orange Book* decision of the German Federal Supreme Court (Bundesgerichtshof) is silent on the question whether the potential licensee would still be able to challenge the validity or essentiality of the SEP in question. While the Orange Book Standard does not exclude such a possibility, some first instance courts have decided that a successful FRAND defense would require the potential licensee to waive its validity and/or essentiality challenge; see, e.g., Mannheim District Court, Decision of 9 December 2011 - *Motorola v Apple*. Later, the Court of Appeal of Karlsruhe granted Apple's request to preliminarily stop the enforcement of the first instance judgment after Apple amended its license offer, Karlsruhe Court of Appeal in Karlsruhe, Decision of 27 February 2012, 6 U 136/11 - *Motorola v Apple*.

[50] Within the context of FRAND litigation, the German courts granted injunctions in the following cases: Karlsruhe Court of Appeals, Decision of 27 February 2012, 6 U 136/11 - *Motorola Mobility Inc. v Apple Sales International;* Mannheim District Court, Decisions of 2 May 2012, 7 O 373/11 and 7 O 376/*1 - General Instruments Corp v Microsoft Corp. and Microsoft Deutschland GmbH;* Düsseldorf District Court, Decision of 24 April 2012, 4b O 274/10 - *IPCom v Deutsche Telekom and Vodafone;* Karlsruhe Court of Appeal, Decision of 19 February 2014, 6 U 162/13 – *ZTE v Vringo*; Karlsruhe Court of Appeal, Decision of 23 April 2015, 6 U 44/15 - *St Lawrence Communication v Deutsche Telekom.*

[51] Mannheim District Court, Decision of 9 December 2011, 7 O 122/11 - *Motorola v Apple*; Mannheim District Court, Decision of 27 May 2011, 7 O 65/10 - *Philips v Sony/Ericsson*. In the latter case, the Mannheim District Court dismissed an injunction claim on the grounds that the defendant's offer to license at a fixed royalty rate and

In the aftermath of the CJEU decision, more SEP-related proceedings that had been stayed before the district courts of Düsseldorf and Mannheim have been re-opened and, to some extent, concluded. The core question addressed in these decisions is under what circumstances a claim for injunctive relief can be seen as an abuse of dominant position and, in support of an abuse, whether the parties have fulfilled their obligations according to the guidance of the CJEU (i.e., alerting the SEP user, expressing willingness, presenting a written offer, diligently responding to the initial offer). By intentionally not specifying the notions of "willingness", "good faith" or "diligent response", the CJEU leaves a wide margin of interpretation for national courts to fill.

In the case *St. Lawrence Communication v. Vodafone*, the Düsseldorf District Court sharpened the meaning of FRAND by establishing a conduct framework for the negotiation of FRAND licenses[52]:

1. Notification by the Claimant
2. Declaration of willingness to license by the Defendant
3. FRAND offer by the Claimant
4. FRAND counter-offer by the Defendant
5. Rejection of counter offer by the Claimant
6. Security and rendering of account by the Defendant, and if both agree:
7. Third-party determination of the licensing terms.

The Courts of Düsseldorf and Mannheim have further specified the above requirements as follows:

Regarding the first requirement to alert the SEP user of the alleged infringement, the Mannheim District Court recently held in *NTT v. HTC* that to fulfil this obligation the SEP-holder has to specify the patent on which the claim is based and declare that this patent is declared essential to the relevant standard.[53] Furthermore, the alleged infringer must be put in a position to understand why the SEP-holder assumes that the alleged infringer makes use of the teaching of the patent in dispute. In the court's view the SEP-holder can fulfil this obligation by providing claim charts. In the court's view it is sufficient, if the SEP-holder provides claim charts for only some exemplary patents, not for all standard-essential patents that are included in the offered license. In the above-mentioned case *St Lawrence Communication v. Vodafone*, the Düsseldorf District Court decided that the notification requirement established in *Huawei v. ZTE* must occur before the filing of the complaint but in any case before the deposit of the advance payment of the court fees is made – the latter is a requirement under German law.[54]

On the second requirement, i.e., the licensee's declaration of willingness and the promptness at which it is expressed after gaining knowledge of the alleged infringement, both courts in Düsseldorf and Mannheim held that a delay of five or

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the deposit of the calculated royalties in an escrow account validly established the FRAND defense.

52 Düsseldorf District Court, Decision of 31 March 2016, 4a O 73/14 - *St. Lawrence Communication v Vodafone.*

53 Mannheim District Court, Decision of 29 January 2016, 7 O 66/15 - *NTT DoCoMo v HTC*.

54 Düsseldorf District Court, Decision of 31 March 2016, 4a O 73/14 - *St. Lawrence Communication v Vodafone.*

three months, respectively, does not sufficiently demonstrate the willingness of the alleged infringer to take a license.[55]

Regarding the third and fourth requirements of the infringer's counteroffer in response to the SEP holder's initial offer, the district courts of Mannheim and Düsseldorf require a sufficient counteroffer by the defendant even when the initial offer is not FRAND. Specifically, the Düsseldorf District Court suggested in *Sisvel v. Haier*[56] that a defendant may not have to make a counteroffer if the SEP owner's offer was not FRAND-compliant and could, instead, require a modified, FRAND-compliant offer. However, in the case that the defendant decides to make a counteroffer, the counteroffer must comply with the Huawei v. ZTE requirements even if the SEP owner's initial offer did not. The court found that the defendants failed to meet those requirements. A similar approach was adopted by the Mannheim District Court in the case *St Lawrence Communication v. Deutsche Telekom*, in which Deutsche Telekom raised a FRAND defense in the context of injunctions based on a license offer made by HTC to St Lawrence Communication.[57] In this case, the district court held the HTC's counter-offer to be neither timely nor "specific" according to the case law in Huawei v. ZTE. In its ruling, the Mannheim court did not review St Lawrence Communication's initial offer for FRAND compliance, but was satisfied that it was sufficiently specific so as to enable HTC to make a counter-offer.

By examining whether the counter-offer passes the FRAND test first prior to questioning whether the initial offer is FRAND, the districts courts effectively shift the burden of FRAND compliance back to the defendant or lower the bar for the burden of proof carried by the SEP holder. In the aforementioned decision in *NTT v. HTC,* the Mannheim District Court held it sufficient that – on the basis of a summary examination – the license offer was not evidently in breach of the FRAND requirements. The SEP holder has merely the obligation to specify the adequate royalty rate and the basis for the calculation of the royalty rate through objective criteria so that the alleged infringer is in a position to understand why the SEP-holder is convinced that his offer is FRAND.[58]

Albeit this approach hardly surprises given the German courts' established case law on the Orange Book standard, their interpretation of FRAND does not comply with the CJEU's requirements as set out in *Huawei v. ZTE*. Most decisions reveal that the burden for a successful FRAND defense still lies entirely with the implementer.

Correcting this course, the Düsseldorf Court of Appeal stayed on 13 January 2016 the enforcement of the aforementioned judgment in *Sisvel v. Haier*, arguing that the Düsseldorf District Court had misunderstood the CJEU guidance.[59] According to the appeal court, the CJEU established a process of balancing the interests of the SEP owner with those of the alleged infringer in which every step of the process must sequentially follow the preceding step. Hence, the alleged infringer must satisfy its requirements only if the SEP owner has first met its own

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55 Dusseldorf District Court, Decision of 31 March 2016, 4a O 73/14 – *St Lawrence Communication v Vodafone;* Mannheim District Court, Decision of 27 November, 2015, 2 O 106/14, 2 O 107/14, 2 O 108/14 - *St Lawrence Communication v Deutsche Telekom*.

56 Düsseldorf District Court, Decisions of 3 November 2015 – 4a O 144/14 und 4a O 93/14 - *Sisvel v Haier.*

57 Mannheim District Court, 27 November, 2015, case nos. 2 O 106/14, 2 O 107/14, 2 O 108/14, *St Lawrence Communication v Deutsche Telekom*.

58 Mannheim District Court, Decision of 29 January 2016, 7 O 66/15 - *NTT DoCoMo v HTC.*

59 Düsseldorf Court of Appeal, Decisions of 13 January 2016 – 15 U 65/15 und 15 U 66/15 – *Sisvel v Haier.*

respective burden. The appeal court emphasizes that an injunction cannot be granted if the SEP owner fails to make a FRAND-compliant license offer after the alleged infringer has expressed its willingness to take a license on FRAND terms. The alleged infringer has no obligation to react to an offer that is not on FRAND terms. Absent such an offer by the SEP owner, the alleged infringer is under no obligation to take any of the further steps set out in Huawei v. ZTE (such as a counteroffer on FRAND terms or the provision of adequate security and accounting). The Court of Appeal has scheduled two oral hearings at the end of 2016 and beginning of 2017, respectively, in order to render a final judgment on the issue.

Despite the guidance of the Düsseldorf appellate court in *Sisvel v. Haier*, the Düsseldorf District Court left open in its recent decision in *St Lawrence Communication v. Vodafone*, the question as to whether the defendant has to respond with a counter-offer, if it cannot be determined that the SEP-proprietor's initial offer was actually FRAND. [60] In the case at hand, however, the court examined the claimant's offer and considered it FRAND, i.e., in line with established licensing practice. Subsequently, injunctions were granted and later affirmed by the Düsseldorf Court of Appeal.[61]

Finally, the German district courts have addressed the question of how quickly the counteroffer must be provided. In two cases, the respective submissions of a counteroffer six months[62] and 18 months[63] after the initial offer were deemed untimely and injunctions were granted. The courts clarified that an alleged infringer can only raise the FRAND defense if the counteroffer is made without delay taking into account the circumstances of the particular case.

The divergent views between district and appellate instances regarding the post-Huawei role of German courts in the interpretation of FRAND become more apparent in the latest case law. Specifically, the Karlsruhe Court of Appeal confirms in its decision dated 31 May 2016, that the SEP holder's initial offer should be on FRAND-terms and that it is up to the national courts to clarify those circumstances.[64] According to the court, the fact that the CJEU did not clarify the specific requirements of a FRAND-compliant license – the CJEU was not addressed with these issues in the referral in the first place - does not imply that the national courts are discharged from further clarifying FRAND. Moreover, it cannot be inferred from the CJEU decision, that the national courts should restrict themselves to a summary judgment and examine only for evident non-FRAND compliance. On the contrary, this superficial examination could not be in line with the CJEU's reference to the possibility of the parties to agree to the adjudication of a FRAND royalty rate by a third party when bilateral negotiations fail. Instead, a full and comprehensive review would be required to determine if the offer was in fact FRAND. In light of these considerations, the appellate court favors an enhanced role for courts in the definition of FRAND terms that extends beyond the restrictive interpretation of the Mannheim District Court at the first instance trial, according to which infringement proceedings should not shift into mere FRAND calculation proceedings, as this endeavor is complex and time consuming.

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60 Düsseldorf District Court, Decision of 31 March 2016, 4a O 73/14 – *St Lawrence Communication v Vodafone*; five further parallel decisions were rendered the same day (4a O 126/14, 4a O 127/14, 4a O 128/14, 4a O 129/14 and 4a O 130/14).

61 Düsseldorf Court of Appeal, Decision of 9 May 2016, I-15 U35/16, 15 U35/16 – *St Lawrence Communication v Vodafone.*

62 Düsseldorf District Court, Decision of 31 March 2016, 4a O 73/14 – *St Lawrence Communication v Vodafone.*

63 Mannheim District Court, Decision of 29 January 2016, 7 O 66/15 - *NTT DoCoMo v HTC.*

64 Karlsruhe Court of Appeal, Decision of 31 May 2016, 6 U 55/16.

3.2.2.3. Converging practice in European jurisdictions in the context of injunctions

i) The Netherlands

Unlike German practice, Dutch courts do not recognize the existence of an antitrust law defense in the context of patent infringement proceedings. Instead, they merely refer of "special circumstances" that exempt the SEP holder from obtaining an injunction. Specifically, The District Court of The Hague held in the case *Philips Electronics v. SK Kasetten* that the mere existence of an obligation to grant a FRAND license does not necessarily prevent the holder of an essential patent from enforcing its patent, including through a suit seeking injunctive relief.[65] The court found that it was the responsibility of the party seeking a license to obtain a license prior to entering the market and to initiate proceedings against the patentee if the latter were to unreasonably refuse such a license. If the potential licensee has failed to do this prior to its market entry, the patentee may then in principle enforce its essential patents, unless "special circumstances" exist. Save for exceptional circumstances, an enforcement action does not amount to an abuse of power or unlawful/unreasonable conduct of the patent holder. In the case at hand, the court ordered injunctions as SK Kasetten failed to make any offer to Philips and therefore establish the occurrence of special circumstances. The mere existence of a FRAND commitment does not provide any safeguards to implementers that infringe SEPs.

In more recent case law, Dutch courts have been more reluctant to grant injunctions automatically. In a Blu-ray standard dispute between *Sony and LG Electronics*, The Hague District Court distanced itself from the aforementioned case law in *Philips v. SK Kasetten* and considered a contractual mechanism for getting to an agreed license as sufficient to lift the interim injunction against Sony and have the seized products implementing the contested standard (Sony's Playstation 3) released.[66] The Court ordered that LG Electronics, should it wish to obtain a new leave to attach for the purpose of surrender that is based on the allegedly essential Blu-Ray patents, must serve this request on Sony before filing it with the court and state in the request that it wishes that parties be heard and that Sony be called to that hearing.

In the Dutch proceedings *Samsung v. Apple* involving the availability of injunctive relief in relation to standard-essential FRAND-encumbered patents related to 3G/UTMS technology, the District Court of The Hague did find such "special circumstances": the specific way in which Samsung acted in the negotiations - inter alia by initiating proceedings before making a first license offer and failing to respond substantively to certain counter-offers - contravened its obligations to negotiate on FRAND licenses in good faith.[67] The Court subsequently denied injunctive relief on the basis of an abuse of rights by an act contrary to pre-contractual good faith. It held that an injunction grant would put Apple under considerable pressure in the negotiation of the terms and conditions of the FRAND license. The ruling explicitly left open the question of whether Samsung's filing for the injunction could also be considered an abuse of a dominant position within the meaning of competition law. Furthermore, the court rejected the argument that a

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[65] The Hague District Court, Decision of 7 March 2010, Doc. no. 316533/HA ZA 08-2522 and 316535/HA ZA 08-2524 (joint cases) - *Philips v SK Kasetten.*

[66] The Hague District Court, Decision of 10 March 2011, Doc. no. 389067 / KG ZA 11-269 - *Sony Supply Chain Solutions (Europe) B.V. and LG Electronics, Inc.* Case reported in AIPPI Report 2011.

[67] The Hague District Court, Decisions 14 March 2012 and 20 June 2012, Doc. no. 400367/HA ZA 11-2212 - *Samsung Electronics v Apple Inc. et al.*

FRAND undertaking constitutes a license offer that an implementer could simply accept by practicing the standard; a patentee does not have to assume that every implementer wants a FRAND license, and not every implementer has to expect that it is contractually bound to the patentee by merely practicing the standard (cf. AIPPI Report 2014).

With parallel proceedings before the German and UK courts, the dispute *ZTE v. Vringo* before The Hague District Court raised the question whether ZTE's "wiling licensee defense" established special circumstances in favor of lifting a customs seizure of several shipments of ZTE goods using UMTS technology and allegedly infringing Vringo's SEP.[68] Although, as of September 2012, Vringo and ZTE had been unsuccessfully engaged in licensing negotiations regarding Vringo's SEP portfolio, Vringo made ZTE an ultimate licensing offer in June 2014, following the successful request for customs seizure. ZTE did not respond to this offer and instead initiated preliminary proceedings before the District Court of The Hague to lift the customs seizure and prohibit Vringo from effectuating further seizures on the basis of any of its SEPs. Only a month into the proceedings, did ZTE make a counteroffer to Vringo. The Court denied ZTE's claims, stating that ZTE could not be considered a willing licensee under FRAND. Moreover, according to the court, the customs seizure could not be perceived as abusive on Vringo's part. In the matter at hand, the seizure was not so much a reaction to an unsatisfactory counteroffer by ZTE as a reaction to the absence of any counteroffer on behalf of ZTE.

ii) France

In a case involving Ericsson's three standard-essential patents for the implementation of the 3G standards (UMTS) declared as such to ETSI, the Paris district court found that the requested preliminary injunction cannot be granted for SEP when the negotiations for a license are ongoing and where the parties agree on the geographical extent and technological scope of the agreement, but disagree only on the royalty rate. While the plaintiff contended that the defendants should be described as infringers acting in bad faith, considering the facts of the case, the court found that the parties should be able to negotiate without the balance of power being impaired. The court was of the view that granting an injunction in the specific context would unduly favor the patentee and distort the principle of FRAND licenses by putting unjustified pressure on the future licensee.[69]

iii) United Kingdom

In the English courts, the law governing the grant of an injunction is that of equity, strongly focused on achieving a fair outcome between the parties. An injunction is therefore always a matter of the judge's discretion, although - for many years - an injunction was invariably granted in cases where patent infringement was affirmed.

However, in 2012, the English Patent Court decided to deny a permanent injunction in an infringement action brought by *IPCom against Nokia*. [70] Considering whether Nokia, who had agreed to take a (conditional) license,

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[68] The Hague District Court, Decision of 24 October 2014, C/09/470109 / KG ZA 14-870 - *ZTE v Vringo*.

[69] Paris District Court, Decision of 29 November 2013, no 12/14922, *Telefonaktiebolaget LM Ericsson v TCT Mobile Europe SAS and TCT Mobile International Ltd.*

[70] *IPCom v Nokia*, 18 May 2012, [2012] EWHC 1446 (Ch).

should be prohibited from further sales pending a determination of what terms should apply, the judge accepted that, as a "general working rule", damages may be awarded in substitution for an injunction when the injury to the claimant's legal right can be estimated in money and adequately compensated by a small money payment, and the case is one in which it would be oppressive to the defendant to grant an injunction. The judge found no basis for an injunction award, even though Nokia's commitment to take a license was conditional upon a finding that the patents at issue were both valid and infringed, matters which can take several years to reach a final determination.

In one of the parallel proceedings initiated by *Vringo v. ZTE*, the Patents Court did not directly have to consider whether or not to grant injunctive relief, but Birss J used the opportunity to note that injunctions should likely not be available against a willing licensee and that the defendant's challenge of the infringement or validity of the patent would not make him unwilling[71]:

"There is what I will call a general idea (without expressing a view on whether it is right or wrong) that when a patent is an SEP, if a defendant is a willing licensee, then it may be that the patentee is not entitled to obtain an injunction against the defendant, whereas if the defendant was not a willing licensee, then the defendant may be subject to the risk of an injunction. [...] In my judgment, a defendant accused of patent infringement by a patentee who claims to have a standards essential patent is and must be entitled to say, 'I wish to know if this patent is valid or infringed or not before I take a license'. Such a stance cannot fairly be described as unwillingness."

3.2.2.4. Evolving landscape of injunctions in emerging SEP markets

i) China

The first document to address the issue of injunctions in the context of FRAND was the so-called "Interpretation of the Supreme People's Court on Several Issues Concerning the Application of Law in the Trial of Patent Infringement Dispute Cases" (entered into force on 1 April 2016; henceforth: "Interpretation"). According to Art. 24 of the Interpretation, the court would generally not support the grant of injunctive relief in favor of the holder of an explicitly disclosed and FRAND-encumbered SEP under the following conditions: i) when the SEP holder intentionally violates its FRAND commitment, causing the negotiations between the SEP holder and the alleged infringer to fail, and ii) the alleged infringer is not obviously at fault in the process of negotiation.

In its Interpretation, the Supreme People's Court separates SEP disputes from traditional IP infringements: contrary to the ordinary patent infringement, the decision of the grant of an injunctive relief in SEP infringement cases should consider the subjective fault of the parties when the defendant raises a FRAND defense. A summary of judicial practices, the Interpretation deals with the issue of injunctions from a patent and tort law perspective without any reference to antitrust considerations.

Additional guidance on the issue of injunctions is embedded in Anti-Monopoly Guidelines for the Abuse of Intellectual Property Rights (Draft for Comments, dated 31 December 2015) issued by the Anti-Monopoly Commission of the State

[71] *Vringo Infrastructure Inc. v ZTE (UK) Ltd.,* UK High Court, Patents Court, Decisions of 6 June 2013, [2013] EWHC 1591 (pat).

Council. The Draft introduces four factors to be considered for the grant of injunctive relief in the context of patent infringement:

1. The performance and actual will of both parties in the negotiation;
2. whether the SEP commitment contemplated injunctive relief;
3. the licensing conditions provided by both parties in the negotiation; and
4. the impact of an injunction on licensing negotiations, the relevant market, downstream competition and consumer welfare.

Albeit not judicial in nature, the above guidelines have significant impact on the decision of Chinese courts.

Lastly, Art. 17 of the draft of the Anti-monopoly Law (AML) and relevant practices in other jurisdictions addresses two ways of regulating the abuse of the instrument of injunctive relief by SEP holders. Subject to comments, the draft version proposed by the National Development and Reform Commission (NDRC) and State Administration of Industry and Commerce (SAIC) leaves open which of the two approaches will be adopted at the final stage: The first option emulates the European approach, i.e., the abuse of injunction is treated as an abusive conduct prohibited by the "catch-all" provision of Art. 17(7) AML; the second option establishes abusive conduct only when the injunction is used as a tool by the SEP holders to force licensees into accepting unfair licensing terms prohibited under Art. 17 AML (excessive pricing, refusal to deal, exclusive dealing, tying, discrimination etc.).

So far, the practice of the Chinese courts and administrative authorities remains consistent, pointing to the second approach and after considering the broader impact of injunctions on public interests:

In *Huawei v. InterDigital*, the Guangdong Higher People's Court upheld the district court's decision finding that the US-based SEP holder InterDigital had abused its patent rights and violated Chinese antitrust law by seeking an injunction in a US court against an alleged infringer.[72] Specifically, the court characterized InterDigital's attempt to seek an injunction as a patentee negotiation tactic based inter alia on the following grounds: i) InterDigital breached its FRAND duties; ii) InterDigital filed actions against Huawei in a Delaware court and ITC to seek injunction remedy for its SEPs while the two parties were still at the negotiation stage; iii) Huawei acted in good faith throughout the negotiation process, while InterDigital's goal was to force Huawei to accept the unreasonably high royalty rates; iv) SEP holders may not force a good faith negotiating party to accept terms for using SEPs. InterDigital's conduct was therefore deemed an abuse of a dominant market position.

Similarly, as part of the anti-monopoly investigations into the mergers *Microsoft/Nokia* and *Nokia/Alcatel-Lucent*, the Chinese Ministry of Commerce (MOFCOM) examined the behavior of the parties and the combination of facts in order to determine bad faith in the context of injunctions: Where the SEP holder honors its FRAND commitments but the SEP licensee does not act in good faith, an injunction may be appropriate.[73] In both investigations, MOFCOM raised

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[72] *Huawei v InterDigital*, Judgments of 28 October 2013, Guangdong Higher People's Court of China (Yue Gaofa Minsan Zhougzi Nos. 305 and 306).

[73] In October 2015, MOFCOM conditionally cleared the $17.6B acquisition of Alcatel-Lucent by Nokia approximately seven months after the parties initially notified the transaction. Prior to MOFCOM's imposition of a remedy, the US, the EU, and various other authorities cleared the merger Nokia/Alcatel without conditions. In contrast, MOFCOM approved the transaction subject to three remedies covering each of the parties' 2G, 3G, and 4G SEPs: i) a commitment to license SEPs on a fair, reasonable and non-discriminatory ("FRAND") basis and not to enforce SEPs with injunctions unless licensees were unwilling to accept FRAND license terms; ii) a commitment to

concerns regarding the concentration of SEP ownership in the hands of the merging entities, i.e., the Nokia/Alcatel-Lucent transaction was found to increase Nokia's market share of wireless technologies from 25-35% to 35-45% for 2G and 3G, placing it ahead of Qualcomm as the 4G market leader. Regarding SEP licensing as the primary barrier to entry in smartphone manufacturing, MOFCOM leverages the concept of FRAND in the context of merger control as an effective regulatory instrument - a direct route to level the playing field and ensure licenses for local manufacturers.

In general, an SEP holder may obtain an injunction if it offers a FRAND-compliant offer and acts in good faith during the negotiation. At the same time, the licensee engages in negligent or wilful misconduct during the negotiation (delaying tactics, reverse patent hold-up) or proposes unreasonable licensing terms. Finally, the injunction may not harm the public interest. SEPs are usually part of a larger patent portfolio, which means preventing the implementation of an SEP can significantly impair a product or an entire industry (cf. Cheng et al., 2016).

ii) Korea

The Korean Patent Act recognizes injunctive relief as a remedy against patent infringement (Article 26), but it does not make any express distinction between SEPs and non-SEPs. In addition, the Korean Supreme Court has never expressly denied the availability of injunctive relief for patent infringement simply due to the existence of a FRAND commitment (AIPPI Report 2014).

As in China, the issue of injunctions has been decided both on a judicial and administrative level:

In *Samsung v. Apple*, the Seoul Central District Court decided that Samsung's request for injunctive relief did not constitute an abuse of patent rights on the grounds that a FRAND declaration cannot be construed to include a commitment not to seek injunctive relief.[74] In its decision, the court clarified the principle of availability of injunctive relief for FRAND-encumbered SEPs and noted that denying an injunction against unauthorized and unilateral implementation of an SEP would overprotect implementers that do not act in good faith. The court found that the potential licensee needs to demonstrate willingness to enter negotiations in good faith and the offer should be concrete enough to satisfy that requirement. Whether the parties negotiated in good faith or not would eventually have to be determined on a case-by-case basis under consideration of the particular circumstances. In the case at hand, the court reached the conclusion that Apple did not meet the requirement of good faith in the light of the following circumstances: i) it did not request or negotiate a license despite being aware of the existence and implementation of the SEPs; ii) it did not negotiate despite being informed by Samsung of the possibility of infringement; iii) it did not deposit or offer a financial contingency as described in Art. 4.5 ETSI IPR Guidelines against the possibility that there was infringement; iv) it did not

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inform Chinese licensees and Chinese companies engaged in licensing negotiations about transfers of SEPs to third parties; and (iii) a commitment not to transfer SEPs to third parties except on the condition that the third party accepts Nokia's FRAND commitments. Previously, in April 2014, MOFCOM conditioned its approval of the acquisition on Microsoft's and Nokia's compliance with similar terms (adherence to the FRAND terms of the SSOs, refrain from seeking injunctions against Chinese manufacturers, refrain from certain cross-licensing practices, non-transfer clause etc.); see case reports, Koblitz (2014) and Gu (2016).

[74] Seoul Central District Court, 24 August 2012, Case no. 2011 GaHap 39552, *Samsung Electronics Co., Ltd. v Apple Korea Ltd.*

negotiate a royalty rate calculated on the basis of a rational evaluation and review of the SEPs.

In contrast, Samsung had not illegally maintained or reinforced a dominant position in violation of the KFTA and its claim for an injunction did not constitute an unfair trade practice. Moreover, there was no evidence that Samsung had intentionally failed to conceal its declared SEPs during the standard-setting process or otherwise deceived the SSO. Although the court viewed some forms of Samsung's conduct in a negative light (i.e., no specific basis for calculation of the royalty rate was provided to Apple), it determined that such conduct did not amount to an abuse of rights that would prevent Samsung from seeking an injunction. Consequently, Apple's defense was dismissed. The court enjoined the sale of certain older models of Apple and Samsung products, but the injunction was immediately stayed pending de novo appellate review, which is ongoing.

In application of French law, the court further came to the conclusion that the FRAND commitment does not give cause for a license agreement to be concluded by mere implementation of the standard. The court did not view the FRAND commitment as a contractual obligation of the SEP holder to provide a license, but rather as a declaration of the general principle to negotiate in good faith under FRAND terms. A FRAND commitment neither confers a license to unspecified third parties nor constitutes a binding contractual offer to license.

On 26 February 2014, the Korean Fair Trade Commission (KFTC) issued its first decision on the question whether seeking injunctive relief on a FRAND-encumbered SEP constitutes a violation under the Korean Fair Trade Law. In the Samsung case, the KFTC concluded that, because Apple failed to engage in good faith negotiations, Samsung's injunction claims against Apple on SEPs related to 3G and 4G mobile communication technology do not constitute an abuse of dominance or unfair trade practice.[75] In particular, Apple was not a willing licensee based on a series of reasons: i) it initiated a patent infringement action against Samsung while negotiations were still underway; ii) it proposed licensing terms that devalued Samsung's patent, and iii) it engaged in reverse hold-up as supported by the fact that it did not intend to pay out any royalties until the litigation was concluded. In contrast, the KFTC found that Samsung negotiated in good faith as demonstrated by the following conduct: i) prior as well as after the infringement actions, Samsung proposed various licensing terms to Apple and sustained substantial negotiations, and ii) Samsung proposed non-excessive royalty rates.

It is noteworthy that, in its reasoning, the KFTC made reference to the commitments Samsung had made to the European Commission in the Samsung case; the opinion of the US International Trade Commission affirming the infringement of Samsung's 3G-essential patent in In the Matter of Certain Electronic Devices, Including Wireless Communication Devices, Portable Music and Data Processing Devices, and Tablet Computers (Inv. No. 337-TA-794); and the decision of the US Department of Justice to close its investigation into Samsung's alleged abuse of SEPs (Statement of the Department of Justice Antitrust Division on Its Decision to Close Its Investigation of Samsung's Use of Its Standards-Essential Patents, dated February 7, 2014).

Following the above decision, the KFTC amended in 2014 its Guidelines on Unfair Exercise of Intellectual Property Rights (enacted in 2000), in which it identified certain types of licensing practices by SEP holders that may be deemed to be abusive under Korea's Monopoly Regulation and Fair Trade Act, i.e., unreasonably avoiding or circumventing the granting of a license on FRAND terms, imposing

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[75] Korean Fair Trade Commission (KFTC), Decision of 26 February 2014, *Samsung Electronics Co., Ltd.*

discriminatory conditions when licensing SEPs, and restricting the licensee's exercise related patents.

iii) Japan

In January 2016, the Japanese Fair Trade Commission (JFTC) revised its Guidelines for the use of Intellectual Property under the Antimonopoly Act to specifically address the harm from breaches of FRAND commitments.[76] Notably, these revised guidelines state that a refusal to license or seeking an injunction against a party who is "willing" to take a license based on FRAND terms can violate Japan's Antimonopoly Act. The same types of conduct also can be deemed unfair trade practices even if they do not substantially restrict competition in the relevant product market and are not considered to be unlawful monopolization. The JFTC indicates that whether a prospective licensee is "willing" will be judged on a case-by-case basis by the conduct of both parties in the negotiations. The Guidelines however explain that:

i) a party is deemed to be "willing" if it shows its intention to have the FRAND license conditions determined by a court or through arbitration procedures in case that the parties do not reach an agreement on the license conditions even after a certain period of negotiations;

ii) challenges to the validity, essentiality or possible infringement of the SEP do not render "unwilling" a party intending to license on FRAND terms.

The question whether the licensee could be regarded as "willing" had already been addressed in the Japanese jurisprudence, which looked closer into the negotiation process. The following landmark decisions rendered down by the courts in Japan appear in line with the CJEU in *Huawei v. ZTE* and the more restrictive approach to injunctions adopted by the European national courts. However, Japanese courts have not yet established which facts are relevant in such inquiries and which are not, as their European counterparts have done.

In *Apple v. Samsung*, the IP High Court of Japan did not allow unrestricted assertion of rights to injunctive relief on the grounds that it would unreasonably prejudice the infringer who invests into the production facilities in the belief that the license is offered under FRAND conditions.[77] The court held that the proprietor of a FRAND-encumbered patent could seek injunctive relief, if the infringer/licensee proves its willingness. Under these circumstances, seeking injunctions is regarded as an abuse of right under Art. 1 (3) Civil Code - a fundamental principle of Japanese civil law applied to all areas of private assertion of rights. The court based its ruling on the balance of protection between the proprietary right of the SEP holder and the trust of the implementers in the FRAND declaration: To allow unrestricted assertion of rights to injunctive relief based on FRAND-encumbered patents would unreasonably prejudice the infringer, which makes significant investments in the production facilities with the belief that the license is offered under FRAND conditions.

Whether the IP High Court has succeeded in striking the right balance of interests, was questioned in the Japanese scholarship. It is questionable whether the abuse of right defense should have been applied in *Apple v. Samsung*, it is questionable whether similar exemptions should be granted in subsequent cases

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[76] For the full text version of the partial amendments to the IP Guidelines see, www.jftc.go.jp/en/pressreleases/yearly-2016/January/160121.files/IPGL_Frand_attachment.pdf

[77] *Apple v Samsung*, Japanese IP High Court, Decision of 16 May, 2014, Case No. 2013[Ne] 10043. This is an appeal case from the judgment of Tokyo District Court, February 28, 2013 [Case No. 2011 [Wa] 38969].

on the same basis. The consideration of objective factors was not thorough and this left SEP owners and implementers in an unbalanced relation. It may be possible to adequately protect the rights of SEP owners without injunctions by providing additional protective measures, but merely denying injunctions under the Japanese system may have severe consequences for owners and may result in less standardization and fewer SEPs (Nagakoshi & Tamai, 2016).

In the case *Imation v. One Blue*, the Tokyo District Court affirmed examined whether the parties met exercised their rights in good faith thereby affirming the willingness of the licensee.[78] Although the burden of proof for "willingness" lay with the infringer/licensee, the court stated that the "unwillingness" should be interpreted narrowly. In this particular case, the defendant One-Blue was a patent pool which, after the negotiations with Imation failed, sent out a notice to three retailers in Japan, warning them that the sales of Blu-ray discs were produced without a license, constituted an infringement of the patents managed by the defendant, and that the patent proprietor had the right to seek damages and injunctions with immediate suspension of sales. The Tokyo district court ruled that the above notice contained a "false allegation", prohibited as unfair competition by antitrust law. Specifically, the court based the willingness of the licensee on the following facts:

Imation had clearly stated that it was willing to take a license on FRAND terms, and counter-proposed a royalty rate, which it regarded as fair and reasonable. On the other end, One-Blue not only had it initiated a lawsuit in the US, but sent the above-mentioned notice to retailers in Japan without prior negotiation. One-Blue failed to substantiate its position that its rates should be considered FRAND. It did not submit any documents proving it had licensing contracts with other parties in place based on the proposed royalty rates. Even though the royalties offered by both parties were far apart, as in the case of *Apple v. Samsung*, that difference had existed for a long time and could not be interpreted as unwillingness on behalf of the licensee. Although specifying "unwillingness" based on the facts of the case at hand, the Japanese court did not expand on the determination of what constitutes a willing licensee in the general context of FRAND. "Willingness", as opposed to "unwillingness", is hard to be defined by an outsider/adjudicator as it essentially relies on assumptions about the conduct of the parties during the negotiations (Nagakoshi & Tamai, 2016).

iv) India

The law on injunction in India is based on the principles of equity; the remedy available to the SEP holder occurs in the form of royalty. The use of injunctive relief against a willing licensee constitutes prima facie breach of a FRAND commitment, an action that also qualifies as an abuse of a dominant position and a violation of competition laws. Therefore, an injunction could only be sought either in the case of an unwilling the licensee which refuses to pay the judicially determined FRAND royalty or where monetary compensation is not an adequate remedy.

In a series of proceedings initiated by *Ericsson against Micromax, Xiaomi and Intex* alleging infringement of its patents essential to the 2G and 3G standards, the High Court of Delhi dealt with issues pertaining to SEPs and their availability on FRAND.[79] In the suit against Micromax, the Single Bench of the High Court of

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[78] *Imation Corporation Japan v One-Blue LLC*, Tokyo Dist. Ct., 18 February, 2015, Case No. 2013 (Wa) 21383.

[79] *Telefonaktiebolaget LM Ericsson v Micromax Informatics Ltd. and Mercury Electronics Ltd.,* High Court of Delhi at New Delhi, Court order of 12 March 2013, Docket no. C.S.

Delhi ordered an ex parte interim injunction in favor of Ericsson against Micromax for alleged infringement of eight patents purportedly essential wireless standards. The court also issued an order authorizing the seizure of documents. The court order, however, neither provided any reason for the prima facie finding of patent infringement, nor clarified why the balance of convenience lies in favor of the plaintiff. Micromax' appeal to a Division Bench of the Delhi High Court was dismissed. The order dismissing the appeal did not mention FRAND. Eventually, the interim injunction was lifted following an interim arrangement between the parties, according to which Micromax had to deposit the royalties at the demanded rates. Simlarly, injunctions were granted in the cases against Xiaomi and Intex.

3.2.2.5. Frequency and predictability of injunctive relief in the United States post-*eBay*

In its *eBay v. MercExchange* decision, the US Supreme Court put an end to the practice of "automatic" injunction awards in the context of patent infringement.[80] The Supreme Court rejected unanimously the presumption of irreparable harm and other categorical approaches in favor of a case-by-case application of "traditional equitable principles". In this regard, it proposed a framework for use in court practice that would help mitigate the risk of patent hold-up. The decision namely required district courts to exercise their discretion before awarding an injunction by applying a four-factor test whereby the plaintiff must demonstrate that:

1. it has suffered an irreparable injury;
2. remedies available at law, such as monetary damages, are inadequate to compensate for that injury;
3. considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and
4. the public interest would not be disserved by a permanent injunction.

Post-eBay, US courts no longer grant injunctions as a matter of right, but weigh the above four equitable factors. Both Judge Robart in *Microsoft v. Motorola* and Judge Posner in *Apple v. Motorola* have expressed the view that, under eBay and as a general rule, a commitment to license an SEP on FRAND terms means that the patent owner cannot obtain an injunction but must rather settle for damages only. Judge Posner, in particular, expressed paradigmatic distrust of injunctions in the FRAND context[81]:

"I don't see how, given FRAND, I would be justified in enjoining Apple from infringing the '898 unless Apple refuses to pay a royalty that meets the FRAND requirement. By committing to license its patents on FRAND terms, Motorola committed to license the '898 to anyone willing to pay a FRAND royalty and thus implicitly acknowledged that a royalty is adequate compensation for a license to use that patent."

(OS) 442/2013; *Telefonaktiebolaget LM Ericsson v Xiaomi Technology and others*, Interim Application No. 24580 of 2014 in Civil Suit (Original Side) No. 3775 of 2014, High Court of Delhi (8 December 2014); *Telefonaktiebolaget LM Ericsson v Intex Techs. (India) Ltd,* Interim Application No. 6735 of 2014 in Civil Suit (Original Side) No. 1045 of 2014, High Court of Delhi (13 March 2015).

80 *eBay Inc. v MercExchange, L.L.C.,* 547 U.S. 388 (US Supreme Court 2006).

81 *Apple, Inc. v Motorola Mobility, Inc.,* 869 F. Supp.2d 901 at 913-914, U.S. District Court, N.D. Illinois (2012).

On appeal in both of the aforementioned cases, the Circuit courts adopted a more flexible approach to injunctive relief.

On appeal in *Microsoft v. Motorola*, the Ninth Circuit endorsed the Federal Circuit's view in *ebay* that a FRAND commitment does not always preclude an injunctive action to enforce the SEP.[82] For example, if an infringer refused to accept an offer on RAND terms, seeking an injunctive relief could be consistent with the FRAND agreement, even where the commitment limits recourse to litigation. The pertinent question is whether SEP holder's obligation of good faith and fair dealing under its FRAND agreements precluded it from seeking an injunction in these circumstances. That question was for the jury to decide.

On appeal in *Apple v. Motorola*, the Federal Circuit revisited the case and weighed in on the questions of failed negotiations, unreasonable conduct, and injunctive relief.[83] The court explicitly rejected a per se rule against granting injunctive relief to FRAND-encumbered patent holders, on the grounds that where an infringer unilaterally refuses a FRAND royalty or unreasonably delays negotiations to same effect, the patent holder no longer bears singular responsibility for concluding a contract and subsequently should receive appropriate relief for infringement. Furthermore, the court found the existing strict standard for permanent injunctions "provides ample strength and flexibility for addressing the unique aspects of FRAND-encumbered patents and industry standards." Clearly, an SEP holder does have the right to seek an injunction and it's up to the court to decide on a case-by-case basis whether an injunction is warranted, based, e.g., on whether the infringer is deemed to have engaged in patent hold-out.

Much along the same lines as Judge Robart in the aforementioned *Microsoft v. Mototola,* subsequent case law in *Ericsson v. D-Link Systems* and *Realtek v. LSI* granted the SEP holder a certain degree of flexibility:

In his post-trial opinion dated 6 August 2013, Judge Davis noted in the case *Ericsson v. D-Link* that initial offers should be viewed as a starting point in the negotiations and that FRAND licensing is a two-way street that requires good faith by both parties.[84] In this context, even if a court or jury must ultimately determine an appropriate rate, merely seeking a higher royalty than a potential licensee believes is reasonable is not a RAND violation. In the case at hand, Judge Davis determined that there was no need to rule on D-Link's request for a ban on injunctive relief against Ericsson for violation of its FRAND obligations because Ericsson had not sought injunctive relief on any of the patents in suit.

In *Realtek v. LSI*, Judge Whyte held that Realtek was harmed as a result of the breach of the FRAND commitment because the pending threat of an exclusion order gave the defendants inherent bargaining power in any FRAND licensing negotiation that may take place. The judge found no indication that Realtek was not willing to accept a FRAND license. In fact, Realtek admitted that it would accept a FRAND license as long as it may preserve its rights to appeal and to maintain its defenses at the International Trade Commission, the venue in which the defendants elected to pursue their infringement claims. According to the court, Realtek could simultaneously pursue a determination of the FRAND royalty rate while denying infringement or asserting invalidity, even though those issues may ultimately obviate the need for a license.[85]

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82 *Microsoft Corp. v Motorola Inc.,* 696 F.3d 872 (US Court of Appeals for the Ninth Circuit 2012).

83 *Apple Inc. v Motorola Mobility, Inc.*, 757 F.3d 1286 (Fed. Cir. 2014).

84 *Ericsson v D- Link,* Memorandum Opinion and Order (dated August 6, 2013), at *50-51 Case no. 6:10-CV-473.

85 *Realtek Semiconductor Corp. v LSI Corp*., 946 F. Supp. 2d 998 at 1004-1007 (United States District Court, N.D. California (2013)).

While the stricter standards prevailing in the US since *eBay v. MercExchange* do not necessarily rule out the grant of permanent injunctions for the owner of an infringed SEP, they have clearly made it very difficult for SEP owners in practice to obtain injunctive relief. In an empirical analysis of smartphone-related patent litigation cases, Gupta and Snyder (2014) found that no SEP owner was granted injunctive relief, while injunctions were granted for smartphone-related patents that were not SEPs.

3.2.2.6. Availability of injunctive relief from an SDO perspective

In February 2015, IEEE amended its IPR policy to include, among others, the definition of "prohibitive order" as an interim or permanent injunction, exclusion order or similar adjudicative directive that limits or prevents a party from making, having made, using, selling, offering to sell or importing a compliant implementation or service that conforms to any mandatory or optional portion of a normative clause of an IEEE standard.

Except for circumstances envisaged by the IEEE policy, a patentee that claims to own an essential patent claim may not seek, or seek to enforce, a Prohibitive Order "unless the implementer fails to participate in, or to comply with the outcome of, an adjudication, including an affirming first-level appellate review [...] by one or more courts [...]" that have appropriate, specified authority. The scope of the adjudication can relate to a host of issues, such as license terms, patent validity and patent essentiality. The patent holder is not precluded from conditionally requesting a prohibitive order where failure to do so would permanently waive its rights.

On the one hand, the policy explicitly states that prohibitive orders should not be available against a willing licensee. Thereby, the policy is intended to help avoid situations where an injunction is used as a means of enhancing negotiation power, putting additional pressure on an implementer to agree to a license that it may not believe is consistent with the terms of the IEEE policy. On the other hand, the policy implies that a patent holder may not seek a prohibitive order before seeking adjudication, including adjudication on royalty rates, by one or more courts. Only if an implementer continues to refuse to pay a reasonable royalty after adjudication by one or more courts, is the submitter not restricted by the policy from seeking a Prohibitive Order (Karachalios, 2016). The policy thus endorses a practice whereby courts determine the FRAND royalty rates to be paid by a standard implementer unwilling to participate in bilateral negotiations.

Other SDOs have taken a different approach. In their 2016 position paper, CEN and CENELEC have clarified their view on the implications of FRAND commitments for the ability to seek injunctive relief, and stress that "it shall be understood that a FRAND commitment does not bar an SEP owner from seeking injunctive relief, or of introducing legal proceedings with a view to obtaining the rendering of accounts or an award of damages."[86] CEN and CENELEC refer to the *Huawei v. ZTE* decision as guidance for "rudimentary best practices", whereby parties of a licensing negotiation who have reached a deadlock "may, by common agreement, request that the amount of the royalty be determined by an independent third party, by decision without delay".[87] Accordingly, there is no objection to an SEP owner seeking injunctive relief against an unwilling licensee with third-party adjudication of a dispute between an SEP owner and a willing licensee being merely an option that requires common assent.

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[86] http://www.cencenelec.eu/News/Policy_Opinions/PolicyOpinions/EssentialPatents.pdf
[87] *Id.*

3.3. QUANTIFYING FRAND ROYALTIES

US courts have largely focused on the determination of specific royalty rates. The determination of royalty rates takes place either in the context of past infringement damages or in the context of setting a FRAND royalty rate. With regards to patent damages, in general, there are two different standards: lost profits for sales the patentee would have made (e.g., as a competitor) or reasonable royalties for sales the patentee would not have made. All FRAND cases have so far been dealt with as reasonable royalty cases. Even though specific methodologies may be requested to calculate FRAND royalties, the royalty determination nevertheless follows the principles of reasonable royalty determination. This is significant in particular with respect to the discussion of the royalty base given that lost profits calculations allow calculations based on the entire market value of the end product if the end product is a functional unit. In contrast, the calculation of reasonable royalties is no exact science. The Federal Circuit has repeatedly insisted that courts have discretion in the determination of reasonable royalties. This discretion is, however, subject to significant constraints: the calculation of royalties must be based on factual evidence and it is subject to several substantive principles and evidentiary rules, which will be reviewed in the following sections.

3.3.1. Incremental value

The purpose of the FRAND requirements is to confine the patentee's royalty demand to the value of the patent itself (i.e., the value of the underlying technology) as distinct from the additional value (i.e., the hold-up value) conferred by the patent's being designated as standard-essential.[88] However, the use of the term "incremental value of the patent" in the US jurisprudence as an important benchmark for the calculation of FRAND royalty rates tends to conflate two concepts, which should be analyzed separately, namely, the apportionment to the stand-alone value of the patent and the incremental value added to the standard over the next-best alternative.[89]

The first concept is the stand-alone value of the patent, which reflects the requirement that the FRAND royalty rate should be the result of a double apportionment: First, like in other reasonable royalty cases, the royalty should be apportioned between the patented feature and other features of the standard, including unpatented features and features protected by other patents. Second, going beyond this usual apportionment, courts carry out an additional apportionment between the "intrinsic" value of the patent and the value associated to its inclusion in the standard. Only the value of the patent itself, i.e., the value of the patent as not part of the standard, is the basis for the FRAND royalty. The courts have reiterated this principle in different formulations:

In *Microsoft v. Motorola*, Judge Robart stated that, under a RAND obligation, the reasonable parties to a hypothetical negotiation would not consider the value associated with incorporation of the patented technology into the standard, but the economic value – based on the technology's contribution to the standard and the implementer's product itself.[90] In *Ericsson v. D-Link*, the court determined that the jury must be instructed to consider the difference between the added

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[88] See, e.g., *Apple Inc. v Motorola Inc.*, 757 F.3d 1286 (Fed. Cir. 2014); *In re Innovatio IP Ventures, LLC*, 921 F. Supp. 2d 903 (N.D. Ill. 2013).

[89] The difference between incremental value and essentiality is that the latter may be inherently valuable, but commercially trivial.

[90] *Microsoft Corp. v Motorola, Inc.,* Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 at para 258 (W.D. Wash.).

value of the technological invention and the added value of that invention's standardization. Consequently, it is essential to disaggregate "the value of standardization" from the value of the technologies incorporated into the standard: First, the patented feature must be apportioned from all of the unpatented features reflected in the standard; and, second, the patentee's royalty must be premised on the value of the patented feature, not any value added by the standard's adoption of the patented technology.[91] Therefore damages awards for SEPs must be premised on methodologies that attempt to capture the asserted patent's value resulting not from the value added by the standard's widespread adoption, but only from the technology's "superiority".[92]

The latter reference to the patented technology's superiority could not only imply the patent's "superiority" over prior art, but also the superiority of the adopted technical solution covered by the patent over alternative technologies at the time of the adoption. The above formulation brings us closer to the second concept behind the notion of the incremental value of the patent, namely the incremental value that the patent adds to the standard by comparison to the next-best alternative.[93]

Approaching this notion in the context of the hypothetical negotiation, Judge Robart clarified in *Microsoft v. Motorola* that a reasonable royalty rate for an SEP committed to a FRAND obligation must value the patented technology itself, which necessarily requires considering the importance and contribution of the patent to the standard. If alternatives available to the patented technology would have provided the same or similar technical contribution to the standard, the actual value provided by the patented technology is its incremental contribution.[94] Thus, comparison of the patented technology to the alternatives that the SSO could have written into the standard is a consideration in determining a FRAND royalty. Such reasoning implies that if a different technological solution also provides value to the standard, this value should be entirely removed from the damages award. This seems to presume that the SDO would have been able to incorporate the alternative technology at no cost, and therefore in a hypothetical negotiation would have been willing to pay no more for the superior technology it ended up choosing than the strict value of its superiority.

In *In re Innovatio*, Judge Holderman deepened the analysis, stating that it would be unreasonable to assume that the owner of an alternative patented technology would have given that technology away for free, or that the two competing patent owners would have competed down to zero. Therefore, the existence of patented alternatives does not provide as much reason to discount the value of Innovatio's patents as the existence of alternatives in the public domain does.[95] For practical reasons, the *In re Innovatio* approach restricted the consideration of available alternatives to the options that were discussed in the SSO; the court should assume that technology that did not even merit a mention by the respective SDO

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91 *Ericsson v D- Link,* 773 F.3d 1201 at 1232 (Fed. Cir. 2014).

92 *Id.* at 1233.

93 Contreras and Gilbert (2014) advocate a general return to the incremental value rule whose central role has – in their opinion - faded from view only after the emergence and popularization of the fifteen Georgia-Pacific factors. Contreras and Gilbert define the incremental value as the willingness to pay for one technology relative to its next best alternative. The willingness to pay can be derived from a performance benefit or cost-savings attributed to the technology, but it is not greater than the cost of inventing around the patented technology if the alternative offers similar performance benefits.

94 *So Judge Robart in Microsoft Corp. v Motorola, Inc*., Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 at para 80 (W.D. Wash.).

95 *In re Innovatio IP Ventures, LLC Patent Litig.,* MDL No. 2303, 2013 WL 5593609, at *37 (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

in its deliberations about the standard was not likely to have been a serious contender for adoption into the standard.

Multi-dimensional technologies introduce a number of difficulties implementing an incremental value rule for FRAND licensing due to downstream competition and the presence of network effects. While the pricing of SEPs at incremental value may facilitate the dissemination of the standard in the short-term, concerns are expressed that the licensing fee resulting from the incremental value of the SEP holder's technology would not be enough to properly compensate the investment costs and risks a company incurred during the development of its (superior) technology; neither would it be enough to drive further investment in new technologies (Geradin, 2014). The perceived detrimental impact of the incremental value rule on innovation incentives and standards appears to be exacerbated in the light of the composite value of multi-component products: an SEP has "combinatorial" value related to its operation with the other proprietary technology in the standard and, therefore, its incremental value is practically zero until it operates in combination with all other SEPs - as opposed to "incremental" additions of each non-SEP to the end product outside the standard (Sidak, 2013). No SEP holder could accept a zero face value for any individually protected technology, since each patent still carries incremental cost burdens to the owner: innovators must be compensated for their investment in research and development. Accordingly, Sidak suggests that to reach an efficient result, fair royalty rates that focus solely on the "incremental" value of the SEP holder are not sufficient.

Similar concerns regarding the application of the incremental value benchmark were addressed in the jurisprudence. In *Microsoft v. Motorola*, Judge Robart noted that there are practical difficulties in actually doing an ex ante analysis, not the least of which is the fact that SSOs do not actually conduct those kinds of negotiations as part of the standard setting process. The ex ante incremental value rule lacks "real-world applicability" given that "explicit multilateral ex ante negotiations cannot be conducted under the auspices of many SSOs," and is impractical with respect to implementation by courts.[96]

3.3.2. Apportioning value from the royalty base

3.3.2.1. Apportionment requirement

The calculation of FRAND royalties is subject to the requirement of apportionment. The apportionment requirement ensures that a patentee is normally awarded damages in proportion to the value that its patent contributed to the infringing article, and not based on any value attributable to the infringer's own inventions or the prior art (Love, 2007). Even though particularly relevant to FRAND calculations, the apportionment requirement is not specific to FRAND or SEPs.

The apportionment requirement is not specific to the FRAND calculation. The US Supreme Court has recognized that if patent damages were not calculated after apportioning value between the patented invention and the prior art, the unfortunate mechanic who sells a complex device may be compelled to pay treble his whole profits to each of a dozen or more several inventors of some small improvement in the device he has built.[97] Apportionment can, however, be particularly challenging in the case of SEPs given the large number of SEPs

[96] *Microsoft Corp. v Motorola, Inc.*, Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 at para 77 (W.D. Wash.).

[97] *Seymour v McCormick,* 57 U.S. 480 at 490-491 (1853).

embedded in standards as well as the high number of standards implemented by some products.

Pinning down the portion of the value of an infringing product attributable to a patented feature as opposed to all other elements that make up the value of the product is further complicated by the fact that the same standard is not equally important for the different products that implement it. For instance, the WiFi standard is indispensable for the full operability of a modern handset, but less critical for the performance of an MP3 player.

The US jurisprudence has developed different methodologies for the calculation of FRAND royalties in order to help implementing the apportionment rule and to determine the incremental value attributable to the patented invention:

In the context of the hypothetical negotiation, Judge Whyte instructed the jury in *Realtek v. LSI*[98] to adopt a double apportionment in determining the FRAND royalty for two of the LSI's WiFi standard-essential patents: 1) Consider the importance of the two LSI patents to the standard as a whole, comparing the technical contribution of the two LSI patents to the technical contributions of other patents essential to the standard; 2) Consider the contribution of the standard as a whole to the market value of Realtek's products utilizing the standard. The jury established a royalty of 0.19% of the total sales price of Realtek's WiFi chips (0.12% for one patent plus 0.07% for the other), or an estimated $0.0019 to $0.0033 per chip, as compared to LSI's initial demand for a royalty exceeding the $1-1.75 price of Realtek's WiFi chips.[99]

A more prevalent practice in the US case law is to articulate and meet the apportionment requirement through the application of the Entire Market Value Rule (EMVR). The EMVR states that apportionment is required when a patented feature does not constitute the entire market value of the infringing product. Over time, courts have increasingly restricted the circumstances under which a patented feature can be deemed to drive the entire market value of a product. Furthermore, in order to assist US courts with implementing the apportionment requirement, the Federal Circuit has expressed a preference for damages calculations based on the price of the Smallest Saleable Patent Practicing Unit (SSPPU), although, in one case, the court ruled that the application of SSPPU does not exclude evidence-backed reference to end product prices. In several recent decisions, the Federal Circuit also clarified that the preference given to the SSPPU does not preclude damages calculations based on comparable licenses - even if these licenses are based on end product prices.

In the following sections, we address the above evidentiary rules in detail.

3.3.2.2. Entire Market Value Rule (EMVR)

The EMVR arose from lost profits cases decided long before the reasonable royalty measure of damages (Fahrenkrog et al., 2015). In *Garretson v. Clark*, the respective substantive patent law rule was defined as follows[100]:

"The patentee [...] must in every case give evidence tending to separate or apportion the defendant's profits and the patentee's damages between the patented feature and the unpatented features, and such evidence must be reliable and tangible, and not conjectural or speculative; or the [sic] must show,

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98 *Realtek Semiconductor Corp. v LSI Corp*., 946 F. Supp. 2d 998, United States District Court, N.D. California (2013).

99 *Realtek Semiconductor Corp. v LSI Corp*., Jury verdict dated February 26, 2014, Case no. C-12-3451-RMW.

100 *Garretson v Clark,* 111 U.S. 120 (1884).

by equally reliable and satisfactory evidence, that the profits and damages are to be calculated on the whole machine, for the reason that the entire value of the whole machine, as a marketable article, is properly and legally attributable to the patented feature."

The EMVR recognizes the economic reality that sometimes a single patent may drive the demand for an entire product. With time, the Federal Circuit became more critical of damages calculations by the district courts based on the price of end products including more than the patented feature, and tightened the definition of the EMVR to reduce the risk of extreme and unfounded damage awards.

In *Lucent v. Gateway*, Lucent accused Microsoft's Outlook, Money and Windows Mobile software of using the patented "date picker" feature, of which Microsoft sold approximately 110 million units. Sales of these three products amounted to approximately $8 billion. Lucent's royalty base at trial was based on the entire market of these sales. Lucent applied an 8% royalty against sales revenue for the accused software, and asked the jury to award $561.9 million. The Federal Circuit rejected Lucent's application of EMVR, citing lack of evidence that the date-picker was the basis - or even a substantial basis - of any consumer demand for Microsoft's products.[101] According to the court, common sense suggests that no one reasonably bought these Microsoft products just because they could pick a date in Outlook.[102] Nonetheless, the jury awarded Lucent a lump-sum royalty payment of approximately $358 million.

In *LaserDynamics v. Quanta Computer*, the Federal Circuit stated that the EMVR allowed damages calculations based on the value of the entire product only in "narrow" circumstances. In this case, the Federal Circuit noted that, in any case involving multi-component products, patentees could not calculate damages based on sales of the entire product without showing that the demand for the entire product is fully attributable to the patented feature. In this case, the Federal Circuit addressed a demand for a 2% royalty on the price of an entire notebook computer for a single patent that read on a method for identifying the type of optical disc inserted into a disc drive. The court concluded that "[…] where 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."[103] The value of the entire apparatus is not necessarily limited to the value of the direct downstream product. In principle, it could include any complementary product or service for which the patent holder can prove that the customer's decision to buy results primarily from the existence and use of the patented component. Finding that LaserDynamics failed to show the patent "drove demand for the laptop computers," the court denied application of EMVR and set a high evidentiary hurdle for plaintiffs.[104]

The EMVR affirms the requirement to apportion the value of the infringing end product to the incremental value added by the patented feature; but it does not necessarily prescribe a specific methodology for this apportionment. In particular, if the product or component does not satisfy the EMVR, the patentee may apportion the value to the patented feature "by careful selection of the royalty base to reflect the value added by the patented feature, where that differentiation

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101 *Lucent Techs., Inc. v Gateway, Inc.,* 580 F. 3d 1301 at 1337 (Fed. Cir. 2009).
102 *Lucent Techs., Inc. v Gateway, Inc.,* 580 F. 3d 1301 at 1315 (Fed. Cir. 2009).
103 *LaserDynamics, Inc. v Quanta Computer Inc*., 694 F. 3d 51 at 67 (Fed. Cir. 2012).
104 *LaserDynamics, Inc. v Quanta Computer Inc*., 694 F. 3d 51 at 63 (Fed. Cir. 2012).

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." [105]

In *Lucent v. Gateway*, the Federal Circuit recognized the probative value that the end product may have in royalty calculation cases, including in cases where the invention is only a small portion of the product[106]:

"Although our law states certain mandatory conditions for applying the entire market value rule, courts must nevertheless be cognizant of a fundamental relationship between the entire market value rule and the calculation of a running royalty damages award. 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) […] Some commentators suggest that the entire market value rule should have little role in reasonable royalty law […] But such general propositions ignore the realities of patent licensing and the flexibility needed in transferring intellectual property rights."

In several decisions, the Federal Circuit nevertheless referenced the EMVR to mandate damages calculations based on royalty bases smaller than the price of the end product. In *Uniloc v. Microsoft*, the Federal Circuit expressed the concern that a very large base has the potential to "skew the damages horizon for the jury, regardless of the contribution of the patented component to this revenue". [107] According to the Federal Circuit, precedents did not allow consideration of the entire market value of accused products for minor patent improvements simply by asserting a low enough royalty rate. In this case, the plaintiff's damages expert performed a "check" as to whether his determination of a royalty of approximately $565 million was reasonable by comparing it to his calculation of Microsoft's approximate total revenue for Office and Windows of $19.28 billion during the relevant period. The Court ruled that Uniloc's use of the entire $19 billion revenue base in its check was improper under the entire market value rule.

In *Ericsson v. D-Link*, the Federal Circuit described the EMVR as having two separate parts: 1) a "substantive legal rule" that the "ultimate reasonable royalty", i.e., combination royalty rate and royalty base, "must be based on the incremental value that the patented invention adds to the end products"; and 2) an "evidentiary principle" applied to the choice of the royalty base that is intended "to help our jury system reliably implement" the substantive legal rule of apportionment.[108] This evidentiary principle (covered by Federal Rule of Evidence 403) requires an appropriate balance between the probative value of admittedly relevant damages evidence and the prejudicial impact of such evidence caused by the potential to mislead the jury into awarding an unduly high royalty. The point of the evidentiary principle is to help the jury system reliably implement the substantive statutory requirement of apportionment of royalty damages to the invention's value[109]:

"The principle, applicable specifically to the choice of a royalty base, is that, where a multi-component product is at issue and the patented feature is not the item which imbues the combination of the other features with value, care must be taken to avoid misleading the jury by placing undue emphasis on the value of the entire product. It is not that an appropriately apportioned royalty award could

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105 *Ericsson v D- Link,* 773 F.3d 1201 at 1226 (Fed. Cir. 2014).
106 *Lucent Techs., Inc. v Gateway, Inc.,* 580 F. 3d 1301 at 1338 (Fed. Cir. 2009).
107 *Uniloc USA, Inc. and Uniloc Singapore Private Limited v Microsoft Corp*., 632 F. 3d 1295 at 1320 (Fed. Cir. 2011).
108 *Ericsson v D- Link*, 773 F.3d 1201 at 1226 (Fed. Cir. 2014).
109 *Id*.

never be fashioned by starting with the entire market value of a multi-component product - by, for instance, dramatically reducing the royalty rate to be applied in those cases - it is that 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."

Beyond the US jurisdictions, the end-product-based calculation of FRAND royalties has faced scrutiny in the context of antitrust investigations both in India and China.

In a series of decisions involving Ericsson's 2G and 3G WiFi standards, the Competition Commission of India (CCI) regarded a royalty calculation based on the downstream product's sales price as excessive and without link to the value of the SEP. The investigations alleged that Ericsson seemed to be acting contrary to the FRAND terms by imposing royalties linked with cost of product of user for its patents. Regarding the use of GSM chip in a phone costing Rs 100, royalty would therefore be Rs. 1.25. However, if this GSM chip is used in a phone of Rs. 1000, royalty would be Rs. 12.5. According to the CCI, charging of two different license fees per unit phone for use of the same technology prima facie is discriminatory and also reflects excessive pricing vis-à-vis high cost phones.[110] The CCI decision appears to favor the use of the smallest saleable patent practicing unit (SSPPU) as the royalty base for the calculation of FRAND royalties, but lacks the necessary economic reasoning and evidence. Not so the Delhi High Court in its Ericsson decisions: following the relevant US case law in CSIRO v. Cisco and relying on comparable licenses, the court found that Ericsson's practice of charging a royalty based on the price of the downstream product is FRAND.[111] Albeit nascent in the field of SEP licensing, the Indian court's jurisprudence is deemed economically sound and in line with major jurisdictions in the rest of the world (Sidak, 2015-1; Gupta, 2016).

The royalty base issue was one of the issues addressed by China's National Development and Reform Commission (NDRC) in connection with its antitrust investigation of Qualcomm. According to an unofficial translation of the NDRC's decision, the NDRC determined that it was "unfair of [Qualcomm] to use as base for calculating royalty the net wholesale price of the whole device, which is beyond the coverage of the SEPs held by [Qualcomm], while insisting on a relatively high royalty rate at the same time [...]". The NDRC barred Qualcomm from "insisting on comparatively high royalty rates" while using devices' wholesale prices as the royalty base".[112]

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[110] *Best It Worlds (India) Private Ltd. v Telefonaktiebolaget LM Ericsson*, Case No. 4 of 2015, Competition Commission of India (12 May 2015); *Intex Techs. (India) v Telefonaktiebolaget LM Ericsson*, Case No. 76 of 2013, Competition Commission of India (16 January 2014); *Micromax Informatics, Ltd v Telefonaktiebolaget LM Ericsson*, Case No. 50 of 2013, Competition Commission of India (12 November 2013).

[111] *Telefonaktiebolaget LM Ericsson v Micromax Informatics Ltd. and Mercury Electronics Ltd.*, High Court of Delhi at New Delhi, Court order of 12 March 2013, Docket no. C.S. (OS) 442/2013; *Telefonaktiebolaget LM Ericsson v Xiaomi Technology and others*, Interim Application No. 24580 of 2014 in Civil Suit (Original Side) No. 3775 of 2014, High Court of Delhi (8 December 2014); *Telefonaktiebolaget LM Ericsson v Intex Techs. (India) Ltd*, Interim Application No. 6735 of 2014 in Civil Suit (Original Side) No. 1045 of 2014, High Court of Delhi (13 March 2015).

[112] *Chinese National Development and Reform Commission (NDRC) v Qualcomm*, Decision of 10 February 2015.

3.3.2.3. Smallest Saleable Patent Practicing Unit (SSPPU)

As part of the EMVR jurisprudence, the Federal Circuit and lower US courts have developed the principle that calculations of patent damages for multicomponent products should be based on the price of the "smallest saleable infringing unit" or the "smallest saleable patent practicing unit" (SSPPU).[113] Whereas the EMVR allows the value of the end product to be apportioned to the patented feature either by selecting a smaller royalty base or choosing a lower royalty rate, the doctrine of the SSPPU states that in many cases it is preferable to carry out this apportionment starting from the price of the smallest possible component.

The main idea behind the SSPPU is a theory of cognitive bias, which is particularly relevant to the US jury system. Recent jurisprudence defines the purpose of the SSPPU as a means of avoiding prejudicing a jury with large royalty base figures that result from the sales of the downstream product containing the SSPPU component.[114] The concern here is that the market price of the downstream product can reflect a great deal of value to consumers derived from other sources – value that the SEP holder can expropriate through hold-up (Ordover et al., 2014). In this regard, the SSPPU was designed as a step towards mitigating the risk of hold-up (Layne-Farrar and Wong-Ervin, 2014).

Hence, where the entire value of a machine as a marketable article is "properly and legally attributable to the patented feature", the damages may be calculated by reference to that value. But where this is not the case, the royalty base "must insist on a more realistic starting point for the royalty calculations by juries - often, the smallest saleable unit and, at times, even less." In these words, the Federal Circuit affirmed in *Ericsson v. D-Link* the application of a strong SSPPU principle.[115] However, it declined to apply it in the specific case because royalties were calculated based on comparable licenses, not product prices.

In *VirnetX, Inc. v. Cisco Systems*, the Federal Circuit explained that the reasonable royalty may have to be apportioned even further than the SSPPU, when a patented feature does not drive the entire value of the component. Thus, where the smallest saleable unit is, in fact, a multi-component product containing several non-infringing features with no relation to the patented feature, the patentee must do more to estimate what portion of the value of that product is attributable to the patented technology. In this decision, the court makes it clear that using the SSPPU is no guarantee that the EMVR is satisfied. In other words, additional apportionment may be required even if the product component used as a royalty base is the patent's SSPPU. District courts performing reasonable royalty calculations are "cautioned [...] and must account for differences in the technologies and economic circumstances of the contracting parties."[116]

In the *Cornell v. Hewlett-Packard* case, Judge Rader of the Federal Circuit excluded at trial testimony that the entire market value of HP's servers and workstations should be used as the royalty base. The court found that the processor was an appropriate royalty base because the infringing part was an important component.[117] Thus, the processor represented the SSPPU and damages could be calculated by multiplying the 0.8% royalty rate against the processor as the royalty base. The court applied that rate and reduced the jury award by one-third to approximately $53.5 million.

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[113] *Cornell University v Hewlett-Packard*, 609 F. Supp. 2d 279 at 287-88 (N.D.N.Y. 2009); *LaserDynamics, Inc. v Quanta Computer Inc*., 694 F. 3d 51 at 67 (Fed. Cir. 2012); *In re Innovatio IP Ventures*, LLC , 921 F. Supp. 2d 903 (N.D. Ill. 2013).

[114] See, e.g., *Ericsson v D- Link*, 773 F.3d 1201 (Fed. Cir. 2014).

[115] *Ericsson v D- Link,* 773 F.3d 1201 at 1227 (Fed. Cir. 2014).

[116] *VirnetX, Inc.v. Cisco Systems, Inc.*, 767 F.3d 1308 at 1330 (Fed. Cir. 2014).

[117] *Cornell University v Hewlett-Packard Co.,* 609 F. Supp. 2d 279 (N.D.N.Y. 2009).

Whether the SSPPU is adequate to compensate for high value SEPs was equally questioned in *CSIRO v. Cisco*.[118] In the trial before the District Court, CSIRO's expert had proposed a damages model premised on the profit difference between (1) Cisco products using versions of the 802.11 WiFi standard that incorporated the patented technology (IEEE 802.11 versions a and g) and (2) Cisco products using versions of the WiFi standard that did not use the patented technology (IEEE 802.11 version b). CSIRO, an R&D specialist firm, argued that the difference between the two versions was primarily attributable to the patented technology. This led to CSIRO proposing a volume-tiered royalty ranging from $1.35 to $2.25 per end unit (totalling about $30 million for past infringement). According to CSIRO, the end products (network interface cards, routers, access points) were the smallest saleable patent practicing unit.

In the district court, Judge Davis highlighted that - in the case of computer chips - basing a royalty solely on the chip price is like valuing a copyrighted book based only on the costs of the binding, paper, and ink needed to actually produce the physical product; while such a calculation captures the cost of the physical product, it provides no indication of its actual value.[119] The district court judge explicitly restricted "reliable" calculations of royalty rates to calculations based either on the SSPPU or comparable licenses - even if these are expressed as portion of the end product price. It clarified that the SSPPU royalty-base "rule" would conflict with prior approvals of a methodology that values the asserted patent based on comparable licenses.

On appeal, the Federal Circuit concluded that the district court did not violate apportionment principles in employing a damages model that took account of the parties' informal negotiations with respect to the end product. Recognizing that each case presents unique facts, the Federal court affirmed the SSPPU principle by highlighting two justifications based on its prior jurisprudence: i) where 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; ii) it is the important evidentiary principle that care must be taken to avoid misleading the jury by placing undue emphasis on the value of the entire product. Fundamentally, the SSPPU principle states that a damages model cannot reliably apportion from a royalty base without that base being the smallest saleable patent practicing unit. However, according to the Federal court, that principle was inapplicable in the specific case, as the district court had not apportioned from a royalty base at all. Instead, the district court had begun with the parties' negotiations. The rule Cisco advanced - which would require all damages models to begin with the smallest saleable patent practicing unit – was deemed untenable. It conflicted with the Federal court's prior approvals of a methodology that values the asserted patent based on comparable licenses. Such a model begins with rates from comparable licenses and then accounts for differences in the technologies and economic circumstances of the contracting parties. Where the licenses employed are sufficiently comparable, this method is typically reliable because the parties are constrained by the market's actual valuation of the patent.[120] In this respect, the court reaffirmed its earlier decision in *Ericsson v. D-Link* that otherwise comparable licenses are not inadmissible solely because they express the royalty rate as a percentage of total revenues, rather than in terms of the smallest saleable unit.[121]

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[118] *CSIRO v Cisco*, 809 F. 3d 1295 (Fed. Cir. Dec. 3, 2015).
[119] See the district court decision, *CSIRO v Cisco*, 2014 WL 3805817 at *11.
[120] *CSIRO v Cisco*, 809 F. 3d 1295 at 1302-1303 (Fed. Cir. Dec. 3, 2015).
[121] See, *Ericsson v D- Link,* 773 F.3d 1201 at 1228 (Fed. Cir. 2014).

CSIRO v. Cisco, 809 F. 3d 1295 (Fed. Cir. Dec. 3, 2015)

Patent owner Commonwealth Scientific and Industrial Research Organization ("CSIRO") is the principal scientific research organization for the Australian Federal Government. The US patent-in-suit addressed multipath problems in a wireless local area network, a technology incorporated into certain versions of the IEEE 802.11 WiFi standard. In 1998, CSIRO provided the IEEE with a letter of assurance that it would license the specific patent-in-suit on RAND-terms if the patent were essential to the 802.11a standard. IEEE sought additional letters of assurance from CSIRO for later revisions of the standard, but CSIRO declined to provide them. Following the patent grant, CISCO participated in the formation of Radiata Communications that was intended to commercialize the patented technology. CSIRO entered a Technology License Agreement (TLA) with Radiata in February 1998 that, among other things, had a per-WiFi chip royalty payment, decreasing from 5% royalty per chip to 1% as the volume of licensed chips increased. In 2001, Cisco acquired Radiata and started paying Radiata's license fees under the TLA license agreement for Radiata products. This agreement was renegotiated several times, always keeping the general concept of a per-chip royalty base.

In 2003, CSIRO offered industry participants a license on FRAND terms on all versions of the standard - at first indicating that it had agreed with IEEE to do so, but later clarifying there was no FRAND obligation. By June 2004, CSIRO developed a Voluntary Licensing Program offering licenses to the said under "a flat-fee royalty, charged per end product unit sold" under what it called a "Rate Card" structure. The lowest royalty rate under this structure was $1.40 to $1.90 per unit. In lack of any licensees willing to pay under the Rate Card schedule, CSIRO approached Cisco with a licensing offer, which Cisco did not accept. During discussions in 2005, Cisco informally suggested that $0.90 per unite might be an appropriate royalty rate (a rate about equal to what Cisco had been paying Radiata under the initial TLA agreement).

In July 2011, CSIRO sued Cisco for infringing the patent-in-suit. Both parties stipulated to a bench trial solely on damages and that Cisco would not challenge the patent's infringement or validity. In February 2014, Judge Davis held a four-day bench trial on damages. Judge Davis of the District Court awarded a royalty structure that ranged between $0.65 and $1.90 per unit and resulted into a total damages amount of approx. $16 millions for past infringement.

On appeal, the Federal Circuit addressed multiple aspects of value apportionment in the context of damages, including SSPPU and comparable licenses. The Federal Circuit stated that there are "unique considerations that apply to apportionment in the context of a standard-essential patent", and these considerations applied even for standard-essential patents that did not have a FRAND or other standard-setting obligation - as is the case of the CSIRO patents at issue. The Federal Circuit rejected Judge Davis' royalty range. On remand, the district court should consider whether the initial rates taken from the parties' discussions should be adjusted for standardization and give more weight to the TLA as "the only actual royalty agreement between Cisco and [CSIRO] […] contemporaneous with the hypothetical negotiation."

The practicability (and traceability) of the SSPPU is questionable in the context of portfolio licensing: it is often not possible to map a portfolio of hundreds or even thousands of diverse patents to a single SSPPU. The patents in a typical large portfolio cover multiple different components of a smartphone, including SEP for

communication standards, SEPs for non-communications standards as well as non-SEPs. Each family of patents in a portfolio would potentially map to a different SSPPU, and the implied royalty base for the portfolio would therefore be the aggregate of all those components. Furthermore, trying to determine a portfolio royalty based on the SSPPU for every patent in a substantial portfolio of SEPs and non-SEPs would be an unmanageable task (Stark, 2015). Petit (2016) points out the adverse transactions cost effect of the SSPPU, which itemizes SEP licensing by requiring a different value for each component – information typically privy to the firm that practices the patent.

The debate around the proper royalty base for calculating FRAND damages is particularly accentuated in the context of the recently amended IEEE policy. The amendments recommend the consideration of three non-mandatory factors for the determination of FRAND royalties: 1) the value contributed "to the value of the relevant functionality of the smallest saleable Compliant Implementation that practices the Essential Patent Claim," 2) the value contributed "in light of the value contributed by all Essential Patent Claims for the same IEEE Standard practiced in that [smallest saleable] Compliant Implementation," and 3) "Existing licenses" that "were not obtained under the explicit or implicit threat of a Prohibitive Order" and "otherwise sufficiently comparable" circumstances and resulting licenses. With this licensing framework, IEEE is the first SSO that specifies methodologies to be used to determine FRAND rates in specific cases. Whereas the applicability of the SSPPU principle had so far been limited to the US case law, the introduction of a very similar wording in the IEEE bylaws broadens the scope of the principle, igniting further controversy around its usefulness and applicability.

3.3.3. Judicially defined FRAND rates

3.3.3.1. Bottom-up approach and the proportionality contribution method

The proportional contribution method or the so-called "bottom-up" approach begins with the price of the "end user" product. The patent constitutes part of a standard, which in turn typically forms part of a package of standards necessary to develop and manufacture a commercial product. The market price a firm can charge, comprised of considerations of distribution, overhead, sales costs, and other incidentals, informs the value of the product to the licensee.

The bottom-up approach suggests determining the costs of implementing reasonable alternatives to the patents at issue that could have been adopted into the standard, and dividing that cost by the total number of infringing units to determine the maximum per unit royalty. The "bottom-up" approach is typically favored by manufacturers and has been proposed for the calculation of FRAND by the defendant's expert in *In re Innovatio*.[122] In this case, the bottom up involved considering the value of the patents compared to the alternatives, but relied on proxies in the lack of precise alternatives and direct evidence. Judge Holderman regarded the recommended approach as correct from an economic point of view, but opted in his decision for an alternative, top-down method (see below in detail).

In a series of cases filed by Ericsson involving its patents essential to the 2G and 3G standards, the High Court of Delhi used the net sales price of the downstream device as royalty base for the calculation of FRAND royalties payable to Ericsson.

[122] *In re Innovatio IP Ventures, LLC* , 921 F. Supp. 2d 903 (N.D. Ill. 2013).

For the purpose, the court examined relevant cases across various jurisdictions worldwide and relied on the comparable licenses.[123]

Similarly, courts in Japan and China have handed down landmark decisions and defined FRAND royalties based on benchmarks such as the total sales amount of the infringing products and the percentage of the SEPs' contribution to the standards[124] or 0.019% of the sales price of the end product.[125]

3.3.3.2. Top-down approach

A broad range of different rates may be compatible with different considerations related to FRAND. In Microsoft v. Motorola, for instance, the court held that FRAND could describe a range of royalty rates and that a patentee complied with his FRAND commitments if he agreed to a rate within this range.[126]

In other cases, the courts were asked to determine damages and therefore calculate a specific rate. In *In re Innovatio*, the manufacturers suggested a "Top Down" approach to calculating royalties: with regards to the end-products in this case that included at least one Wi-Fi chip, the court should determine the weighted average selling price of a Wi-Fi chip over time. The court should then determine the percentage of that price attributable to the average operating profit of a chipmaker, and then apportion the resulting amount, which represents the maximum royalty for all SEPs, to account for the patented features in this case. The result of the methodology is a royalty of between .72 cents and 3.09 cents per chip, significantly less than Innovatio's proposed royalties.[127] According to the order, Innovatio's proposed method would have resulted in royalties on average of approximately $3.39 per access point, $4.72 per laptop, up to $16.17 per tablet, and up to $36.90 per inventory tracking device (such as a bar code scanners).

Judge Holderman applied a three-step approach for the determination of the FRAND royalty. First, he considered the importance of the patent to the standard. Second, he considered the importance of the alleged infringer's accused products. Third, he examined other licenses for comparable patents, using the first and second steps' decisions to determine which patents are comparable. In the absence of comparable licenses, Judge Holderman adopted an alternative "top-down" valuation method by starting with the average sales price of a WiFi chip. As a second step, he took the average sale price of the end product and calculated the average profit, the portion of sales available to pay RAND royalties. From there, the average profit was multiplied by the ratio of the total number of SEPs from the owner in question over the total number of SEPs from all owners.

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[123] *Telefonaktiebolaget LM Ericsson v Micromax Informatics Ltd. and Mercury Electronics Ltd.*, High Court of Delhi at New Delhi, Court order of 12 March 2013, Docket no. C.S. (OS) 442/2013;*Telefonaktiebolaget LM Ericsson v Xiaomi Technology and others*, Interim Application No. 24580 of 2014 in Civil Suit (Original Side) No. 3775 of 2014, High Court of Delhi (8 December 2014); *Telefonaktiebolaget LM Ericsson v Intex Techs. (India) Ltd*, Interim Application No. 6735 of 2014 in Civil Suit (Original Side) No. 1045 of 2014, High Court of Delhi (13 March 2015).

[124] Japanese IP High Court, Decision of 16 May, 2014 Case No. 2013[Ne] 10043 - *Apple v Samsung*.

[125] *Huawei v InterDigital*, Judgments of 28 October 2013, Guangdong Higher People's Court of China (Yue Gaofa Minsan Zhougzi Nos. 305 and 306).

[126] *Microsoft Corp. v Motorola, Inc.*, 854 F. Supp. 2d 993 (W.D. Wash. 2012).

[127] *In re Innovatio IP Ventures, LLC Patent Litig.*, MDL No. 2303, 2013 WL 5593609, at *23-24 ff. (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

The opinion noted that the denominator of this ratio could be modified to account for differences in value among the SEPs.[128]

Judge Holderman found that the price per component, a WiFi chip, was $14.85; the profit margin was 12.1%; and the contribution was 19 of approximately 3,000 SEPs. Accounting for the percentage of value of Innovatio's patents to the total number of electronics patents in the 802.11 standard, the top-down formula generated a net royalty of 9.56 cents per WiFi chip - about three times the rate of 3.471 cents per unit -, which Judge Holderman stated was "comfortably within" the range of 0.8 – 19.5 cents decided in Microsoft v. Motorola case.[129] By declining to find a percentage of the end product price, the top-down method provides a less favorable lower bound for the SEP holder. However, the court saw several significant advantages in the adopted methodology: First, by taking the profit margin on the sale of a chip for a chip manufacturer as the maximum potential royalty, the approach accounts for both the principle of non-discrimination and royalty stacking concerns in RAND licensing. A second advantage of this top-down approach is that it apportions to the value of Innovatio's patented features without relying on information about other licenses that may or may not be comparable to accomplish the apportionment. Finally, the method requires verifiable data points as inputs (number of SEPs, average price of a chip, average profit of a chip manufacturer) thus allowing the court to base its RAND rate on objective considerations and sound hypotheses, rather than on mere speculation.[130]

3.3.3.3. Comparable licenses and patent pools

Using sufficiently comparable licenses is a generally reliable method of estimating the value of a patent because it inherently accounts for market conditions at the time of the hypothetical negotiation, including a number of factors that are difficult to value, such as the cost of available, non-infringing alternatives. Comparable licenses can be admissible as long as there is some "basis in fact to associate the royalty rates used in [the] prior licenses to the particular hypothetical negotiation at issue in the case."[131]

In *Realtek v. LSI*[132], Judge Whyte instructed the jury to consider other licenses for patents comparable to the two FRAND-encumbered 802.11 patents at issue. In determining the comparability of other licenses, the following factors may be taken into account: 1) the patents included in the license agreement, 2) the date of the license, 3) any limitations on the use of the licensed technology, 4) the inclusion of other consideration in the agreement, 5) whether the license was part of a settlement of litigation or arbitration, 6) whether the royalty was a lump sum or a running royalty rate, 7) opinion testimony of qualified experts.

According to *Ericsson v. D-Link*, excluding real-world, relevant licenses as inadmissible would often make it impossible for a patentee to resort to license-

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[128] *In re Innovatio IP Ventures, LLC Patent Litig.*, MDL No. 2303, 2013 WL 5593609, at *73 ff. (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

[129] Explaining the difference, Judge Robart concluded that Motorola's patents were only of minimal value to the standard, whereas Innovatio's patents are of moderate to moderate-high importance to the standard; *In re Innovatio IP Ventures, LLC Patent Litig.*, MDL No. 2303, 2013 WL 5593609, at *86 ff. (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

[130] *In re Innovatio IP Ventures, LLC Patent Litig.*, MDL No. 2303, 2013 WL 5593609, at *74 ff. (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

[131] *Apple Inc. v Motorola Inc.*, 757 F.3d 1286 (Fed. Cir. Apr. 25, 2014).

[132] *Realtek Semiconductor Corp. v LSI Corp.*, 946 F. Supp. 2d 998, United States District Court, N.D. California (2013).

based evidence. In this respect, he Federal Circuit ruled that any concerns about the licenses proffered in the case go to the weight of evidence of those licenses – not its admissibility. At the same time, the court stressed that prior licenses, however, are almost never perfectly analogous to the infringement action. For example, allegedly comparable licenses may cover more patents than are at issue in the action, including cross-licensing terms, cover foreign intellectual property rights, or – as in the case at issue - be calculated as some percentage of the value of a multi-component product. Hence, testimony relying on licenses must account for such distinguishing facts when invoking them to value the patented invention. In each case, district courts must assess the extent to which the proffered testimony, evidence and arguments would skew unfairly the jury's ability to apportion the damages to account only for the value attributable to the infringing features. Where expert testimony explains to the jury the need to discount reliance on a given license to account only for the value attributed to the licensed technology, the mere fact that licenses predicated on the value of a multi-component product are referenced in that analysis (and the district court exercises its discretion not to exclude the evidence) is not reversible error.[133]

A more recent decision has challenged the admissibility of comparable license agreements as key evidentiary standard in relation to FRAND royalty determinations. In *CSIRO v. Cisco*, the district court had rejected at the first instance any application of the proposed licensing agreement with a third party-licensee as non-comparable on the grounds that it was crafted as related-party agreement between CSIRO, an R&D specialist, and one of its former scientists. The said agreement was dated long before any hypothetical negotiation between Cisco and CSIRO and royalty rates were based on the price of chips rather than the value of the invention embodied by the SEP. Interestingly, while dismissing rates of the proposed licensing, the district court used later licenses as a basis for the structure of the hypothetical negotiation, because all of the licenses were based on per-unit royalties with volume discounts. On appeal, the Federal Circuit rejected most of the District Court's reasoning, stating that a license may not be excluded from the fact finder's consideration solely because of its chosen royalty base.[134]

Prior to that, in the appeal case *Microsoft v. Motorola*, the Ninth Circuit upheld the district court's exclusion of allegedly comparable license agreements to which Motorola was a party for reasons including the fact that some agreements i) entered into to resolve an ongoing infringement dispute between the parties, ii) included cross-licenses and the royalty rate represented a blended rate for all Motorola patents (SEPs and on-SEPs), included in the products covered by the agreement, iii) included monetary caps, and provided licenses for Motorola patents that expired before Motorola and Microsoft's hypothetical agreement would have occurred.[135]

In Europe, German courts have equally highlighted the importance of comparable licensing agreements as an important indicator of the adequacy of the license terms offered. In *St Lawrence Communication v. Vodafone*, the Düsseldorf District Court was presented with (anonymized) licensing agreements of six mobile telecommunication companies with a comparable royalty. In the Court's view, there was no sufficient indication that the claimed royalty is not in line with the commercial practice in the mobile communication sector. In addition, a comparison between the claimed royalty and the lower (per patent) royalty of

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[133] *Ericsson v D- Link,* 773 F.3d 1201 at 1228 (Fed. Cir. 2014).
[134] *CSIRO v Cisco*, 809 F. 3d 1295 at 1307 (Fed. Cir. Dec. 3, 2015).
[135] *Microsoft Corp. v Motorola Inc.,* 795 F.3d 1024 at 1044 (US Court of Appeals for the Ninth Circuit 2015) *(Microsoft II)*.

the SIPRO pool also offering SEPs to the AMR-WB-standard, could not convince the court that the claimed royalty is not FRAND. [136]

In *Sisvel v. Haier*, the Düsseldorf District Court had to consider Sisvel's motion for an injunction against German and European distribution companies of the Haier group, enjoining them from selling the accused UMTS- and GPRS-compliant smartphones and tablets in Germany. [137] Sisvel runs various patent licensing programs, including a wireless licensing program that includes more than 350 patents originally acquired from Nokia that Sisvel claims have been declared essential to second, third, and fourth generation. Haier tried to defend itself by pointing to a license granted by Nokia to Haier's chipset supplier Qualcomm. Since at least part of Haier's mobile phones use Qualcomm chipsets and the patented invention is essentially embodied in these chipsets, Haier argued that phones with Qualcomm chipsets should be covered by the prior license between Nokia and Qualcomm, which is also binding for Sisvel. Haier's problem was that it could not produce the agreements between Nokia and Qualcomm and Nokia and Sisvel in court, but had to rely on relevant press releases by Nokia. In the absence of further proof, the court ruled that Haier's defense based on the Nokia press releases was merely speculative and therefore irrelevant. Despite the existence of the unavailable prior licensing agreement, the court neither consider ordering its disclosure for evidentiary purposes, nor did it shift the burden of proof to Sisvel as Nokia's successor-in-title to the patent. The outcome of the case points to an information gap in German court proceedings given the relevance of prior licenses to the non-discriminatory aspect of FRAND.

Along with comparable licenses, patent pool rates have also been deemed as a reliable indicator of the FRAND rate.

In Germany, the Mannheim District Court in *NTT v. HTC* granted injunctions based on the FRAND-compliance of the claimant's license offer that drew on pool licenses. [138] In the case at hand, NTT's license offer covered patents that were part of the WCDMA SIPRO pool as well as the LTE "Via" license pool. In its license offer, NTT had specified the share of its patents in the aforementioned patent pools, calculated the royalty rate for using NTT's patents based on the royalty rates for licensing all patents in the pools and specified the overall royalty rates for licensing SEP's for the WCDMA and LTE standards. This outcome differs form the aforementioned decision by the Düsseldorf District Court in *St Lawrence Communication v. Vodafone* in that it takes into account the patent pool royalties as useful FRAND benchmarks in favor of an injunctive relief.

In the US, the question whether pool licenses provide information regarding the value of a FRAND royalty rate has been raised in at least two cases:

In *Microsoft v. Motorola*, Judge Robart used two pool licenses as comparable licenses. The IEEE 802.11 pool (Via Licensing pool), which has not achieved wide coverage in the market, was considered only somewhat probative, whereas the H.264 pool, which includes a significant number of patent holders, was considered as an appropriate comparable license. The judgment recognizes that pool rates are typically lower than rates achieved bilaterally, in particular because pool members obtain other benefits from pool membership than the royalty revenue (such as grant-backs). Furthermore, many pools, including the pools used as comparable licenses, practice patent-counting sharing rules, and thus fail to

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[136] See, e.g., Düsseldorf District Court, 31 March 2016, 4a O 73/14 - *St. Lawrence Communication v Vodafone.*

[137] Düsseldorf District Court, Decisions of 3 November 2015, 4a O 144/14 und 4a O 93/14 - *Sisvel v Haier.*

[138] Mannheim District Court, Decision of 29 January 2016, 7 O 66/15 - *NTT DoCoMo v HTC.*

account for the significance of each patent. Based on these arguments, Motorola objected the use of pool licenses as comparable licenses, because it argued that pool patents are likely to be of lower significance and thus don't provide reliable evidence for truly comparable rates. According to the court, however, the claim that pool patents are of lower quality needs to be corroborated by factual evidence. Since the patents in this particular case had been determined to be SEPs of minor significance, the pool license was deemed a comparable license.[139]

Using a very similar argument, Judge Holderman in *In re Innovatio* concluded that the same IEEE 802.11 pool (Via Licensing pool) did not constitute a comparable license for the patents in dispute, because these patents had been considered to be of moderate to moderate-high importance. In addition, the Via Licensing pool was relatively unsuccessful in attracting licensors and had thus limited utility for determining a RAND rate.[140]

3.3.3.4. Will the European courts set a FRAND royalty rate?

European courts are not inclined to engage in any simple arithmetic nor do they emulate any US rate-setting opinion as a blueprint. They rather look for pragmatic solutions and – with the help of experts – use their understanding of the relevant technologies and competitive dynamics in order to assess the FRAND compliance of the proposed rates. German courts, in particular, would rather derive the value of the SEP at issue based, e.g., on established licensing practices and existing agreements, than actively determine it. In any case, these courts do not generally perceive royalty determinations as the derivative of simulated negotiations.

In the recent case *St Lawrence Communication v. Vodafone*, the Düsseldorf District Court held that specifying the way the royalty is calculated, as required under *Huawei v. ZTE*, should not be interpreted too strictly.[141] As FRAND is usually not an exact amount but rather a range, the claimant is not required to disclose a mathematical derivation. It is, therefore, in principle sufficient to disclose the basic considerations that led to the amount of the claimed royalty. Saint Lawrence Communication was held to have fulfilled this obligation by referring to a standard licensing royalty and its acceptance in the market.

If deemed necessary, European courts may choose to perform a basic plausibility test over a full-fledged valuation. In *Samsung v. Apple*, the Hague District Court rejected Samsung's the proposed royalty rate of 2.4% of the chip price for each of its asserted patents, the court held that Samsung's offer was so far out of the FRAND ballpark that the company failed to honor its obligation to make an offer on FRAND terms.[142]

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[139] *Microsoft Corp. v Motorola, Inc.,* Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 at paras 425 ff., 465 ff. (W.D. Wash.).

[140] *In re Innovatio IP Ventures, LLC Patent Litig.,* MDL No. 2303, 2013 WL 5593609, at *69-70 (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

[141] Düsseldorf District Court, Decision of 31 March 2016, 4a O 73/14 - *St. Lawrence Communication v Vodafone.*

[142] The Hague District Court, Decisions 14 March 2012 and 20 June 2012, Doc. no. 400367/HA ZA 11-2212 - *Samsung Electronics v Apple Inc. et al.*

3.3.4. Compliance of patent portfolio licensing with the notion of FRAND

3.3.4.1. Cumulative rates and royalty stacking

Before examining the interface of portfolio licensing with FRAND, it is important to understand the background of cumulative rates and the associated concern of royalty stacking.

Cumulative rates represent the value of all SEP portfolios an Original Equipment Manufacturer (OEM) has to pay in order to sell its product. Especially in the area of cellular standards where portfolio licensing is an established practice, there are three categories of mobile phones sold worldwide[143]:

i) Phones sold by OEMs with own basic wireless R&D and SEP portfolios. Many (other) asserting SEP portfolio holders are themselves implementers, and thus need a "grantback" license to these OEMs' SEP portfolios with a "royalty-netting" effect: the cumulative royalty for this category of phones is somewhere in the 0-10% interval.

ii) Phones sold by OEMs without own basic wireless R&D and SEP portfolios. Instead of doing heavy investments in cellular wireless R&D, these OEMs have chosen to focus their business efforts on, e.g., design, brand management, localization, feature development, marketing or logistics. The cumulative royalty is estimated at 10%.

iii) Phones sold by OEMs that are "unwilling licensees". Due to factors such as patent hold-out and the emergence of major localized OEMs in jurisdictions with less effective IPR enforcement regimes, a number of phones sold globally today are unlicensed. That is, they constitute infringing devices and no royalty at all is paid for them (0%).

Based on the above, SEP-holding OEMs ultimately pay a lower net cumulative royalty rate than non-SEP-holding OEMs. This is not a violation of the non-discriminatory aspect of FRAND since the value of a license is transferred back in place of some royalties.

However, in situations when cumulative rates may lead to a higher aggregate royalty under scenario (ii), royalty stacking becomes a concern for both judicial and administrative authorities from the US over to India. In this context, "royalty stacking" basically means that OEM of standards-compliant products need to obtain licenses from several SEP holders, and the aggregate royalty then becomes the sum of the individual royalties paid to the different SEP holders. SEPs are complementary and an OEM must obtain licenses to all SEP portfolios in order to be fully licensed. Royalty stacking poses a problem when the cumulative SEP license royalty fee can become too high for an OEM to bear while maintaining a reasonable profit margin. The situation is difficult to observe and reliable evidence is lacking. Nevertheless, the courts consider royalty stacking as a way of checking the accuracy of a proposed RAND royalty's correspondence to the technical value of the patented invention.[144]

3.3.4.2. Complexities of value apportionment for large portfolios

Apportioning value for a diverse patent portfolio that bundles SEPs and non-SEPs, patented and non-patented features, infringing and non-infringing components is

[143] See, e.g., http://patentperspectives.blogspot.com

[144] So Judge Holderman in *In re Innovatio IP Ventures, LLC Patent Litig.,* MDL No. 2303, 2013 WL 5593609, at *18 (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

an arduous task. This is particularly evident in court practice given the differences inherent to licensing negotiations and patent infringement lawsuit: Whereas only a subset of SEPs can be litigated, patent portfolios are licensed based on complex license agreements that seek to provide the license with comprehensive freedom to operate on the defined technical field. Only subsets of subsets of global portfolios, sometimes only a handful patents, can feasibly (from a time- and cost perspective) be processed per jurisdiction. The relevant question here is whether the SEP owner will have to claim the infringement of all portfolio patents in order to "force" the alleged infringer to take the portfolio license or whether the alleged infringement of one or several (major) portfolio patents is enough if a portfolio license is the standard license on the market.

In the context of a licensing disagreement between *Apple and Ericsson*, the US district courts are asked to determine FRAND with regards to Ericsson's wireless SEP portfolio. Specifically, on 12 January 2015, Apple filed a complaint with a California district court of California asking the court to issue a declaratory judgment that seven Ericsson LTE patents are neither essential nor infringed.[145] On 14 January 2015, Ericsson countered with a FRAND-declaration complaint filed with a Texas district court.[146] These complaints trigger a process of FRAND determination where the courts are confronted with two different approaches to an SEP portfolio license valuation: an individual patent license value adjudication ("patent-by-patent approach"), as requested by Apple, and a whole portfolio license value adjudication ("one-stop-shopping approach"), as requested by Ericsson. As to the background of the conflict, the parties began negotiations to renew the license to Ericsson's 2G and 3G SEPs long before the expiration of a five-year term licensing agreement. During the negotiations, Ericsson offered a global portfolio license, which Apple refused. The parties have not exchanged any offers or requests to license individual patents; nor has Apple ever made a request for Ericsson to provide a license offer on a patent-by-patent basis. Hence, Ericsson filed this suit against Apple in order to obtain a declaration that it its offer of a global portfolio license on FRAND terms is consistent with both its FRAND commitment as well as standard industry practice. From Apple's perspective, Ericsson refuses to adapt its long-standing licensing practices to the current technological and legal environment and instead i) demands royalties for FRAND-encumbered patents based on a percentage of the value of entire smartphones or tablet computers, and ii) asserts its patents as SEPs when they are not – no royalties should be owed for such patents.

Recently, the "one-stop-shopping" approach has indeed gained support from courts and agencies worldwide. In *Microsoft v. Motorola*, the district court determined a global FRAND rate to Motorola's SEP portfolio.[147] Outside the US, German Courts have held that offering a worldwide portfolio license may seem reasonable or, in principle, appropriate given that licensing agreements are usually concluded on a worldwide basis, cover entire portfolios and are concluded between groups of companies.[148] In China, the National Development and Reform

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[145] *Apple v Ericsson,* Case no. CV 15 0154 (complaint filed January 12, 2015 with the District Court for the Northern District of California); http://blogs.reuters.com/alison-frankel/files/2015/01/applevericsson-complaint.pdf

[146] *Ericsson v Apple,* Civil action no. 2:15-cv-17 (complaint filed January 14, 2015 with the District Court for the Eastern District of Texas); available at https://regmedia.co.uk/2015/02/27/apple_lawsuit_contract.pdf

[147] *Microsoft Corp. v Motorola, Inc.*, 854 F. Supp. 2d 993 (W.D. Wash. 2012).

[148] Mannheim District Court, 2 O 103/14, Decision of 10 March 2015 - *St Lawrence v Deutsche Telekom*; Düsseldorf District Court, 31 March 2016, 4a O 73/14 - *St. Lawrence Communication v Vodafone.* In the latter, the court held in the context of injunctions that the security deposit had to match the geographical scope of the respective worldwide license in offer.

Commission (NDRC) adopted a similar favorable approach to the offer of a global portfolio license in the field of SEPs.[149]

From a policy perspective, the conundrum lies with striking a balance between the efficiencies tied to global portfolio licensing, i.e., avoiding the minutia of lengthy bilateral licensing negotiations that frustrate the pace of innovation, and the harm stemming from an SEP owner's abusive behavior, i.e., abuse of dominant position may be triggered by extensive and strong patent portfolios. The latter may speak to the scope of antitrust liability, particularly with respect to the legality of patent bundling or tying. Generally speaking, patent bundling is a common practice that takes up two forms: either as pure bundling that leaves the licensee with no option but to accept a license on all patents within the bundle, or as mixed bundling that allows potential licensees to opt either for a license to FRAND-encumbered patents alone or for a license to the full portfolio. A patent-holder can engage in pure bundling/tying of licenses to FRAND-encumbered and non-RAND encumbered patents and still honor its FRAND commitments provided that it charges a royalty that would be FRAND for the FRAND-encumbered patents alone. The patent owner cannot deduct the value of non-FRAND encumbered patents from the license fee for the bundle and argue that it has honored its FRAND commitment as long as the difference is FRAND for the FRAND-encumbered patents (Layne-Farrar & Slinger, 2015).

3.3.4.3. Privateering – FRAND enforceability, royalty stacking and portfolio splitting

The practice of privateering involves the transfer of patents by operating firms to non-practicing entities that typically assert the related IP rights against the operators' rivals. This practice allows companies to maximize IP monetization without incurring any of the risks. Overall, the benefits accrued to practicing firms from assigning patents to the privateers are twofold, namely strategic as patent assertion against competitors can be carried out in a concealed way via the establishment of shell companies; and reputational as some practicing firms may wish to maximize the monetization potential of their IP assets without the reputational costs typically associated with infringement (EC Report 2016).

When privateering deals covering SEPs become part of a scheme to circumvent FRAND licensing obligations, antitrust authorities raise a red flag. Privateering is one of the issues the US Federal Trade Commission and the European Commission are investigating in connection with patent assertion entities (PAEs). Studies commissioned by both institutions on the matter deal with the substantial concerns that patent privateering raises from a competition perspective and possible antitrust solutions.[150]

Scholars raise further concerns over privateering transfers and strategic outsourcing practices as part of a scheme to maintain or obtain monopoly power. Essentially, privateering companies are considered to be a type of Patent Assertion Entities (PAEs) given their incentive and ability to engage in strategic conduct that is prevented by current market forces (Popofsky & Laufert, 2014).

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[149] *Huawei v InterDigital*, Judgments of 28 October 2013, Guangdong Higher People's Court of China (Yue Gaofa Minsan Zhougzi Nos. 305 and 306).

[150] Federal Trade Commission, *Patent Assertion Entity Activity: An FTC Study* (October 2016), available at https://www.ftc.gov/reports/patent-assertion-entity-activity-ftc-study; European Commission, JRC. *Patent Assertion Entities in Europe. Their impact on innovation and knowledge transfer in ICT markets* (October 2016), available at https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/patent-assertion-entities-europe-their-impact-innovation-and-knowledge-transfer-ict-markets.

Regarding the motives or tactics behind patent privateering, it has been suggested that SEP selling to separate entities is largely a rational response to patent hold-out, which could explain why some (but not all) significant SEP-holders with unique market position have so far engaged in this type of outsourcing. It is, for example, argued that Qualcomm's has not yet come under a pressure of patent hold-out great enough to forcibly resort into patent privateering.[151]

Another concern over private privateering is related to the threat of royalty stacking, which may be further compounded though the creation of new licensing entities that enlarge the circle of SEP owners seeking royalties for the assigned patent portfolios. In a recently filed complaint with the US District Court of Delaware, Microsoft alleges that InterDigital transferred "hundreds" of patents to another licensing entity without reducing the licensing demand for its patent portfolio that no longer included those transferred patents, even though InterDigital previously licensed Microsoft's competitors without charging more when those patents were part of InterDigital's portfolio. In April 2016, Judge Andrews issued an order that denied InterDigital's motion to dismiss Microsoft's complaint that alleged violation of antitrust laws based on InterDigital's enforcement of patents alleged to be essential to 3G and 4G cellular ETSI standards and subject to FRAND commitments. [152] Albeit still at an early procedural stage, the case will be an interesting one to watch on the subject.

Prominent (and litigated) examples of privateering in the SEP market are the portfolio transfers of Nokia to Sisvel and Vringo as well as those of Ericsson to Unwired Planet:

The UK Courts currently deal with various aspects of patent privateering and have provided useful guidance on the subject. In particular, they have considered the transfer of FRAND-commitments and the admissibility of "portfolio splitting". The latter typically refers to the assignment of only parts of an SEP-portfolio so that it is eventually split up between different licensors, who can negotiate license agreements separately. The courts have also considered whether the phenomenon of patent privateering amounts to a breach of European competition law.

On 21 July 2015, the UK High Court handed down an interim judgment in *Unwired Planet v. Huawei* et al, which stands out for its consideration of issues surrounding the transfer of an ETSI FRAND obligation.[153] The case concerned an SEP portfolio that had been acquired from Ericsson by Unwired Planet in a Master Sale Agreement (MSA) dated 10 January 2013. Unwired Planet alleged that the defendants had infringed five SEPs related to 2G, 3G and 4G wireless data technology as well as a further non-SEP. Whereas Ericsson sought to strike out allegations of breaches of Article 101 TFEU, the defendants basically contended that:

i) in transferring patents to Unwired Planet, there was a failure to ensure the complete, proper and effective transfer of an enforceable FRAND obligation;

ii) by dividing Ericsson's patent portfolio and transferring only part, a breach of competition law had taken place in that unfair higher royalties would be earned and competition would be restricted or distorted;

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[151] See, e.g., http://patentperspectives.blogspot.com

[152] *Microsoft Mobile, Inc. v InterDigital, Inc.*, District Court of Delaware, Civil Action No. 15-723-RGA, Memorandum Order dated 13 April 2016.

[153] Unwired Planet International Ltd. v Huawei Technologies Co, Samsung Electronics Co, Google and others, UK High Court, Patents Court, Decision of 21 July 2015, [2015] EWHC 2097 (Pat).

iii) certain terms in the MSA were standalone infringements of Article 101 TFEU.

In a summary decision, the court stated that Unwired Planet's renewed ETSI FRAND commitment – coupled with the terms of the MSA – indicated that there was no violation of Art. 101 TFEU based merely on the fact, that the FRAND obligation itself had not been transferred. Six trials are scheduled in the course of 2016, five of them are technical trials whereas the sixth one scheduled for October 2016 will address commercial questions, including the licensing principles of FRAND and the damage claims at issue in this series of cases. The outcome of the commercial case will establish the measure of damages to be awarded.

So far, Unwired Planet has been successful in parallel proceedings before the UK and German courts, although some trials are still pending in the course of 2016. In three decisions dated 19 January 2016, the Düsseldorf District Court found the partial assignment of SEP-portfolios generally admissible under FRAND-aspects.[154] According to the facts of the case, Unwired Planet sued Samsung for infringement of its wireless SEPs, which it had previously acquired from Ericsson. The transfer agreements set out that the Ericsson's FRAND-obligations have to be adopted by Unwired Planet. Samsung argued that Ericsson's portfolio "splitting" was a way of unduly increasing the royalty rates and therefore at odds with the purpose of Art. 101/102 TFEU. In the court's view, the assignment at issue was not intended to establish excessive pricing in the market and remained legitimate, even if the SEP-proprietor seeks to acquire a better position in the negotiation process. The (partial) assignment of SEPs to a non-practicing entity such as Unwired Planet does not lead to an imbalance of the FRAND-negotiation process.

The dispute between *Vringo and ZTE* is another example of patent privateering litigation. Similar to the Ericsson/Unwired Planet arrangement, Vringo had acquired its wireless global SEP portfolio relating from Nokia under a revenue sharing scheme. Asserting the acquired patents, Vringo initiated litigation against ZTE in the UK, but the parties ultimately decided to settle.

3.3.5. Evidentiary challenges in the context of SEP litigation

3.3.5.1. Evaluation of expert testimony and jury instructions

US Courts rely largely on expert testimony and related evidence for the calculation of damages and reasonable royalties. Further challenges include lack of or limited access to market and SDO data that are informative in the support of valuation, design-around (patented) alternatives, cost of non-infringing alternatives, consumer demand etc. Federal courts have authority to appoint neutral expert witnesses and technical advisors (Snow 2009):

- Federal Rule of Evidence 706 establishes a procedural framework for the function of the expert witness. For example, the expert witness must advise the parties of any findings, and the expert witness may be deposed, called to testify, and cross-examined by any party. Through findings and testimony, the court-appointed expert witness plays an evidentiary role in the case and may be deposed or cross-examined.
- Technical advisors are appointed pursuant to the inherent authority of the courts. Court-appointed technical advisors are scientific or technical experts who work directly with the district court judge and help the court with the jargon and theory disclosed by the testimony. Technical advisors do not

[154] Düsseldorf District Court, Decisions of 19 January 2016, 4b O 120/14, 4b O 122/14 and 4b O 123/14 – *Unwired Planet v Samsung*.

themselves contribute testimony or any other form of evidence. They may not be appointed in every case.

In order to temper undue influence and enable a meaningful appellate review, the Federal Circuit has suggested a few guidelines regarding the proper use of technical advisors: 1) choosing a technical advisor by a fair and open procedure in which the parties' counsel may participate; 2) clearly defining and limiting the technical advisor's duties in writing to all parties, for example, by means of pre- and post-appointment affidavits; 3) requiring the technical advisor to confine his or her information sources to those of record; and 4) making explicit, perhaps through a written report or record, the nature and content of the technical advisor's tutelage concerning the technology.[155]

The US judicial system gives a prominent role to juries. In the course of jury trials, evidentiary challenges are particularly accentuated as they often involve technological or commercial issues that few jurors understand, for example, in the case of the application of the entire market value or the construct of hypothetical negotiations. In addition, there is uncertainty around the type of evidence and market-related data that would constitute an admissible and reliable in the context of damage calculations and royalty determination. As opposed to bench trials where a sole judge calculates a FRAND royalty rate or royalty range based on a developed methodology (see, e.g., in the *Microsoft v. Motorola* and *In re Innovatio* cases), damages in jury trials are determined by a jury based on instructions given by the court. In this context, district courts must assess whether the proffered testimony, evidence and arguments are permissible evidence to be presented to the jury or whether they would unfairly skew the jury's ability to apportion damages.

As a general rule, evidence must be reliable and tangible - not conjectural or speculative. When considering expert testimony that introduces scientific, technical or other specialized knowledge, "the trial court acts as a 'gatekeeper' by assessing the soundness of the expert's methodology to exclude junk science".[156] In the US, the applicable rule is the so-called Daubert standard (Federal Rule of Evidence 702). Under Daubert, courts consider 1) whether a theory or technique "can be (and has been) tested;" 2) "whether the theory or technique has been subjected to peer review and publication;" 3) "the known or potential rate of error;" and 4) whether there is "general acceptance" of the methodology in the "relevant scientific community." When an expert meets the threshold established by Rule 702 as explained in Daubert, the expert may testify so that the jury can decide how much weight to give that testimony.

The Federal Circuit counsels district courts to give cautionary instructions to the jury, if requested, and explain the importance of apportionment. District courts should ensure that the instructions fully explain the need to apportion the ultimate royalty award to the incremental value of the patented feature from the overall product. According to *Ericsson v. D-Link*, the jury instructions should shift focus from what a RAND commitment should be to what the actual RAND commitment is[157]:

"Rather than instruct the jury to consider 'Ericsson's obligation to license its technology on RAND terms,' the trial court should have instructed the jury about Ericsson's ***actual*** *RAND promises. "RAND terms" vary from case to case. A RAND commitment limits the market value to (what the patent owner can reasonably charge for use of) the patented technology. The court therefore must inform the*

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[155] TechSearch, L.L.C. v Intel Corp., 286 F.3d 1360 (Fed. Cir. 2002).
[156] *GPNE Corp. v Apple Inc.*, No.: 12-CV-02885-LHK, US District Court of the Northern District of California, August 6, 2014.
[157] *Ericsson v D- Link,* 773 F.3d 1201 at 1231 (Fed. Cir. 2014).

jury what commitments have been made and of its obligation (not just option) to take those commitments into account when determining a royalty award." [Emphasis in original]

In *Apple v. Motorola*, Judge Posner used a hypothetical non-litigation analysis to exclude Apple's expert's proposed testimony based on the grounds that the procedures used to calculate damages failed to consider alternatives to paying a royalty, failed to isolate the value of individual product features encompassed by the claims and relied on information obtained from a biased source, i.e., Apple's technical expert. He also excluded Motorola's expert report for failure to consider the full range of plausible alternatives to paying a royalty.[158]

In the non-adversarial legal systems of Continental Europe and Japan, the judges usually appoint a "neutral" expert who will educate the court on highly technical issues. This is rarely the case in Germany, where the judges of the Federal Patent Court have both a technical and a legal background that allows them to rely on self-acquired knowledge and be less dependent on expert testimony. In China, although economic experts have started to play a role in antitrust cases, they are still largely absent in IP litigation. In order for the judges to implement a more rigorous and scientific calculation of royalty rates in FRAND settings and other complex intellectual property infringement cases, the parties need to tender sufficient evidence and in-depth economic analyses (Deng & Sun, 2014).

3.3.5.2. Assumptions of essentiality, validity and infringement

i) Assumption of essentiality

Both IEEE's and ETSI's IPR policies reject any verification or certification of the validity, essentiality or infringement of any patent claim declared as essential by a patentee. The IEEE policy, in particular, takes no responsibility for the assessment of FRAND compliance of a patentee's licensing terms. Importantly, the IEEE policy states that, "[…] nothing in this policy shall be interpreted as giving rise to a duty to conduct a patent search". Equally with ETSI, there is no assessment of the "essential" nature of the patents declared as such by the owners. In other words, individual SEP declarations cannot be regarded as evidence of actual essentiality of the declared patents.

For their part, courts do not generally examine, but assume essentiality for the sake of procedural economy. Nevertheless, essentiality was addressed in the context of FRAND in three cases:

In *In the Matter of Certain 3G Mobile Handsets and Components Thereof*, Administrative Law Judge Essex equated the defendants' claim of non-infringement to a claim of non-essentiality.[159] Examining the issue of whether the patents-in-suit are essential to a standard, he noted that the ETSI declaration does not create a duty that any patent so declared must be licensed on FRAND terms. Moreover, the declaration itself is not proof that the patents in suit are standard-essential. The duty to license on FRAND terms, if there is one, is a springing duty and can only be triggered by the essentiality of the patents to the standard. If the patents in suit are valid but not standard-essential, they can still be infringed and the burden of proof of their essentiality is subject to

[158] So Judge Posner in his opinion of 22 May 2012*, Apple Inc. v Motorola, Inc.,* No. 1:11-cv-08540, 2012 WL 1959560 at *11 (N.D. Ill. 2012).

[159] U.S. International Trade Commission, Initial determination on Remand issued April, 27 2015, *In the Matter of Certain 3G Mobile Handsets and Components Thereof* (Inv. n° 337- TA-613).

consideration by the administrative judge. In the specific case, the respondents failed to present evidence that the patents in suit were standard-essential and could therefore not claim any licensing rights available under ETSI FRAND policy.

In *Core Wireless v. LG Electronics*, the Paris District Court confirmed that proof of essentiality remains a prerequisite when addressing FRAND.[160] In the case at hand, Core Wireless and LG failed to reach a licensing agreement regarding a large SEP portfolio that Core Wireless had acquired from Nokia back in 2012 (1,261 SEPs relating to 2G, 3G and 4G ETSI standards). Core Wireless claimed to have engaged in discussions and meetings with LG, but did not at any point receive a precise counter-proposal. As a result, Core Wireless asked the court to set a FRAND rate for its portfolio license. LG responded that the patents were invalid or, at least, non-essential to the standards. Given that ETSI (its IPR policy was applicable in the particular case) does not perform any verification of the essentiality or the validity of the relevant patents, the burden of proof for the essentiality of the allegedly infringed patents lies with the SEP owner. Since Core Wireless failed to demonstrate that any of the asserted patents was essential to any of the standards, there was no need for the court to set a royalty rate. Despite the clarity provided by the French court on the burden of proof, the determination of how essentiality of a patent should be proven remains an outstanding issue.

In *Nokia v. InterDigital*, the English High Court ruled on the essentiality of InterDigital's European Patents to the 3G standard.[161] Nokia initiated the proceedings before the Patents Court seeking declarations of essentiality while merely reserving the right to challenge validity. Pumfrey J regarded the requested declarations as genuinely useful: A decision on essentiality would be material to the parties' licensing negotiations. Out of the four patents in suit, only one was held standard-essential. For the rest of the patents, the court noted that the declaration of non-essentiality should not be interpreted as a declaration of non-infringement.

In the US system, essentiality is assumed when not challenged. It is, however, unclear whether essentiality should also be assumed when courts apply the construct of hypothetical negotiation to determine FRAND. The distinction between the technology and products that enable the implementation of an essential patent claim and those that actually implement an essential patent claim ultimately depends on the specific court and circumstances under which the judicial FRAND determination is made.

In *Microsoft v. Motorola*, the court considered whether Motorola's licensing offer constituted a breach of contract. At the time Motorola made the licensing offer, Microsoft was confronted with uncertainty about the essentiality of Motorola's patents. At trial, Motorola presented scant evidence that its patens were essential to the 802.11 standard. Even though the parties to a hypothetical negotiation would examine the patents for their importance to the standard, their value would be diminished by the lack of evidence regarding their relevance.[162] Based on its evaluation, Judge Robart ultimately discounted the RAND rate due to pre-litigation uncertainty regarding the essentiality of the patent at issue.

The approach is different in damage cases where the courts apply a principle from the general determination of reasonable royalties, namely that facts known at the

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[160] Paris District Court, Decision of 17 April 2015, n° 14/14124, *Core Wireless v LG Electronics.*

[161] *Nokia v Interdigital Technology,* UK High Court, Patents Court, Decision of 21 December 2007, [2007] EWHC 3077 (Pat).

[162] So Judge Robart in *Microsoft Corp. v Motorola, Inc.*, Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 at para 338 (W.D. Wash.).

time of the ruling must equally be considered as known at the time of the hypothetical negotiation. In *LaserDynamics v. Quanta Computer*, the court held that the hypothetical negotiators were presumed to know that the patents were essential to the standard. It concluded that, in considering the fifteen Georgia-Pacific factors, it is presumed that the parties had full knowledge of the facts and circumstances surrounding the infringement at that time. [163]

Similarly, in *In re Innovatio*, the court considered whether it should adjust the license rate for patents whose essentiality was questionable prior to the court's adjudication. Although it may be reasonable to argue that ex ante the parties should account for that uncertainty, the court found that he problem with that argument was that the hypothetical negotiation is a counter-factual that the court usually relies on only after establishing liability. At the time of the hypothetical negotiation, the parties would not have known whether a given patent is valid or infringed, and the alleged infringer would have had the option of contesting these issues in court. Nonetheless, by the time the damages phase of an infringement suit arrives, the court has determined infringement and validity, thus foreclosing the hypothetical negotiator from benefiting from any uncertainty as to future court rulings. The difference to the Microsoft v. Motorola decision – mentioned above – is that Judge Robart's discounting assumes that an implementer would choose not to license a non-essential patent because it could practice the standard without that patent. In an infringement context, the alleged infringer has already allegedly chosen to implement the non-essential patent. In that context, the licensing rate should be increased for patents of doubtful essentiality, on the ground that the infringement damages for such a patent would not be limited to a RAND rate, and that the patent owner could therefore seek typical patent damages for that patent.[164]

ii) Assumptions of validity and infringement

Assumptions of validity and infringement are particularly common in German and Japanese proceedings that operate under a bifurcated system, in which infringement and nullity proceedings are conducted in separate, parallel procedures before various courts. Particularly in the context of injunctions, patent validity and infringement are assumed since the opposite would contravene the nature and purpose of such expedite measures.

In contrast, assumptions of validity and infringement are not necessarily the case in legal systems of conjoined procedure such as the UK. In *Vringo v. ZTE*, Birss J of the Patents Court held that a defendant is entitled to challenge the patent's infringement and validity before any FRAND license is settled since the court needs to know the basis on which the hypothetical negotiation would have taken place: in the knowledge that the patent is indeed valid and infringed, or on the pragmatic basis that it is worth paying something to eliminate the risk. [165] Accordingly, the judge differentiated between two kind of analysis: i) setting an appropriate royalty rate in a licensing scheme, the only issue being the tariff terms without challenge of the underlying rights (similar kinds of analysis are done in the United Kingdom Copyright Tribunal); or ii) determining the rate (and terms) which would be arrived at as the outcome of a notional negotiation between a willing licensor and a licensee who is willing to negotiate without a trial on the merits about the underlying rights. Under the second type of analysis, the

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[163] *LaserDynamics, Inc. v Quanta Computer Inc.*, 694 F. 3d 51 at 76 (Fed. Cir. 2012).

[164] *In re Innovatio IP Ventures, LLC Patent Litig.*, MDL No. 2303, 2013 WL 5593609, at *12 (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

[165] *Vringo Infrastructure Inc. v ZTE (UK) Ltd.,* UK High Court, Patents Court, Decisions of 6 June 2013, [2013] EWHC 1591 (pat).

hypothetical negotiation takes place with a licensee who is willing to agree on a license prior to a declaration of patent validity and infringement and the court has to determine what the outcome of the real negotiation would be. This exercise would produce a different royalty rate than the first one - the royalty rate would be discounted in view of the uncertainty. Although the UK Court managed to build momentum on the determination of FRAND, the issue was never fully decided after the parties entered a settlement in December 2015.

Vringo and ZTE have a long litigation history and are still engaged in a long series of parallel infringement and injunction proceedings in Europe (Germany, UK, The Netherlands, France, Romania), Asia (India, China, Malaysia), Brazil and the United States. Vringo's European patents declared essential to wireless standards have been challenged for validity and infringement across various jurisdictions with different outcomes. In the parallel Dutch proceedings between *Vringo v. ZTE*, The Hague District Court examined the validity and infringement of Vringo's European patent EP 119 as declared essential to the UMTS standard.[166] In its summary decision, the court preliminary held the infringement to be sufficiently demonstrated and the patent validity not to be sufficiently in doubt, given that both the Opposition Division and the Technical Board of Appeal of the European Patent Office had previously confirmed the validity. However, a year later, the same court declared the Dutch part of the EP 119 invalid due to lack of inventive step.[167] Vringo has announced plans to file an appeal.

Finally, a French court dismissed in *Apple v. Samsung* a motion for preliminary injunction after examining the facts of the alleged infringement.[168] Specifically, Samsung filed for preliminary injunctions against Apple with the Paris District Court, attacking the iPhone4S. Apple argued that Samsung's claim would constitute an abuse of a dominant position. The Court did not address the issue on the grounds – following a summary assessment of the facts - that there were serious doubts against infringement and that, consequently, the grant of a preliminary injunction could not be justified. The Court found that the likelihood of the infringement alleged by Samsung was not established, because Apple brought serious enough challenges as to the exhaustion of Samsung's rights under the patents in suit. In view of sufficient evidence that the chips used in the iPhone 4S were Qualcomm-originated and FRAND-encumbered, the court clarified that Samsung could neither revoke nor limit the scope of the license granted to Qualcomm in order to exclude a chipset customer such as Apple; in compliance with ETSI rules, the licenses granted for patents as being essential are irrevocable.

Across the Atlantic, validity and infringement are not examined when the relevant challenges are not brought before the US courts. Moreover, there is no clarity on whether courts should try to reconstruct the royalty the parties in the context of hypothetical negotiation and under application of the Georgia-Pacific factors based on the assumption that the patent was valid and infringed. It has been argued that, in an infringement trial, it is economically correct to indulge this counterintuitive assumption in order to avoid a double discounting problem. However, if a court is trying to reconstruct the royalty outside the context of an infringement action - as in the case *Microsoft v. Motorola* - it is correct to do as Judge Robart did and consider the probability of validity and infringement as relevant factors in determining the licensing rate (Cotter, 2013; Akemann et al., 2016). Real-world negotiations take place in the shadow of uncertainty regarding

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[166] The Hague District Court, Decision of 24 October 2014, C/09/470109 / KG ZA 14-870 - *ZTE v Vringo*.

[167] The Hague District Court, Decision of 28 October 2015, C/09/481474 - *Vringo v ZTE.*

[168] Paris District Court, Decision of 8 December 2011, no. RG 11/58301, *Samsung Electronics Co Ltd, et al. v Apple France Sarl.*

validity and infringement. Assuming away that uncertainty unrealistically inflates the royalty (Gates, 2015).

3.3.5.3. Evidence for hold-up, royalty stacking and hold-out

i) Incentive compatibility

In his pioneer analysis of FRAND royalty determination, Judge Robart in *Microsoft v. Motorola* heard extensive testimony on the purpose of FRAND policies. The conclusion drawn from the presented evidence was that FRAND policies aim to achieve a balance between the incentives to contribute technology to standards and the incentives to adopt standards including patented technology: "A FRAND royalty should be set at a level consistent with the SSOs goal of promoting widespread adoption of their standards […] To induce the creation of valuable standards, the RAND commitment must guarantee that holders of valuable intellectual property will receive reasonable royalties on that property."[169] In this regard, Robart assessed that patent pool licensing rates provide relevant benchmarks because patent pools have the same policy goal of encouraging standard adoption while remaining sufficiently attractive to SEP holders to voluntarily contribute their patented technology.

Subsequent case law has corroborated this analysis: In *In re Innovatio*, after considering the role of FRAND in mitigating the risks of patent hold-up and royalty stacking, Judge Holderman highlighted that the third guiding principle for the FRAND determination is that "the FRAND rate must be set high enough to ensure that innovators in the future have an appropriate incentive to invest in future developments and to contribute their inventions to the standard-setting process."[170]

Establishing incentive compatibility as part of the policy rationale behind FRAND has direct implications for the calculation of royalties. The resulting tendency is to achieve a balance of interests for both SEP holders and implementers given the strong societal and welfare aspects of standardization. Courts show concern about overcompensating SEP holders, typically citing two potential forms of ex post opportunism - "hold-up" and "royalty stacking". Although both forms could occur in theory with little evidence to back them, courts seem to suggest their existence in view of an actual violation of RAND commitments and abuse of market power. For instance, US courts have modified the Georgia-Pacific factors based on the recognition that the purpose of FRAND is to mitigate the risks of patent hold-up and royalty stacking while ensuring both reasonable royalties for SEP holders as well as appropriate incentives for participants to invest in future development and contribute to standard-setting.[171]

ii) Hold-up

Despite the academic controversy whether the risk of hold-up is theoretically plausible and empirically relevant, the hold-up concept plays an important role in the case law regarding FRAND royalty determination. While both hold-up and hold-out are symmetrical risks stemming from the incomplete contract between

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[169] So Judge Robart in *Microsoft Corp. v Motorola, Inc.*, Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 at para 113 (W.D. Wash.).

[170] *In re Innovatio IP Ventures, LLC* , 921 F. Supp. 2d 903 (N.D. Ill. 2013).

[171] *In re Innovatio IP Ventures, LLC Patent Litig*., MDL No. 2303, 2013 WL 5593609, at *9 (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

SEP owners and standard implementers, the judicial analysis has predominantly focused on hold-up considerations:

In *Microsoft v. Motorola*, Judge Robart regarded patent hold-up and royalty stacking as "potential concerns", clarifying that patent hold-up exists when the SEP holder demands excessive royalties after companies are locked into using a standard whereas royalty stacking can arise when a standard implicates numerous patents, perhaps hundreds, if not thousands[172]:

"When the standard becomes widely used, the holders of SEPs obtain substantial leverage to demand more than the value of their specific patented technology." […] "The ability of a holder of an SEP to demand more than the value of its patented technology and to attempt to capture the value of the standard itself is referred to as patent "hold-up."

In *In re Innovatio*, Judge Holderman states that "one of the primary purposes of the RAND commitment is to avoid patent hold-up" and that "the court concludes that patent hold-up is a substantial problem that RAND is designed to prevent."[173] The Federal Circuit reaffirms this analysis in *Apple v. Motorola*[174]:

"The purpose of the FRAND requirements, the validity of which Motorola doesn't question, 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."

Parties often disagree over the relevance of hold-up to the case at issue. In the aforementioned case *Microsoft v. Motorola*, a jury trial (separated from the bench trial on the royalty determination) established that Microsoft was entitled to damages because of Motorola's breach of a FRAND commitment. Motorola, which had initiated parallel proceedings before a German court, disputed that its conduct constituted hold-up. In the court's view, Motorola's German litigation was "vexatious or oppressive" to Microsoft and interfered with "equitable considerations" by compromising the court's ability to reach a just result in the case before it, free of external pressure on Microsoft to enter into a hold-up settlement before the litigation was complete. According to the district court, Motorola's argument that hold-up did not exist in the real world did not trump the evidence presented by Microsoft that hold-up took place in the particular case. On appeal, the Ninth Circuit recently ruled that Microsoft presented "significant evidence" for a jury to infer that the injunctive actions violated Motorola's good faith and fair dealing obligations. The jury could conclude that Motorola's actions were intended to induce hold-up, i.e., to force Microsoft into accepting a higher RAND rate than what was objectively merited, and thereby frustrate the purpose of the contract.[175] It was for the jurors to assess witness credibility, weight the evidence and make reasonable inferences.[176]

In *Ericsson v. D-Link*, Judge Davis addressed the evidentiary aspect of patent hold-up and royalty stacking. According to the judge, FRAND rate calculations need not account for royalty stacking or patent hold-up unless relevant evidence

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[172] See, *Microsoft Corp. v Motorola, Inc.*, Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 at para 52 (W.D. Wash.).
In re Innovatio IP Ventures, LLC Patent Litig., MDL No. 2303, 2013 WL 5593609, at *16 (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

[174] *Apple, Inc. v Motorola Mobility, Inc.,* 869 F. Supp.2d 901 at 913, U.S. District Court, N.D. Illinois (2012).

[175] So Judge Brezon of the Ninth Circuit in *Microsoft Corp. v Motorola Inc.,* 795 F.3d 1024 at 1045 (US Court of Appeals for the Ninth Circuit 2015) (*Microsoft II)*; see also, *Microsoft Corp. v Motorola Inc.,* 696 F.3d 872 at 877 (US Court of Appeals for the Ninth Circuit 2012) (*Microsoft I)*.

[176] *Id. Microsoft II*, at 1047.

is presented to the court. In this regard, the burden of proof shifts to the defendant who has to prove the SEP owner's opportunistic conduct. The Federal Circuit agreed with the district court's decision not to instruct the jury on patent hold-up or royalty stacking because there was no evidence of either. Absent such evidence, an instruction would neither be necessary nor appropriate[177]:

"In deciding whether to instruct the jury on patent hold-up and royalty stacking, again, we emphasize that the district court must consider the evidence on the record before it. The district court need not instruct the jury on hold-up or stacking unless the accused infringer presents actual evidence of hold-up or stacking. Certainly something more than a general argument that these phenomena are possibilities is necessary. Indeed, a court should not instruct on a proposition of law about which there is no competent evidence. Depending on the record, reference to such potential dangers may be neither necessary nor appropriate."

The Federal Circuit ruled there was no evidence of patent hold-up in the case at issue, e.g., showing that the patent holder started seeking higher royalty rates after the 802.11(n) standard was adopted. Equally, there was no evidence of royalty-stacking since D-Link did not present any other licenses it had taken under the 802.11 standard: The mere fact that thousands of patents are declared to be essential to a standard does not mean that a standard-compliant company will necessarily have to pay a royalty to each SEP holder.

The above case law does not provide specific guidance with regards to how the risk of hold-up should be factored into royalty calculations, i.e., what steps courts should precisely take to identify the hold-up value and exclude it from the damages award. Given the wide range of rates compatible with the fundamental principles of FRAND and the important latitude that courts and juries have in their calculations of damages, taking hold-up concerns into account adds - alongside considerations of the incremental value, royalty base and the use of comparable licenses – to the nexus of evidence, data analysis and fact assessment that guide and frame the methodology used by the courts for the determination of FRAND.

In jurisdictions outside the US, reference to the hold-up risk is generally made in the context of antitrust investigations in order to justify regulatory intervention. In contrast, courts in Europe and Asia neither cite "hold-up" directly in their decisions, nor require related evidence. This does not exclude, though, the possibility that they consider it when drafting their reasoning. For instance, in *Huawei v. InterDigital*, both the Shenzhen district court and the Guangdong appellate court held that the SEP holder is not entitled to profit that derives from the value of the standard itself and noted that the appropriate valuation of the SEP should only be based on the value of the patent itself, because the contribution by the holder of the SEPs lies in its innovative technology - not in the standardization.[178] The courts also stressed that the added value of an SEP that derives from its inclusion in the standard should be disregarded. From the analogy to Judge Robart's reasoning in *Microsoft v. Motorola* (see above citation) one could plausibly infer that the Chinese courts do consider hold-up when defining the meaning of FRAND (Lee & Li, 2015).

iii) Royalty stacking

According to the case law in *Microsoft v. Motorola*, the FRAND commitment should also address the aspect of royalty stacking and the need to ensure that the

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[177] *Ericsson v D- Link,* 773 F.3d 1201 at 1234 (Fed. Cir. 2014).

[178] *Huawei v InterDigital*, Judgments of 28 October 2013, Guangdong Higher People's Court of China (Yue Gaofa Minsan Zhougzi Nos. 305 and 306).

aggregate royalties associated with a given standard are reasonable court: "In the context of standards having many SEPs and products that comply with multiple standards, the risk of the use of post-adoption leverage to extract excessive royalties is compounded by the number of potential licensors and can result in cumulative royalty payments that can undermine the standards."[179]

Although subsequent case law affirms the importance of mitigating the risk of royalty stacking as one of the principal goals of a FRAND policy and the courts – as analyzed above under ii) – often mention the threat of patent hold-up and royalty stacking in a single breath, the relevance of royalty stacking in the context of FRAND determination is somewhat secondary and not regarded as a starting point for royalty calculation. This is most apparent in *In re Innovatio*:

"The court should consider royalty stacking as a way of checking the accuracy of a proposed FRAND royalty's correspondence to the technical value of the patented invention."[180] *Accordingly, the court should first establish a royalty rate compatible with the other principles of FRAND and then assess whether this rate needs to be adjusted based on evidence of royalty stacking. The evidentiary aspect of this adjustment is emphasized in Ericsson v. D-Link: "A jury, moreover, need not be instructed regarding royalty stacking unless there is actual evidence of stacking."*[181]

More recent case law of the Federal Circuit reaffirms that, as damages models are fact-dependent, abstract recitations of royalty stacking theory, and qualitative testimony that an invention is valuable - without being anchored to a quantitative market valuation - are insufficiently reliable.[182]

iv) Hold-out

The potential problem of reverse hold-up or patent hold-out has also been addressed in various jurisdictions, albeit to a limited extent. Specifically, in *Apple v. Motorola*, dissenting Chief Judge Rader commented that hold-out is equally as likely and as disruptive as a hold-up. Judge Rader's defined the terms "hold-out" versus "hold-up," which he believed to be questions for a fact finder. Specifically, hold-out refers to an unwilling licensee of an SEP seeking to avoid a license based on the value that the technological advance contributed to the prior art, whereas hold-up refers to an SEP owner demanding unjustified royalties based solely on value contributed by the standardization.[183]

As opposed to royalty stacking and patent hold-up, procedural allegations of hold-out have not been supported so far by relevant evidence, placing this risk outside the calculation of FRAND royalties.[184]

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[179] *Microsoft Corp. v Motorola, Inc.*, 2013 WL 2111217, at *11 (W.D. Wash. 2013), affirmed, No. 14-35393 (9th Cir. Jul. 30, 2015); *In re Innovatio IP Ventures, LLC Patent Litig*., MDL No. 2303, 2013 WL 5593609, at *9 (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

[180] So Judge Holderman in *In re Innovatio IP Ventures, LLC Patent Litig*., MDL No. 2303, 2013 WL 5593609, at *18 (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

[181] *Ericsson v D- Link,* 773 F.3d 1201 at 1234 (Fed. Cir. 2014).

[182] *CSIRO v Cisco*, 809 F. 3d 1295 at 1302 (Fed. Cir. Dec. 3, 2015).

[183] *Apple Inc. v Motorola Inc.*, 757 F.3d 1286 at 1333 (Fed. Cir. 2014).

[184] See, e.g., U.S. International Trade Commission, Initial determination on Remand issued April, 27 2015, *In the Matter of Certain 3G Mobile Handsets and Components Thereof* (Inv. n° 337- TA-613); Korean Fair Trade Commission (KFTC), Decision of 26 February 2014, *Samsung Electronics Co., Ltd.*

3.4. FRAND-COMPLIANCE AND ANTITRUST CONCERNS

3.4.1. European Commission – competitive enforcement priorities

Europe lacks a comprehensive intellectual property regime for the protection of patents. The European Patent Convention, a non-EU agreement, harmonizes to a certain extent the requirements of patent eligibility and streamlines procedures for the grant of European patents. The interpretation of substantive patent law, however, lies with the respective national jurisdiction that deals with validity and infringement issues. The future Unified Patent Court is expected to fill in gaps in the interpretation of the law and restore legal certainty in the European patent and - by extension - SEP market.

The Treaty on the Functioning of the European Union (TFEU) grants the European Union exclusive competence over competition and the internal market. The European Commission has used this power to regulate IP and FRAND licensing, mainly through antitrust investigations and the Horizontal Guidelines. The Guidelines on the applicability of Article 101 TFEU to horizontal cooperation agreements (revised in 2010) provide a framework for the analysis of the most common forms of horizontal co-operation. One of the key features of the reform is a substantial revision of the chapter on standardization agreements, particularly when involving intellectual property rights. The purpose of that chapter on standardization agreements is to give guidance on how to ensure that the process of selecting industry standards is competitive and that, once the standard is adopted, access is given on FRAND terms to all interested users.

During the drafting of the Guidelines, the EC was charged with the task to bridge divergent interests and views amongst stakeholders regarding key aspects of the rules governing standard-setting agreements. As a result, the Guidelines emphasize the often pro-competitive nature of many standard-setting agreements, but caution against their ability to reduce price competition or foreclose innovative technologies. They also address the detrimental impact that hold-up may have on the effective access to the standard through refusal of a license or through the extraction of excessive royalty fees.

The contributions of the European Commission to the definition of the circumstances in which licensing conduct and litigation strategy around standard-essential patents are laid out in its decisions on Rambus, Samsung and Motorola.

In the 2007 *Rambus* case[185], the Commission sent Rambus a Statement of Objections, setting out its preliminary view that Rambus may have infringed then Article 82 of the EC Treaty (now Article 102 TFEU) by abusing a dominant position in the market for DRAMs. In particular, the Commission was concerned that Rambus had engaged in a so-called "patent ambush", intentionally concealing that it had patents and patent applications which were relevant to technology used in the JEDEC standard, and subsequently claiming royalties for those patents.

To address the Commission's concerns, Rambus committed to putting a worldwide cap on its royalty rates for products compliant with the JEDEC standards for five years. As part of the overall package, Rambus agreed to charge zero royalties for the SDR and DDR chip standards that were adopted when Rambus was a JEDEC member, in combination with a maximum royalty rate of

[185] European Commission, Decision of 9.12.2009 relating to a proceeding under Article 102 of the Treaty on the Functioning of the European Union and Article 54 of the EEA Agreement, Case COMP/38.636 – *RAMBUS.*

1.5% for the later generations of JEDEC DRAM standards (DDR2 and DDR3), which is substantially lower than the 3.5% Rambus is charging for DDR.

A different contribution that seems to balance concerns about hold-up and reverse hold-up has emerged in the context of injunctions, more specifically in the *Samsung* case before the European antitrust authorities.[186] Samsung owns SEPs related to various mobile telecommunication standards and has committed to licensing those on FRAND terms. In April 2011, Samsung sought injunctive relief against Apple on the basis of its ETSI 3G UMTS standard. The European Commission regarded Apple as a willing licensee and expressed its concerns that Samsung's behavior may constitute abuse of a dominant position in breach of Art. 102 TFEU.

In response to these competition concerns, Samsung offered commitments pursuant to Article 9 of Regulation (EC) No 1/2003. Under its commitments, Samsung undertakes not to seek injunctions before any court or tribunal in the European Economic Area ("EEA") for infringement of its SEPs (including all existing and future patents) implemented in smartphones and tablets ("Mobile SEPs") against a potential licensee that agrees to (and complies with) a particular licensing framework ("Licensing Framework") for the determination of FRAND terms. The Licensing Framework encompasses either a unilateral licensing agreement covering Samsung's Mobile SEPs or, if either Samsung or the potential licensee so requests, a cross-licensing agreement covering both Samsung's Mobile SEPs and certain of the potential licensee's Mobile SEPs.

The Commission accepted the commitments offered by Samsung as legally binding under EU antitrust rules. The commitments provide for a "safe-harbor" available to all potential licensees of Samsung's Mobile SEPs – as long as they submit to the Licensing Framework, they are protected by the commitments. The solution proposed in the Opinion seems to be concrete enough to significantly clarify what is meant for a potential licensor to be "unwilling" and hence to clarify the conditions under which an injunction can be sought. As such, it was regarded as a welcome framework (and precedent) for the settlement of disputes over FRAND terms in line with EU antitrust rules (European Commission, Press Release, 29 April 2014).

In the *Motorola* case[187], the Commission found that it was abusive for Motorola to both seek and enforce an injunction against Apple in Germany on the basis of an SEP which it had committed to licensing on FRAND terms and where Apple had agreed to take a license and be bound by a determination of the FRAND royalties by the relevant German court. Without going into more detail of the scope and exact framework of such a possible adjudication process, the Commission found that "the acceptance of binding third party determination for the terms of a FRAND license in the event that bilateral negotiations do not come to a fruitful conclusion is a clear indication that a potential licensee is willing to enter into a FRAND license". The Commission also found it anticompetitive that Motorola insisted, under the threat of the enforcement of an injunction, that Apple give up its rights to challenge the validity of Motorola's SEPs: Implementers of standards and ultimately consumers should not have to pay for invalid or non-infringed patents, and that implementers should therefore be able to ascertain the validity of patents and contest alleged infringements.

However, the Commission clarified that injunctions for infringement of a FRAND-encumbered SEP should be available against unwilling licensees. It emphasized

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[186] European Commission, DG Competition, Commitment Decision of 29 April 2014, C(2014) 2891 final, *Samsung Electronics Co., Ltd., et. al.*

[187] European Commission, DG Competition, Decision of 29 April 2014, C(2014) 2892 final, *Motorola Mobility Inc*.

that it is not questioning the use or pursuit of injunctions by patent holders, noting that recourse to injunctive relief is generally a legitimate remedy for patent holders in infringement cases. The Commission also made clear that whether a company can be considered a "willing licensee" is to be determined on a case-by-case basis. Although Motorola was found to be engaged in anticompetitive behavior and ordered "to eliminate the negative effects resulting from its conduct", the Commission did not impose a fine, reasoning that there is no EU case law on the issue and European national courts have reached different conclusions on the issue on the grounds that i) there is an absence of case law by EU courts dealing with the legality of SEP-based injunctions under pertinent antitrust law prohibiting abusing a dominant position and ii) European national courts have issued diverging opinions on the issue.

The Commission's decision is intended to provide a safe harbor for standard implementers who are willing to agree that a court or a mutually agreed arbitrator adjudicates the dispute. However, "the fact that an act by an autonomous judicial body (e.g., the granting of an injunction by a court) is a precondition for the likely anti-competitive effects resulting from the conduct to materialize cannot affect the abusive nature of the conduct." The Commission is of the opinion that national courts and arbitrators are better positioned to decide on FRAND terms. They may, however, seek guidance from the Commission regarding the interpretation of EU law.

So far, the Commission has not provided guidance to adjudicators as to what constitutes a FRAND royalty rate or, more importantly, how these rates ought to be calculated. While it is reasonable to leave this task to a competent judicial body, providing more clarity on FRAND would enhance legal certainty and convergence of practice.

3.4.2. US antitrust authorities – from enforcement to advocacy

Recognizing early on both the value of intellectual property and the importance of dynamic competition, US antitrust agencies have equally tried to ensure that adequate enforcement takes place in the area of patents and SEPs and that competition is not harmed. The intention to strike that balance is evident in the policies of the U.S. Department of Justice (DoJ) and the Federal Trade Commission (FTC).[188] Over time, the US antitrust agencies have established an effective and praiseworthy record of competition advocacy over the years. Their role in the work of international organizations such as OECD and ICN reflects a positive contribution to sound global antitrust convergence. Advocacy, however, must be based on sound factual and economic analysis and correct legal principles. In this respect, concerns are voiced whether agency advocacy concerning SSOs and essential patents satisfies these criteria (Rill & Botts, 2015).

The US Federal Trade Commission takes on an advocacy role through expert research and regular reports such as the 2011 Report, *The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition*. The Report suggests improvements in specified areas of patent law, outlines antitrust action and offers guidance to courts for the calculation of reasonable royalty damages in

[188] See, e.g., the 2007 and 2015 DoJ Business Review letter to IEEE as well as the official policy statements of DoJ Commissioner Wright, FTC head of the Justice Department's Antitrust Division, Renata Hesse and FTC Chairwoman Ramirez.

infringement cases. In particular, it recommends that courts apply the concept of the hypothetical negotiation as the proper framework for royalty determination and treat the other Georgia-Pacific factors as information relevant to the outcome of the hypothetical negotiation. The FTC further clarifies that an incremental value benchmark must often reflect both a royalty rate and a royalty base and that the two are closely linked. With reference to the royalty base, it is suggested that courts identify the base that "the parties would have chosen in a hypothetical negotiation as best suited to appropriately valuing the technology." As a result of the Report, several federal district courts have weighed in on a framework for determining a reasonable royalty for FRAND-encumbered SEPs.

The FTC approved in the matter *Robert Bosch GmbH*[189], an order settling charges that Robert Bosch GmbH's acquisition of the SPX Service Solutions business of SPX Corporation would have given it a virtual monopoly in the market for air conditioning recycling, recovery, and recharge devices for vehicles. In the context of the merger between two companies that make automotive air conditioning recharging products, the FTC investigated Robert Bosch GmbH's request injunctive relief when it enforced SEPs subject to a voluntary RAND licensing commitment. Under a settlement with the FTC, Bosch agreed to resolve allegations that, before its acquisition by Bosch, SPX harmed competition in the market for this equipment by reneging on a commitment to license key, standard-essential patents on FRAND terms. The FTC alleged that SPX reneged on its obligation to license on FRAND terms by seeking injunctions against willing licensees of those patents. Bosch agreed to abandon its claims for injunctive relief and voluntarily agreed to license its SEPs and non-SEPs royalty free and not to seek injunctive relief for FRAND-encumbered SEPs, unless the third party refuses in writing to license the patent consistent with the letter of assurance, or otherwise refuses to license the patent on terms that comply with the letter of assurance as determined by a process agreed upon by both parties (e.g., arbitration) or a court.

Similarly, in the *Motorola Mobility case*[190], the FTC required Google to resolve disputes over FRAND licensing terms before a neutral third party before seeking an injunction and outlined specific negotiation procedures in the interest of both parties. According to the facts of the investigation, the FTC alleged that before its acquisition by Google, Motorola Mobility (MMI) breached commitments to license patents essential to implementing various cellular, video, and WiFi standards on FRAND terms by seeking injunctions and exclusion orders against implementers that were willing to abide by a FRAND license. Google continued the same conduct after acquiring MMI in June 2012.

3.4.3. Evolving antitrust landscape in the emerging SEP markets

3.4.3.1. China

Regarded as positive step towards a coordinated effort of addressing various aspects of FRAND at the intersection of IP, antitrust and competition law, the following key regulatory initiatives have taken place in the last two years:

- On 1 January 2014, the Interim Regulations on National Standards Involving Patents drafted by the Standardization Administration of China (SAC) and the State Intellectual Property Office (SIPO) entered into force. The Interim

[189] Federal Trade Commission, *Robert Bosch GmbH*, Dkt No. C-4377 (F.T.C. Apr. 24, 2013).
[190] Federal Trade Commission, *Motorola Mobility LLC,* No. C-4410 (F.T.C. July 23, 2013).

Regulations require: 1) the disclosure of essential patents owned or known about; 2) that patents included in national standards must be licensed on FRAND terms; and 3) that, for mandatory national standards, if an essential patent holder does not agree to license on FRAND terms, the SAIC, SIPO, and relevant authorities must negotiate with the patent holder regarding a method for the patent holder to divest the relevant patents.

- On 13 April 2015, China's State Administration for Industry and Commerce (SAIC) released the Regulation on the Prohibition of Conduct Eliminating or Restricting Competition by Abusing Intellectual Property. Dated 7 April 2015, and entered into force on 1 August 2015, the Regulation implements the high-level principle in the Anti-Monopoly Law (AML)[191] that the law does not apply to the lawful exercise of intellectual property rights, but does apply to anti-competitive IPR abuses. In this context, the Regulation confirms that the ownership of an IPR does not necessarily confer market dominance, but that an IPR's nature as a legally authorized "monopoly" over a technology or product is an important factor in determining dominance. AML violations include excessive royalties, discriminatory treatment and the use of injunctive relief or abuse of the litigation process by SEP holders. Some key provisions of the Regulation include (Li, 2015):

Article 10 of the Regulation lists a number of types of licensing conditions that dominant licensors cannot insert in agreements absent valid reasons – for example, exclusive grant-backs to improved technology, no-challenge clauses, non-compete clauses, etc. Article 13 addresses standard-essential patents, standard-setting and standard implementation. This provision embeds the general principle that IPRs shall not be used to prohibit or restrict competition during the setting and the implementation of standards. It also deals in detail with two specific prohibitions: i) The assertion of SEPs after failure to disclose the essentiality of the patents in violation of SSO rules; and ii) the IPR holder's refusal to license SEPs under FRAND terms.

- SAIC and China's National Development and Reform Commission (NDRC) have drafted separate (and to some extent competing) versions of the AML guidelines on abuse of IPR.[192] Following approval by the State Council's Anti-Monopoly Committee, the final text of the AML guidelines will be mandatory for all three enforcement agencies, i.e., SAIC, NDRC and China's Ministry of Commerce (MOFCOM). Whereas SAIC's current draft guideline adds to the list of the aforementioned AML violation three more types of abusive practices, namely excessive royalties, discriminatory treatment and the use of injunctive relief or abuse of the litigation process by SEP holders (Article 28), the NDRC's current draft addresses potential collusion among participants in standards development, but without requiring proof of consumer harm. In addition, the NDRC's draft contains various provisions referring to potentially abusive practices such as unfairly high prices, refusal to license, tie-in sale, unreasonable trading conditions and discriminatory treatment. However, it does not specify to what extent these provisions apply to FRAND-encumbered patents. On the issue of injunctive relief, the draft recognizes its negative impact on competition when an SEP holder uses

[191] The AML is China's comprehensive competition law that came into effect on 1 August 2008. The AML is enforced by three agencies, namely the NDRC, SAIC and MOFCOM (Ministry of Commerce).

[192] SAIC, *Guideline on Antitrust Enforcement against IP* Abuse, February 2, 2016, www.saic.gov.cn/zwgk/zyfb/qt/fld/201602/t20160204_166506.html (in Chinese); NDRC, *Anti-Monopoly Guideline on Abuse of Intellectual Property Rights* (Exposure Draft), December 31, 2015, available as English summary at www.aipla.org/committees/committee_pages/Standards_and_Open_Source/Committee%20Documents/IPR%20Guideline%20(draft)%2020151231-EN.PDF

injunctions as a means of coercing standard implementers to accept excessive royalties or other unreasonable conditions.

Chinese courts and authorities have largely addressed antitrust concerns over the licensing practices of large foreign firms in the domestic markets, including excessive pricing and portfolio bundling:

In its 2013 decision *InterDigital v. Huawei*[193], the Guangdong Higher Court confirmed the judgment of the Shenzhen Intermediate Court finding InterDigital liable for abuse of dominance arising out of unfairly high pricing and improper tying or bundling in the licensing of its standard-essential patents. The court ordered InterDigital to pay RMB 20 million in damages (approx. USD 3.2. million). The Guangdong People's Court held that InterDigital violated China's antitrust laws by filing a lawsuit with the U.S. International Trade Commission (ITC) against Huawei, while negotiations were still in progress regarding InterDigital's Chinese SEPs on 2G, 3G and 4G technologies. The appellate court affirmed the determination of FRAND royalties based on 0.019% of the sales price of the end product – it is unclear how the Shenzhen Court reached this number.[194] Moreover, there is no insight into how the Guangdong Higher People's Court addresses Huawei's tying claims or whether these claims were affirmed. The court appears to regard SEP bundling as justified on efficiency grounds and under certain circumstances that render it compliant with antitrust law.

In the context of an antitrust investigation, InterDigital submitted to NDRC a set of commitments dated on March 3, 2014. Specifically, InterDigital agreed 1) to offer a worldwide portfolio license of only its SEPs and to comply with FRAND principles while negotiating license agreements with Chinese manufacturers; 2) not to require royalty-free, reciprocal cross licenses; and 3) before seeking exclusionary or injunctive relief, to offer expedited binding arbitration under fair and reasonable procedures to resolve disputes over FRAND terms and conditions of a worldwide license under InterDigital's 2G, 3G, and 4G SEPs. If the Chinese manufacturer accepts the arbitration offer, InterDigital will not seek an injunction or similar relief. The investigation is now formally suspended.

In the context of another investigation against a foreign SEP holder, the *Qualcomm* case[195], NDRC determined Qualcomm's dominant position in two markets: i) the license market of SEPs for wireless communication technology, which is a collection of each independent license market constituted by each SEP held by Qualcomm, and ii) baseband chip market, including CDMA baseband chip market, WCDMA baseband chip market, and LTE baseband chip market. NDRC's opinion mainly focused on factors including market share, Qualcomm's control over the relevant market, downstream customers' reliance on Qualcomm's technology/products and market entry barriers. Qualcomm is required to cease anticompetitive conduct, pay a fine of RMB 6.088 billion and implement rectification measures agreed upon by Qualcomm and NDRC. The rectification measures inter alia a ban on cross-licensing of non-SEPs (against the licensees' will and without fair compensation) and unjustified tying practices. Qualcomm is also obliged to modify its sales terms for baseband chips and lower the royalty base: royalty rates for its SEP covering 3G and 4G technologies should be

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[193] *Huawei v InterDigital*, Judgments of 28 October 2013, Guangdong Higher People's Court of China (Yue Gaofa Minsan Zhougzi Nos. 305 and 306).

[194] Although relied on it in theory, the Chinese court did not apply the proportionality principle in royalty calculation. Specifically, it did not analyze how many SEPs were implicated by the standards; how many of these SEPs were granted in China and owned by InterDigital; how many of InterDigital's Chinese SEPs were used by Huawei etc. (Lee & Li, 2015).

[195] *Chinese National Development and Reform Commission (NDRC) v Qualcomm*, Decision of 10 February 2015.

calculated on the basis of 65% instead of 100% of the wholesale price of standard-incorporating handsets sold for use in China in licensing agreements with Chinese customers.

Qualcomm's fine marks an enforcement milestone, the largest fine ever imposed on a single company by a competition authority in the world. This precedent is singular, also due to the particularities of NDRC-led investigations and the broader industrial policy context of market price regulation and local subsidies.[196] Apparently, the pricing enforcement responds to pressure by government and local firms, but it remains to be seen whether the implementer-friendly drivers of the Qualcomm decision effectively protect Chinese smartphone makers in the short term, or China's emerging innovators in the long run (Hou, 2015; Sokol & Zheng, 2016). Hou highlights a less noticeable aspect within the Qualcomm decision: the NDRC seemed to place high burden of proof on Qualcomm. When evaluating the anti-competitive harm of Qualcomm's conduct, the NDRC did not further substantiate its position, but shifted the burden of proof to Qualcomm, which failed to submit relevant evidence. According to Hou, the abusive conduct listed in the AML may have both anti-competitive and pro-competitive implications; unreasonably high prices, predatory prices, refusal to deal, tying and discrimination can easily go two ways. A proper assessment of abusive conduct should thus adhere to a comparison between its pro-competitive effects with its anti-competitive ones, and be based on solid evidence rather than theoretical arguments.

NDRC v. Qualcomm, Decision of 10 February 2015

Following complaints by competitors and industry associations - most notably Mobile China Alliance and the Internet Society of China in early November 2013 - NDRC's investigation of Qualcomm began in November 2013 with a dawn raid at the company's Beijing and Shanghai offices. NDRC devoted substantial resources to the process, including teaming up with external advisors that combed through the substantial volume of collected data. Throughout the investigation, NDRC cooperated closely with the Ministry of Industry and Information Technology (MIIT, i.e., the Chinese telecom and internet regulator) and had several meetings with Qualcomm.

After lengthy investigations and discussions, NDRC imposed a record-penalty of RMB 6.088 billion (USD 975 million) and an additional set of remedies and commitments, including offering wireless SEP licenses separately from non-SEP licenses and presenting a patent list during negotiation. The terms of the settlement apply only to smartphones sold in China by companies based in China. They neither apply to Chinese headsets sold in other countries nor to foreign handsets sold in China.

[196] Since the China's Antimonopoly Law (AML) entered into force in 2008, NDRC has gradually increased its enforcement efforts. NDRC focused initially on local cartels, fining an international cartel (LCD panels) for the first time in January 2013. Since then, NDRC has investigated in various cases of domestic and international cartels and resale price maintenance matters. In 2014, NDRC and its local agencies imposed total fines of approximately RMB 1.8 billion (~USD 293 million) for AML violations. NDRC had not dedicated significant resources in the investigation of market abuse until June 2013, when it launched proceedings against InterDigital, a U.S.-based patent licensing entity. Since then, NDRC has increased its scrutiny of intellectual property rights, as evidenced most recently by its investigation against Qualcomm and the ongoing investigation against Vringo.

3.4.3.2. Japan

In January 2016, the Japanese Fair Trade Commission (JFTC) revised its Guidelines for the use of Intellectual Property under the Antimonopoly Act to specifically address the risks emanating from breaches of FRAND commitments. The revised IP Guidelines state that a refusal to license or pursuit of injunctions against a party who is "willing" to take a license based on FRAND terms can violate the Japanese Antimonopoly Act. Moreover, this type of conduct can be deemed unfair trade practice, even if it does not substantially restrict competition in the relevant product market and does not constitute unlawful monopolization. The JFTC indicates that whether a prospective licensee is "willing" will be judged on a case-by-case basis by the conduct of both parties in the negotiations. The Guidelines however explain that:

i) A party is deemed to be "willing" if it shows its intention to have the FRAND license conditions determined by a court or through arbitration procedures in case that the parties do not reach an agreement on the license conditions even after a certain period of negotiations;

ii) Challenges to the validity, essentiality or possible infringement of the SEP, doesn't make a party, which intends to be licensed on FRAND terms "unwilling".

3.4.3.3. Korea

In December 2014, the Korean Fair Trade Commission (KFTC) revised the Review Guideline on Unfair Exercise of Intellectual Property Rights (enacted in 2000). The IPR Guidelines specify abusive practices in the field of patents, including patent ambush, refusal to license, excessive licenses, discriminatory terms, unlawful concerted act in standardization etc. Section 3 of the amended IPR Guidelines applies specifically to patents relevant to technical standards. As a primary framework for the enforcement of the Korean Monopoly Regulation and Fair Trade Act (MRFTA) in the field of IPR, the Guidelines identify certain types of licensing practices that may be deemed abusive such as unreasonably avoiding or circumventing the granting of a license on FRAND terms, imposing discriminatory conditions when licensing SEPs, or restricting the licensee's exercise related patents. Further provisions address the issues of unreasonable royalty calculation, unreasonable conditions against patent exhaustion doctrine, unreasonable tying or bundling, unreasonable restraints on competition for innovation as well as the activities of Non-Practicing Entities (NPE).[197] The Guidelines establish abusive practices by NPEs as a separate category of IPR abuse and provide examples of such anti-competitive conduct. Despite the KFTC's effort to define NPEs and regulate their activities, NPEs remain unchartered territory in Korea and practitioners still have to cope with a certain degree of ambiguity and legal uncertainty.

Albeit not an enforceable law, the above Guidelines are significant in that they reflect both the general policy stance as well as the Korean regulator's willingness to step up action.

[197] The IPR Guideline reiterates the vague term "unreasonable" without further specifying the types of conduct prohibited by law, introducing relevant benchmarks or allowing for timely notice of the conduct from which an enterprise must refrain in order to avoid administrative sanctions (Hong, 2015).

3.4.3.4. India

In India, the royalty burden owed to foreign firms is often viewed as inequitable by local firms and government, particularly when local competitors do not own their own SEPs. In a series of antitrust complaints filed with the Competition Commission of India (CCI), Micromax, Intex and Best It Worlds alleged that Ericsson abused its dominant position in violation of Section 4 Competition Act by imposing excessive royalties for the use of its patents essential to 2G, 3G, and 4G standards in the Indian market.[198] The complaint alleged that Ericsson "seem[s] to be acting contrary to the FRAND terms by imposing royalties linked with cost of product of user for its patents." Thus, "for the use of GSM chip in a phone costing Rs 100, royalty would be Rs. 1.25 but if this GSM chip is used in a phone of Rs. 1000, royalty would be Rs. 12.5."

Stating that Ericsson enjoyed a complete dominance over its present and prospective licensees in the relevant market, CCI deemed the firm's royalty rates both excessive and discriminatory, given that they were set as a percentage of the price of the downstream product instead of a percentage of the price of the GSM or CDMA chip. Furthermore, Ericsson's refusal to share commercial terms and royalty payments on the grounds of non-disclosure agreements (NDAs) was deemed "strongly suggestive of the fact that different royalty rates/commercial terms were being offered to the potential licensees belong to the same category."

The CCI decisions have undergone scrutiny due to lack of reasoned analysis and economic methodology (see, e.g., Pai & Daryanani, 2016). It is therefore suggested that Indian authorities improve their institutional capabilities, rely more on economic expertise and refine their case law to reflect economic principles (Ghosh & Sokol, 2016).

On the policy level, the Indian regulator is preparing to take action and introduce important changes in the standardization setting. The Indian Ministry of Commerce and Industry recently launched a paper that discusses SEPs and their availability on FRAND terms.[199] The paper aims at raising awareness around the importance of regulating the SEP market while facilitating access to relevant technologies on FRAND terms, and invites stakeholders and the general public to contribute to the emerging policy dialogue with comments and suggestions.

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[198] *Best It Worlds (India) Private Ltd. v Telefonaktiebolaget LM Ericsson*, Case No. 4 of 2015, Competition Commission of India (12 May 2015); *Intex Techs. (India) v Telefonaktiebolaget LM Ericsson*, Case No. 76 of 2013, Competition Commission of India (16 January 2014); *Micromax Informatics, Ltd v Telefonaktiebolaget LM Ericsson*, Case No. 50 of 2013, Competition Commission of India (12 November 2013).

[199] *Discussion Paper on Standard Essential Patents and their availability on FRAND Terms,* at http://dipp.nic.in/english/Discuss_paper/standardEssentialPaper_01March2016.pdf (2016).

3.5. CONCLUSIONS - EVOLUTION OF CASE LAW AND CONVERGING TRENDS

Most cases before courts and competition authorities concerning SEPs are related to patent infringement damages, injunctions or antitrust. A comprehensive comparative analysis of a wide body of case law reveals the following:

Idiosyncrasies of SEP litigation: Complexities in the technologies and licensing practices of SEPs have challenged well-established methodologies and doctrines applicable in the general context of patent infringement. Over time, courts have questioned the "real-world applicability" of existing frameworks and evidentiary rules, leading to modifications and adjustments in the specific context of FRAND. As a result, courts have introduced economic guideposts into the legal analysis. Moreover, within the context of SEP litigation, different standards have different dispute profiles - with the IEEE 802.11 standards attracting the most litigation across various jurisdictions. Portfolio licensing as an established market practice is also becoming the norm in FRAND litigation. The mix of SEP and non-SEPs (FRAND and non-FRAND-encumbered patents) imposes an additional burden on value apportionment and damage calculation.

Incentive compatibility and fair balance of interests: Across various jurisdictions worldwide, policymakers aim for a definition of FRAND that strikes a balance between the need to make standards available on the one hand, and fairly compensate SEP holders on the other. This approach is motivated by the necessity of protecting the rights and legitimate interests of patent owners and standard users, taking into account the broader public interest and welfare. Policymakers recognize the importance of the FRAND definition for economic incentives, including the incentives to innovate, to participate in standard development, and to rapidly implement and adopt innovative technology standards. Moreover, the risk of hold-up is considered a significant factor for the determination of FRAND royalties, even though its empirical relevance is disputed. US courts require supporting evidence that a party behaved in bad faith before considering hold-up for damages calculation.

Converging practice on injunctions: The decision of the Court of Justice of the European Union (CJEU) in Huawei v. ZTE has enhanced convergence across the European national jurisdictions by emphasizing the need for good faith in negotiations toward an actual result over the initial offer of the licensee: injunctions are no longer granted automatically without further consideration of the parties' conduct in the light of their relevant bargaining power. The economic analysis of FRAND licensing highlights the pivotal role of injunctions in mitigating potential harm stemming from bargaining failure and patent hold-up. At the same time, the jurisprudence of the CJEU and national courts in Europe increasingly leverage the award of injunctive relief against unwilling licensees as a means of strengthening bilateral negotiations as the principal forum for determining FRAND licensing terms. The availability of injunctive relief for SEP owners is more restricted in other jurisdictions, including the US, Japan and China. Especially in the US, where injunctions are generally considered inappropriate when a patent owner is committed to licensing his patents, the courts play a more active role in determining the licensing terms when negotiations come to an impasse.

Evaluation of conduct v. emphasis on royalty rates: In the US, reasonable royalties are the most frequent kind of damages awarded in patent cases and comprise a greater share with each passing year. Reasonable royalties aim to award the owner of an infringed patent damages that are proportional to those that the patent owner and the infringer would have agreed upon in a hypothetical negotiation before infringement began. While the guiding principle of the hypothetical negotiation framework is theoretically viable, it is inherently difficult to implement in practice. In order to determine a single royalty rate deriving from

a hypothetical agreement of this kind, US courts are methodologically sophisticated when they approach FRAND. In contrast, European courts are more reluctant to define a single royalty rate. Instead, they focus on the conduct of the parties during the bilateral negotiations and assess whether it complies with the specific FRAND commitments made prior to awarding injunctions.

Core principles of FRAND: FRAND does not describe a single rate, but a range of rates. Therefore, courts suggest a specific analysis for the FRAND calculation that extends beyond the apportionment of the value of the infringing product to the infringed patent typical for the determination of royalties in the general context of damages. In addition to preventing hold-up, this specific analysis follows the two core principles of the ex ante negotiation benchmark:

i) every judicial analysis of FRAND should take place in the framework of the hypothetical bilateral negotiation set prior to standard development if there is evidence that the patent owner modified its royalty requests in response to the standard adoption, and

ii) the incremental value of the patent, i.e., the FRAND royalty rate should be apportioned to the incremental value of the patent.

In the interpretation by the courts, however, the notion of the patent's "incremental value" tends to conflate two concepts, which should be analyzed separately: the stand-alone (intrinsic) value of the patented technology and the value added by the patent to the standard (incremental). Both are relevant for the definition of the FRAND range.

Methodologies for calculating the FRAND royalty: Acceptable methodologies use two sources of observable data, namely the prices of comparable licenses and a royalty base (prices of either the infringing product or a component of this product that practices the patented technology). Although subject to correctives, they reveal useful benchmarks to actual values and established practices and help the courts inform their decisions on the many aspects of royalty calculation. Not measurable directly but approached through proxies, royalty determination has become more technical and fact-intensive, revealing existing evidentiary challenges and data constraints. Related evidence must be reliable and tangible, not conjectural or speculative. There is uncertainty around the appropriateness and sufficiency of submitted evidence (comparable licenses, economic modelling based on market and survey data, etc.). Most royalty determinations establish a FRAND royalty by determining the share of the value of a specific royalty base that is attributable to the patented feature. Regarding the royalty base, the choice between the price of the end product and the price of a smaller component lies at the heart of an ongoing controversy in the US – it should also be remembered that the new IEEE policy chooses the smallest saleable patent practicing unit (SSPPU). Both approaches, however, are not necessarily mutually exclusive, and provide useful pointers for the FRAND determination.

4. COMPREHENSIVE ANALYSIS OF FRAND LICENSING

Based on the cases considered, the following provides a systematic overview of FRAND licensing. We take into consideration the available literature in the field to interpret the core concepts developed in the case law, and use economic analysis to assess whether the methodologies used by courts achieve the objectives set forth by their theoretical definition of FRAND. The purpose of this exercise is to combine the FRAND-defining concepts accepted by the courts into a unified framework for the interpretation of the obligations arising from FRAND commitments.

In line with the case law, we proceed in two steps. First, we analyze the concepts defining FRAND licensing terms, and combine these concepts into a more distinct definition of a FRAND royalty range. We analyze how to implement the theoretical definition of the FRAND range in practice, using empirical data on comparable licenses and product prices. We conclude that there are fundamental challenges to any attempt of translating FRAND obligations into a specific royalty rate. Second, we analyze obligations arising from the FRAND commitment regarding the conduct of parties in licensing negotiations. We argue that this approach can encompass an analysis of a range of FRAND licensing terms. In this framework, FRAND licensing terms must be defined in bilateral negotiations, where the FRAND commitments set the boundaries within which the conduct of the negotiating parties can be deemed compliant. Against this background, we address the implications of a FRAND commitment for both litigation and the conduct of SEP licensing negotiations.

4.1. DEFINITION OF FRAND LICENSING TERMS

In this section, we provide an analytical framework for the definition of FRAND licensing terms. First, we lay out the overarching principles of FRAND based on the teachings of our previous case law analysis and the judicial determination of SEP licensing terms. Courts in many jurisdictions – most predominantly in Europe - have so far restrained from setting FRAND licensing terms for specific licenses. The overarching principles applicable to a judicial adjudication on FRAND terms are therefore those distilled from the US court practice. Second, we interpret the core principles of FRAND in light of the legal and economic underpinnings of the current debate. Third, we develop a consistent framework that builds on the various approaches to FRAND to adequately support the definition of a FRAND range. Finally, we discuss how to implement this framework using data on product prices or comparable licenses.

4.1.1. Principles of FRAND licensing terms

We have observed the following principles being repeatedly used in judicial FRAND analyses. A FRAND royalty rate shall reflect:

1. Ex ante negotiation benchmark: the outcome of a hypothetical ex ante bilateral negotiation between the patent owner and the implementer of the standard practicing the patented feature;
2. Incremental value added by the patented feature to the product implementing the standard (in particular the incremental value over the next best alternative);
3. Ex ante value of the patented feature, i.e., the intrinsic value of the patented feature excluding any additional value resulting from the inclusion of the feature into the standard;

4. Incentive compatibility: a FRAND royalty rate preserves incentives to invent, to contribute patented technology to the standard, and to adopt technology standards including SEPs;
5. Account for royalty stacking and concerns of patent hold-up.

These concepts are useful for the determination of a FRAND royalty rate. In order to determine whether the rate charged to a specific implementer is FRAND, it is also necessary to analyze whether the royalty rate is non-discriminatory. The non-discriminatory part of FRAND characterizes a rate's relationship to other rates, rather than to an intrinsic benchmark relative to the SEP's ex ante value. The analysis of non-discrimination is therefore not part of the framework used to determine a FRAND rate.

Comparison with other accounts of the case law on FRAND

Certainly not all of these principles are unanimously accepted in the literature. Nevertheless, we observe that our list of principles underpinning the judicial FRAND analysis closely overlaps with the analysis of other authors. Siebrasse & Cotter (2016) also attempt to identify some basic FRAND principles as the appropriate starting point for the analysis of FRAND commitments in any given context:

1. The royalty should prevent SEP owners from exercising patent "hold-up";
2. Courts should minimize the risk of "royalty stacking," in which the aggregate royalty burden a seller incurs from marketing a product incorporating multiple, separately-owned patents is disproportionate to the value of the added technology;
3. A FRAND royalty should reflect the incremental ex ante value of the technology in comparison with alternatives;
4. The royalty should be proportionate variously to a) the technology's importance to the standard, b) the technology's importance to users of the standard and c) the value of the standard to the user (the "proportionality" principle);
5. The royalty should not reflect "any value added by the standardization of that technology," that is, "by the standard's adoption of the patented technology"– or, as another court puts it simply, the "value of the standard.";
6. The royalty should be adequate to preserve the patent incentive (the "incentive to invent" principle); and
7. The royalty should provide an adequate incentive to participate in the standard setting process (the "incentive to participate" principle).

4.1.2. Interpretation of the concepts underlying the FRAND definition

The various constructs and tests should not be applied in isolation, but help disambiguate the definition of FRAND in their combination/complementarity. The "fairness" aspect of FRAND imposes an overarching principle of regulating the effects of the various methods or tools applied for the calculation of reasonable royalty rates that are perceived as tipping the balance in favour of either the patent owner (i.e., EMVR) or the licensee (i.e., SSPPU, Georgia-Pacific factors). In other words, the assessment of the "reasonableness" of a royalty rate takes place in the shadow of the notion of "fairness". Defining fairness as a balance of

interests among the stakeholders takes into account the overall market and standardization-specific dynamics, such as fragmentation of patent ownership (PAE, privateers), vertical integration of SEP holders which can be both inventors and implementers, downstream channels, de facto monopoly of strong portfolio owners, etc. In this context, it could also be asked whether and to what extent welfare-improving considerations may impact the determination of FRAND.

Notwithstanding this need to analyze FRAND as a unified concept, it is important to resolve a number of interpretation issues regarding the individual concepts. Several of these principles can be interpreted in different ways, leading to different outcomes of the analysis:

4.1.2.1. Ex ante bilateral negotiation

i) General

An important constant in the US case law on FRAND adjudication is the reference to a hypothetical ex ante bilateral negotiation between the patent owner and the implementer. Using the construct of a hypothetical bilateral negotiation to determine a FRAND rate requires determining the bargaining range of the hypothetical negotiation, i.e., the range of values that would have been acceptable to both parties had the negotiation taken place ex ante. Defining the bargaining range is a prima facie set-up that seeks to reinstate the condition of ex ante competition. The bargaining range is the starting point that requires further qualitative adjustments and economic guideposts. The latter implies that the "range of reasonable values" is within the bargaining range and must be narrowed down through additional steps, as elicited below. Useful guideposts in this direction include:

a) examining the commercial and competitive relationship of the parties in the downstream market at the ex ante point of negotiations; and b) defining the bargaining range, i.e., the range between the licensor's minimum willingness to accept a reasonable license and the (would-be infringer) licensee's maximum willingness to pay.

ii) When is ex ante?

The notion of a hypothetical bilateral ex ante negotiation (or a hypothetical ex ante auction) raises the question what is exactly intended by "ex ante". There is a consensus that the ex ante negotiation (or auction) should be deemed to have taken place before the "lock-in" of the standard into a design choice requiring the use of the patented feature. There are however conflicting interpretations of ex ante which are consistent with this consensual definition.

One interpretation is that the negotiation (or auction) takes place right before the patented technology is irreversibly included into the standard, i.e., before the SSO and standard implementers commit to incurring any sunk investment into the patented feature. Reference to a hypothetical negotiation taking place before any irreversible investment by the standard implementers, provides a safeguard against hold-up by the patent holder.

Standard development is however a process taking place over time, involving multiple irreversible choices and costly investments. In particular, the "lock-in" of a standard into a particular design choice (e.g., the release of a standard version or the "freeze" date of a new standard under development) is preceded by earlier decisions in the SSO (e.g., the approval of a work item initiating the work on the

development of a new feature of a standard), and many patented features result from R&D efforts carried out after such earlier decisions.

A second possible interpretation of ex ante is therefore that the hypothetical ex ante negotiation takes place before the beginning of any standard development effort regarding the patented feature. This interpretation has the advantage that the negotiation takes place before any party incurs sunk investments into the standard, including the sunk R&D investments targeted exclusively at the standard. This would allow the patent holder to charge a royalty accounting for his investment in standard-specific R&D. The outcome of this hypothetical negotiation would typically exceed the outcome of a hypothetical negotiation that takes place after this sunk R&D investment was made.

It is important to underline that under both interpretations, the 'lock-in' is not necessarily a single point in time. As standard development progresses, investments by implementers and patent holders become increasingly difficult to reverse. The best application of the ex ante negotiation benchmark is not to select a specific point in calendar time, but to conceptually specify the bargaining range of a negotiation taking place between the parties, assuming that neither party is irreversibly committed to specific choices made during standard development.

iii) Assumptions about bargaining power in the negotiation

The concept of the hypothetical ex ante negotiation generally determines a bargaining range defined by the willingness to pay of the implementer and the willingness to accept of the patent owner. For the hypothetical negotiation to result in an inclusion of the patented feature, the willingness to pay of the implementer must be at least equal to the willingness to accept of the patent owner. In many cases, the willingness to pay of the implementer will be substantially higher than the willingness to accept of the patent owner. In these cases, the concept of hypothetical negotiation leads to a potentially wide royalty range, instead of a single royalty rate.

This royalty range is equivalent to the range of outcomes that would make both parties better off than the absence of a negotiated agreement. From an economic point of view, any outcome within this range (between the willingness to pay of the implementer and the willingness to accept of the patent holder) is a plausible negotiation outcome, and no single outcome can be singled out without using additional assumptions. The economic literature often uses the concept of Nash bargaining, which is a game-theoretic analysis supporting the presumption that ceteris paribus the outcome of a negotiation will be in the middle of the bargaining range. Courts have repeatedly rejected the concept of Nash bargaining for the purpose of damages calculations. The question how to single out a single rate within the bargaining range remains effectively unanswered to date.

iv) Bilateral nature of ex ante negotiation is questionable

The economic literature has advanced the notion of a hypothetical ex ante auction by the SSO (Baumol & Swanson, 2005; Layne-Farrar et al., 2007) to determine a FRAND royalty rate. The case law has made no use of this concept, and rather refers to the outcome of a hypothetical bilateral ex ante negotiation between the patent holder and the infringer. From an economic point of view, this is questionable for two reasons.

First, the decision to incorporate the patented feature into the standard was never subject to a bilateral negotiation between the patent owner and a single implementer. It is therefore unclear why the royalty should be modelled as the

outcome of a bilateral negotiation. In contrast, it is quite clear that if the inclusion of the patented feature in the standard is to be conceived as a negotiated agreement, this agreement must be a (potentially incomplete) contract between the patent holder and the SSO (to the benefit of the entire set of implementers), rather than a series of different bilateral contracts between the patent holder and each of the potential implementers.

Second, if the implementers are competing with each other in the product market, the outcome of a set of bilateral negotiations between the patent holder and each of the implementers would be higher than the outcome of an auction by the SSO, and it also would be higher than the collective benefit of the implementers from using the patented feature. A set of royalty rates compatible with the outcome of separate bilateral negotiations between the patent owner and each of the implementers would leave the implementing industry worse off as a result of the inclusion of the patented feature. It is doubtful that this is intended as outcome of a FRAND determination. The notion of ex ante auction by the SSO is thus clearly preferable over the notion of separate ex ante bilateral negotiations.

4.1.2.2. Ex ante incremental value of the patent

The abstract construction of ex ante benchmarks is used to set the price that would have resulted from a hypothetical licensing negotiation between the litigating parties prior to the setting of the standard. Central to the various methodologies and applied criteria that attempt to define a FRAND royalty is the reference to the ex ante technological and market set-up of the negotiations, determining the ex ante value of the patent. The latter is further refined as the ex ante incremental value of the patented technology.

In other words, court methodologies based on ex ante benchmarks attempt to "neutralize" the value of the patented technology, i.e., distance it from the standard setting process and the politically loaded environment of competing market players in which its takes place. Through the lens of the licensing parties and by reference to their bargaining power in advance of standard selection (ex ante competition), a set of assumptions and constructs is developed that recreate as best as possible the ex ante licensing negotiation scenario and resulting agreement.

The notion of incremental value has been used in two different contexts. Most prominently, the concept of incremental value refers to the value added by the patented feature to the standard, i.e., the difference between the value of the standard including the patented feature and the value of the same standard without the feature. It is commonly understood that if the patented feature had not been available for inclusion into the standard, the SSO may have had the possibility to select a different feature and to set a different standard. The ex ante incremental value added by the patented feature to the standard should therefore be assessed with respect to the feature's next-best alternative. Formally, the incremental value added to the standard can be defined as the value of the standard including the patented feature, minus the value of a hypothetical standard that would have been set if the feature had not been available. By extension, the incremental value added by the feature to the standard-compliant product is the value of the standard-compliant product minus the value of the product implementing the hypothetical standard (assuming that the hypothetical standard achieves the same network benefits that the factual standard provides for in reality).

The notion of "incremental value", however, is also used to refer to the value conferred to the patented feature by its inclusion into the standard. This is

apparent, e.g., in *Microsoft v. Motorola*, when Motorola's expert acknowledges that an SEP owner is "not entitled to the incremental value that you get because you are part of the standard."[200] The exclusion of this incremental value results in the intrinsic value of the patented feature, i.e., the value of the patented feature that strictly results from the feature's technical superiority, and does not result from the inclusion of the feature into the standard. We can define this intrinsic value as the value of the patented feature in the counterfactual scenario in which the feature is not selected for inclusion into the standard.

These two concepts refer to two different values. The incremental value added by the feature to the standard is distinct from the stand-alone value of the patent if it is not selected for the standard. Assuming that it was beneficial to include the patented feature into the standard, the value added by the patent to the standard should be higher than the stand-alone value of the patent. In order to underline the distinction between these two different concepts, we prefer to use the notions of "incremental value added to the standard" and "stand-alone value of the patent".

Intrinsic and incremental value of the patent

It is commonly accepted in FRAND interpretations that the patentee is entitled to the "value of the patented technology" itself, as contrasted with the value that arises from standardization. The value of standardization is presumably the incremental value resulting from the patent's inclusion into the standard, which has to be disentangled from the patent's intrinsic value resulting from its ex ante technological superiority. In addition, courts have emphasized the "incremental value added by the patent", in particular with respect to the next-best alternative that was available at the time the standard was set. This value measures the increment in the value of the standard due to the inclusion of the patented feature, i.e., the difference between the value of a standard including this feature, and the same standard not including this feature, but its next-best alternative. The intrinsic value of the patented feature and the incremental value that it adds to the standard define the ex ante value of the patented feature. Nevertheless, it is crucial to understand the difference between the intrinsic value of the patent and the incremental value it adds to the standard.

To see this, consider a standard including two components, a and b. The value of a hypothetical standard including only a is v_a, the value of a hypothetical standard only including b is v_b, and the value of the standard including both components is $v_{a+b} = v_a + v_b + v_c$, where v_c is the combination value; or the added value from combining components a and b. The incremental value added by including component a is ${v^I}_a = v_a + v_c = v_{a+b} - v_b$, i.e., the value of the standard including the feature a minus the value of the same standard not including feature a. Similarly, the incremental value added by component b would be calculated as ${v^I}_b = v_{a+b} - v_a$. The sum of both incremental values is $v_a + v_b + 2v_c$, which is larger than the total value of the standard. Adding up incremental values thus may result in an excessive aggregate royalty.

At the same time, remunerating each patent by its intrinsic (stand-alone) value may be insufficient. If developing the component a costs more than the stand-alone value v_a, a FRAND royalty of v_a is insufficient to provide incentives to develop the patented feature. This may be the case in situations in which the value that the patented feature adds to the standard would justify the cost of its

[200] *So Judge Robart in Microsoft Corp. v Motorola, Inc.,* Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 at para 269 (W.D. Wash.).

development. Up to a value of $v^I{}_a = v_a + v_c$, it may be necessary and efficient to pay a royalty rate at least as high as to compensate for the cost of R&D. It is thus clear from this simple numerical example that an incentive-compatible FRAND royalty rate must be somewhere between v_a and $v^I{}_a$, i.e., between the stand-alone value of the patent and the incremental value added by the patent to the standard-compliant product; even though both values may fall outside the range of efficient (incentive-compatible) royalty rates.

In practice, the evaluation of both the stand-alone value and the (incremental) value added by the patent to the standard involves a nexus of assessments that seek to provide adjustments when defining the range of a reasonable royalty:

a) examining for next-best alternative technologies. This aspect takes into account the ex ante competition and considers the utility and advantages of the patented technology over substitutes. The results are different for industries where effective alternatives are available vs. fundamental technologies with no close substitutes;

b) establishing the incremental contribution of the patented technology to the value of the standard over the next-best alternative. This aspect refers to the proportionality principle: the royalty must be proportionate to the centrality of the SEP to the standard, the technology importance to users and the value of the standard to users;

c) defining the upper boundaries of the royalty range by assessing the proportionality of the stand-alone value of the patent to the sales-based value of the end-product. Separating the intrinsic value of the standard from the full market value of the end-product narrows down the royalty range for the specific component based on its technical contribution to the downstream product; and

d) defining the lower boundaries of the royalty range through ex ante benchmarks pertaining to the stand-alone value of the patent. This assessment refers to adjustments based on ex ante benchmarks such as the ex ante market value of the patent, defining the patent holder's opportunity costs or best alternative to negotiated agreement (BATNA). This is the lower bound of the bargaining range, i.e., the patentee would not have accepted a lower royalty rate in a hypothetical ex ante negotiation.

The first two steps are patent-related and address technical aspects, such as the existence of alternative technologies and the technical contribution of the SEP-embedded technology to the standard, also in interaction with other components or features. The third and forth steps address the process of calculating FRAND by taking into account publicly available empirical data that can help us define the upper and lower boundaries of an actual price range. Here, it should be noted that the determination of the ex ante value does not necessarily exclude the use of ex post available information sources, such as standard-related documents and market data (sales/end product prices, ex ante transactions and licenses). Given that only very few negotiated licenses are publicly known, these data repositories provide useful pointers – if not the only pointers. In detail:

a) Examine whether there are any alternative technologies for the specific standard

The starting point for an economically sound definition of FRAND should be the consideration of the extent to which there were close substitute technologies. The setting of a standard necessarily excludes alternative technologies and locks an

industry into a specific method of doing business over an extended period of time. Without the standard setting process, the owners of technologies A, B and C that provide the same level of technological performance can compete freely for market shares. In this hypothetical scenario, the competitive rate at which any of the three licenses its technology would be one that reflects the incremental advantage of one technology over the next-best alternative available ex ante.

Defining the ex ante value of a specific technology in the light of FRAND is an exercise that takes into account this ex ante competitive situation that standard setting supplants in order to calculate the patented feature's value that is stripped from the post-standardization benefits (exclusionary power of the standard owner, network effects of the implemented technology). As a first step, this requires a comparison of the patented technology to the alternatives that the SSO would have written into the standard if the patented feature had not been available. Specifically, the court should "consider the utility and advantages of the patented property over alternatives that could have been written into the standard instead of the patented technology in the period before the standard was adopted," because "the presence of equally effective alternatives to the patented technology that could have been adopted into the standard will drive down the royalty that the patent holder could reasonably demand".[201]

Where alternative technologies could have been used instead of the standard, then the incremental value lies in the incremental profits gained by the use of the standard relative to the profits that could be attained by the use of alternatives. It may also occur – albeit in a few cases – that SEPs responsible for fundamental technologies have no close substitutes. This is widely acknowledged for Qualcomm's CDMA patents, for instance (Bekkers et al., 2011). In this situation, the incremental value added by the patented feature is not bound by the existence of competing technologies, and substantially higher royalty rates could be considered fair and reasonable.

Assumptions about costs of the next-best alternative

As seen above, the incremental value added by the patented feature to the standard is assessed with respect to the value of the standard including the next-best alternative. Also the willingness to pay of the implementer in a hypothetical ex ante negotiation is determined by the increment in implementer profits from using the standard including the patented feature over the profits from using a standard including the next-best alternative.

It is however not always clear what must be assumed regarding the cost of the next-best alternative. While it is generally accepted that this cost is zero if the next-best alternative to the patented feature is in the public domain, there is an important ambiguity in the case that the next-best alternative is also patented. In different economic models, the presence of two competing features leads to different conclusions regarding the price of these features. In a simple model of perfect competition in prices, the price of the superior feature is strictly driven down to the incremental value of the feature over the next-best alternative (i.e., if two features are of equivalent value, they would both be available for free).

Several courts have found these models to be unrealistic, and assume that the presence of alternative features drives down the price that would result from a hypothetical ex ante negotiation, but not as much as to drive down the price to

[201] *In re Innovatio IP Ventures, LLC Patent Litig*., MDL No. 2303, 2013 WL 5593609, at *36 (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

zero.[202] This analysis is compatible with a wide range of economic models of competition, but the precise extent to which the royalty rate must be reduced to account for the existence of alternative features is dependent on more specific assumptions regarding the nature of the competitive process.

b) Assess the contribution of the patented technology to the value of the standard

According to the proportionality principle, the royalty should be proportionate to the technology's importance to the standard and to users of the standard. Central to the court's analysis is the principle "that the parties in a hypothetical negotiation would set RAND royalty rates by looking at the importance of the SEPs to the standard and the importance of the standard and the SEPs to the products at issue"[203] – the higher the importance, the higher the royalty. In *In re Innovatio*, the court's analysis does not include a separate section evaluating the importance of Innovatio's patents to the accused products, but instead merges that analysis into the inquiry about the importance of Innovatio's patents to the 802.11 standard.[204]

The reference to the centrality of the patented feature to the standard does not compromise the ex ante benchmark of the hypothetical negotiations, e.g., by taking into account the network externalities generated by the standardization of the patented technology. Instead, it helps measure how costly it would have been to design around the entire feature. Technical specifications included in standard- and patent-related documentation can reveal helpful information on this aspect.

Given that ex post available empirical evidence can provide accurate and observable information on the value of the standard and, by extension, on the value of the embedded SEPs, it is important to clarify within an established common framework under which conditions ex post gained insight such as market sales and standard-related documentation can be leveraged to shed light into the hypothetical negotiation and maintain the appropriate incentives to invent without compromising the ex ante principles.

Essentiality can also be factored in the incremental value of the SEP insofar it does not drive the rate determination beyond the value contributed by the patented technology: even if the patent is declared essential, or its essentiality is never tested in court, or the patent is perceived as de facto essential, it is always the value of the patented technology that drives the rate determination, not the essentiality.[205]

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[202] *"Accordingly, the court will consider patented alternatives, but will recognize that they will not drive down the royalty in the hypothetical negotiation by as much as technology in the public domain. In other words, the existence of patented alternatives does not provide as much reason to discount the value of Innovatio's patents as does the existence of alternatives in the public domain.",* so Judge Holderman in *In re Innovatio IP Ventures, LLC Patent Litig*., MDL No. 2303, 2013 WL 5593609, at *37 (N.D. Ill. Oct. 3, 2013) (sealed version filed Sept. 27, 2013).

[203] So Judge Robart in *Microsoft Corp. v Motorola, Inc.*, Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823, p. 7 (W.D. Wash.).

[204] *In re Innovatio IP Ventures, LLC* , 921 F. Supp. 2d 903 (N.D. Ill. 2013).

[205] Cf. *GPNE Corp. v Apple Inc.*, No.: 12-CV-02885-LHK, US District Court of the Northern District of California, August 6, 2014, where GPNE's expert relied largely on the essentiality of the GPNE's patents to the standard for his analysis. The court dismissed the expert testimony as "an impermissible black box without sound economic and factual predicates."

Finally, large patent portfolios of SEPs and non-SEPs increase complexity and the difficulties to handle FRAND cases. Here, the plaintiff usually puts forward a small subset of their patents, and it is practically impossible to fight on the validity/infringement of each of them, all the more so as the plaintiff could then open another case with the next subset of claimed SEPs. As a consequence, courts have to adapt and eventually use FRAND determination methodologies that take into account the entire portfolio, possibly with some guess-weighting of the patents.

c) Define the upper boundaries of the royalty range for the patented technology

Once the relative technical contribution of the patented technology to the standard has been defined, we can assess the proportionality of the (incremental) value added by the technology to the sales of a specific product that implements the standard. We can only observe sales of products implementing the entire standard, often including multiple patented features. In other words, we use the sales-based value of the entire standard in order to apportion this value to the distinguished technical contribution of the specific patented feature to the downstream product, as defined in the previous steps. Market prices of standard-compliant products or operational margins of standard implementers encompass the value of the patented technology that is (hypothetically) under FRAND negotiation and eligible to FRAND royalty. The challenge hereby is to correctly disentangle this value from other features and standardization benefits driving the full market value reflected in the price of the end product.

Apportioning the value of the end product to the value of a specific patented feature in clear distinction from all the other patented and unpatented features and non-infringed in the standard is an exercise similar to claim construction during the examination of patent validity.[206] In the case of multicomponent products, apportioning value to a standard-essential component should also take into account its relative value in comparison to other technical contributions embedded in the end product. Observable facts such the strength of the patent (citations, litigation score, validity scope across multiple jurisdictions), other enforcement aspects, portfolio integration/packaged licensing, market transactions etc. can inform and facilitate the apportionment process. Based on the accuracy of pricing data, some scholars suggest multiple patents reading on a standard should be valued in proportion to their marginal contribution ("ex post Shapley pricing"). Approaching the incremental value of the patented technology with awareness of all relevant information that is revealed ex post, including the fact that the patent was incorporated into the standard, it is suggested that, although the patentee cannot capture more than the patent's incremental contribution to the value of the standard, the patentee should also be able to capture some portion of the invention's increase in value attributable to network effects, as revealed ex post (Siebrasse & Cotter, 2016).

d) Define the lower boundaries of the royalty range for the patented technology

While the value added by the patented feature to the value of the standard-compliant products and the implementers' profits define the upper boundary of the royalty range, the lower range is defined by the patent's intrinsic value and best alternative uses of the patents outside the standard. This lower boundary

[206] Cf. *Ericsson v D-Link,* 773 F.3d 1201 at 1232; *GPNE Corp. v Apple Inc.,* ND of Cal. San Jose (August 6, 2014).

defines the patent owner's threat point, or his best alternative to a negotiated agreement, in the hypothetical negotiation. In particular, the patent owner's willingness to accept a negotiated agreement is bound by the revenue the patentee would have been able to make with the patent by refusing the hypothetical agreement. If a patent is truly essential, i.e., the infringer would have used the patented technology also if was not specified by the standard, the patent owner would have legitimately refused any hypothetical agreement that places strong restrictions on the royalty rate.

4.1.2.3. Non-discrimination

The ex ante auction model is designed to curb the potential for ex post opportunism such as patent hold-up. The FRAND commitment however also comprises the prohibition of discriminatory licensing terms. The non-discrimination part of the commitment does not entail a mandate to charge every user of the standard the same royalty (Crane, 2008). Swanson & Baumol (2005) and Layne-Farrar et al. (2007) rather argue that the role of the non-discrimination obligation is to prevent exclusionary conduct by a vertically integrated patent owner. They suggest testing compliance with this obligation by reference to the Efficient Component Pricing Rule (ECPR). This rule mandates that the patent owner charges firms competing with him the same price it charges its own affiliates or the price it implicitly charges itself for the same use of the technology. The rule however allows that different users making different use of the same standard are charged different royalties.

Equal treatment thus does not necessarily mean equal royalty. The justification of license differentials should take into account the implementation of the same standards in a downstream product, while controlling for possible opportunistic behavior based on the ex post value of created by the standard implementer. Georgia-Pacific factor no. 4, i.e., the licensor's established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly, is relevant in this regard.

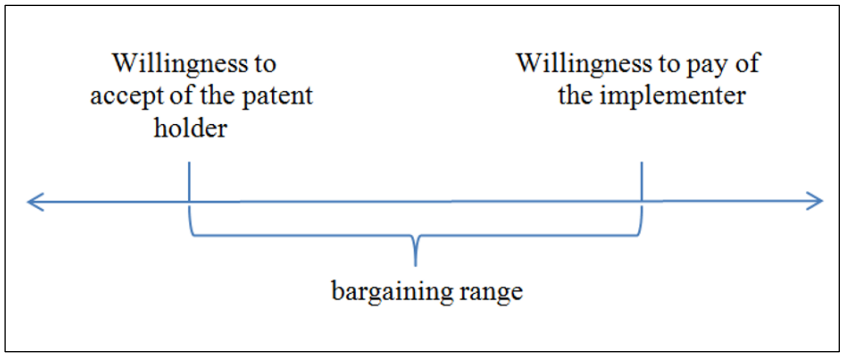
4.1.3. Consistency of the concepts: a unified framework

Next, we will analyze the consistency between different concepts used to define FRAND royalty rates.

Step 1: The bargaining range

It is useful to begin this analysis with the bargaining range of a hypothetical ex ante negotiation. For now, we will assume that the ex ante negotiation takes place after the cost of R&D is sunk.

***Figure 2**: the bargaining range of the hypothetical negotiation*



The bargaining range is defined by the willingness to pay of the implementer and the willingness to accept of the patent holder. The willingness to pay of the implementer is necessarily higher than the willingness to accept of the patent holder (otherwise the bargaining range is empty, and there is no price to which both the implementer and patent holder would have agreed).

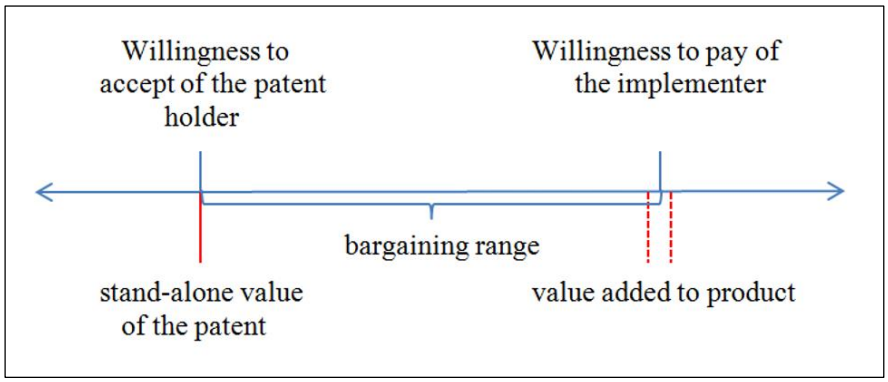
Step 2: Incremental value and stand-alone value of the patent

The willingness to pay of the implementer is equal to the incremental profit of the implementer from using the patented feature, or the incremental value added by the patented feature to the implementer's profits. The implementer would have been willing to pay at most as much as the patented feature adds to his profits. This incremental profit can be defined as the difference between the profit made by the implementer using the patented feature and the highest profit the implementer could have achieved when not using the patented feature.

The incremental value added by the patent to the implementer's profits is related, though not necessarily equal, to the incremental value added by the patented feature to the value of the infringing product. The contribution of the patented feature to the value of the infringing product may be higher than the contribution of the patented feature to the profit of the infringer (e.g., because of the higher cost of producing the good with the patented feature, or because parts of the incremental value are appropriated by consumers or other firms in the value chain), or it may be lower (e.g., if the patented feature generates additional sales; i.e., if the inclusion of the feature shifts not only the price, but also the quantity of the infringing product). The willingness to accept of the patent holder corresponds to the highest possible profit the patent holder could have made by refusing to grant the license. In the FRAND context, this is only possible if the patent holder refuses to make the patent available for inclusion into the standard. The willingness to accept of the patent holder in the hypothetical ex ante negotiation is thus determined by the stand-alone value of the patent.[207]

[207] This interpretation, which ties the intrinsic or stand-alone value of the SEP to the lower bound of the royalty range, was explicitly discussed and recognized in Microsoft v Motorola: "The lower bound of RAND will logically be constrained by the value of the SEP owner's portfolio.", so Judge Robart in *Microsoft Corp. v Motorola*, Inc., Order of Findings of Fact and Conclusions of Law, April 25, 2013, No. 10-cv-1823 at para 626 (W.D. Wash.).

***Figure 3**: Intrinsic and incremental value of the patent*



Step 3: Incentive-compatibility

The next step analyzes the compatibility of the FRAND rate with incentives to innovate and incentives to adopt. We call a FRAND rate incentive-compatible if the rate is such that all investments that were made would also have been made if the parties had known the FRAND rate in advance. In other words, an incentive-compatible FRAND rate is such that it preserves both the patent holder's incentives to innovate and make available his patented technology for inclusion into the standard, and the adopter's incentives to implement the standard without unnecessary delay.

If the royalty does not exceed the willingness-to-pay of the implementer in the hypothetical ex ante negotiation, it preserves his incentives to adopt the standard. The willingness-to-pay of the implementer is by definition the maximum rate the implementer would be willing to pay to have access to the patented feature, i.e., the rate at which the implementer is indifferent between adopting the standard without the patented feature, and adopting the standard including the patented feature and subject to an obligation to pay a FRAND royalty to the patent owner. Any rate exceeding this threshold reduces the adopter's incentives to implement the standard compared to the scenario in which the patented feature does not exist.

If the royalty exceeds the willingness-to-accept of the patent holder, it preserves his incentives to contribute his patented technology to the standard. The willingness-to-accept of the patent holder is by definition the lowest rate that the patent holder would accept in order to make his patent available for inclusion into the standard, i.e., the rate at which he is indifferent between making the patent available for inclusion into the standard subject to a FRAND obligation, and keeping his patent outside of the standard and subject to no FRAND obligation.

The boundaries to the range of incentive-compatible rates are thus directly equivalent to the boundaries of the bargaining range in the hypothetical negotiation. This is not the case for the incentives to produce the patented feature in the first place, i.e., the incentives to innovate as opposed to the incentives to contribute the existing feature to the standard.

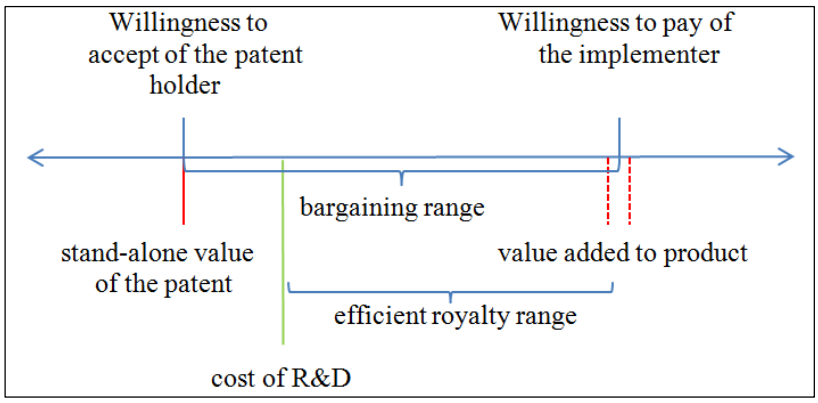
In order to preserve the incentives to innovate, the royalty needs to exceed the cost of R&D (adjusted for risk etc.). There are three different constellations. First, the cost of R&D may exceed the willingness-to-pay of the implementer. In this case, the benefit of including the patented feature into the standard does not justify the cost of its development; and the FRAND royalty rate should not cover the entire R&D cost. The willingness to pay of the implementer is the ceiling for a FRAND royalty, and it is the highest royalty rate compatible with economically efficient incentives. Second, the cost of R&D may be inferior to the stand-alone

value of the patent. In this case, the patent would have been produced independently of the standard; and the royalty rate only needs to preserve the incentives of the patent holder to contribute the patented feature to the standard.

There is a problematic third case, in which the cost of the R&D is within the bargaining range of the hypothetical negotiation. In this case, the patented feature would not have been produced independently of the standard, and the stand-alone value of the patent is not enough to compensate the patent holder for R&D; but the patented feature within the standard adds sufficient value to the product to justify the cost of R&D. A socially efficient royalty rate needs to be set high enough to compensate for the cost of developing such a feature. The royalty rate must at least correspond to the cost of R&D to be socially efficient.

The lower end of the efficient royalty range is thus the stand-alone value of the patent or the cost of R&D -whichever is higher. This is also the willingness to accept of the patent holder in a hypothetical ex ante negotiation taking place before any standard-specific sunk investments are incurred, including the investment into standard-specific R&D.

***Figure 4**: incentive-compatible royalty rates*



Step 4: Account for hold-up and royalty stacking

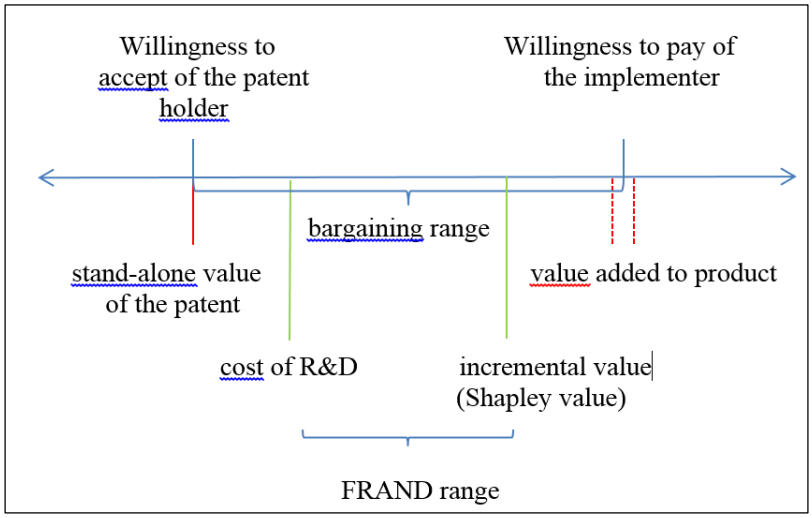
The notion of hold-up is intrinsically related to irreversible sunk investments. By definition of hold-up, a royalty, which is determined before any sunk investments are incurred, is not subject to any hold-up. The willingness to pay of the implementer in the hypothetical ex ante negotiation is thus the value of the patent to the implementer excluding any hold-up value. The willingness to accept of the patent holder in the hypothetical ex ante negotiation before any standard-specific R&D costs are incurred determines the ex ante value of the patent to the patent holder, unaffected by any discount for reverse hold-up.

Finally, the efficient royalty range is subject to royalty stacking considerations. Not any value in the efficient royalty range is compatible with royalty stacking considerations. If a product includes multiple complementary features, the sum of the incremental values added by each of the different features exceeds the value of the product. Remunerating each feature by the entire added value to the product thus results in an excessive total royalty burden. While the R&D cost places a lower bound to the efficient FRAND range which may be higher than the stand-alone value of the patent, royalty stacking places an upper bound which may be lower than the incremental value added by the patent to the product.

There is not one single accepted method of adjusting the notion of incremental value to a situation with multiple complementary components. Several scholars have endorsed the use of the Shapley value, a concept from cooperative game

theory, which allocates to each component its intrinsic value, and distributes the remainder of the value of the end product (the combination value) over components proportionally to their relative contributions. While this value is intended to represent a "fair" distribution of surplus, it is not guaranteed to be economically efficient (e.g., it does not guarantee that each component is sufficiently remunerated to justify the cost of its development). Establishing an economically efficient and legally sound method for sharing the surplus created by combining complementary inputs is still an open avenue for economic and legal research. An efficient FRAND royalty must thus fall somewhere in the range between the stand-alone value of the patent and the incremental value added to the standard, but both the stand-alone value and the value added to the standard can fall outside the FRAND range.

***Figure 5**: The FRAND range*



To summarize, we have combined the overarching principles of the FRAND analysis into a unified analytical framework. The boundaries of the bargaining range of the hypothetical negotiation are intrinsically related to the complementary notions of ex ante value of the patent: the intrinsic, or stand-alone value of the patent, defines the patent owner's willingness to accept (and thus the lower bound of the range), while the value added by including the patented feature defines the implementer's willingness to pay (the upper bound). The bargaining range must be adjusted if the stand-alone value of the patent is insufficient to justify the cost of the patented feature's development, or if the standard includes multiple complementary inputs and the incremental value added by the feature's inclusion includes a combination value which must be distributed over the standard's different components.

4.1.4. Implementation

4.1.4.1. Evidentiary standards

Admittedly, patent valuation is not an exact science. Achieving a high degree of approximation in the calculation of FRAND and coming up with a real value has proven to be a tough challenge for the trial court in view of insufficient evidence or limited access to historic, standard-related and price data – even when available, the latter are tied to entire technologies and multicomponent end-products that already embed or have tested the specific standard in the market.

While the Federal Circuit allows for "some approximation" in the reasonable royalty context, this however "does not negate the Federal Circuit's requirement of 'sound economic and factual predicates' for that analysis."[208]

Frameworks of evidentiary value such as the Georgia-Pacific factors are conceived as a comprehensive list of fact-based requirements that guide damage experts and the trial court through the soundness and probative value of the expert's methodology and submissions. Irrespective of the particularities of the various jurisdictions in Europe, the US and elsewhere, a high standard of proof is the appropriate standard for the evaluation of data-based evidence and multiple variables/calculations that play into the definition of FRAND royalties, ensuring that the latter are economically sound and factually consistent beyond bias (especially in jury trials) and untenable ambiguity.

We have developed a framework for FRAND royalty analysis. We have shown that our framework does not specify a single rate, but a range of rates. In particular, we have argued that there is no accepted economic methodology that could be used to single out a rate in this range as the unique FRAND rate. Nevertheless, it is possible to define the boundaries of a FRAND range, thus specifying whether a particular rate is a FRAND rate (though not necessarily the only FRAND rate). Determining whether a particular rate is FRAND based on this framework is necessarily supported by expert analysis and market data whose probative value will be assessed by the court.

The evolving SEP landscape, the emergence of economic theories and the increasing value of data-driven evidence in patent disputes pose significant challenges to the trial court during patent litigation, both on a substantive and procedural level. Significant procedural differences across the various jurisdictions in Europe and the US will remain – jury trial, cross examination, bifurcation, legally and technically qualified court panels, to name a few. It should, however, be put into consideration whether the threshold imposed by the applicable legal standard for the evaluation of the complex facts in an SEP case is high or adequate enough to ensure that looking into the "blackbox" of available data and the theoretical constructs of various methodologies translates into sound economic and factual predicates.

There are generally two data sources that provide information to calculate a royalty for a specific case: product market prices and the prices of comparable licenses. Product market prices include the prices for the infringing end products, or the prices of smaller components.

The use of these available data to infer a FRAND royalty rate is subject to a significant challenge: as we have seen, the determination of a FRAND rate is the outcome of an informed ex ante analysis. The only available data – both the price of products (end products or components) and the price of comparable licensees – is however determined ex post, i.e., these prices are set after the standard is set. This is not to say that ex post realities and practices should infiltrate the ex ante considerations, rendering the FRAND limitations irrelevant; rather it signifies that ex post available information offers significant pointers, benchmark values and practical references for discount and comparative purposes as part of the procedural and fact-finding "realities" imposed by litigation and the well-established evidentiary rules in the respective jurisdictions.

[208] So Judge Rader in *Cornell Univ. v Hewlett-Packard Co.,* No. 01-cv-1974, 2008 WL 2222189, at *2 (N.D.N.Y. May 27, 2008).

4.1.4.2. Product market prices – choice of royalty base

An important source of empirical information about the ex ante value of a specific SEP for a specific standard-compliant product are product market prices. This includes the price of the product itself and the price of its patent-practicing components. The choice of using end product or component prices is called the choice of the royalty base.

When using product market prices to identify the FRAND range, it is important to highlight that product market prices can only provide information on the right side of the range: product prices can provide information on the value that a patented feature adds to a product (or component), and can thus reveal the willingness-to-pay of the end product maker for the patented feature. Product market prices (end product or component) do not provide any information on the willingness-to-accept of the patent holder, which is a function of alternative standards or other uses that were available to the patent holder instead of making available the patent for the standard. The price of standard-compliant products does not provide information on R&D costs or the hypothetical value of alternative technologies, unrelated to the standard. Product market prices (end product or component) can thus only reveal the upper bound of the reasonable royalty range: they can indicate the value that the patented feature adds to a product; a royalty exceeding this value is not a reasonable royalty.

Disputes regarding the choice of the appropriate base for calculating reasonable royalties have proven to be pivotal in many cases of litigation on FRAND royalty rates. SEP infringement cases usually involve multi-component products; thus raising the issue of apportioning the value of the end product to its different components. In these cases, courts can exercise considerable discretion in the calculation of reasonable royalties. In particular, reasonable royalties can be calculated either as a small fraction of the value of the entire product, or as a larger fraction of a smaller base, i.e., a component of the complex product; or as a combination of both approaches.[209] Given their latitude in the choice of a base, courts have come up with very different results.

In Section 3.3.2., we have discussed two important concepts that guide the choice of an appropriate royalty base in the US case law: the Entire Market Value Rule (EMVR) and the concept of the Smallest Saleable Patent Practicing Unit (SSPPU). The EMVR establishes that when a patented feature does not drive the entire demand for an end product, the value of the end product must be apportioned to the patented feature. The SSPPU is an evidentiary rule developed much more recently by the Federal Circuit, which often requires patent owners to carry out this apportionment by choosing as a royalty base the price of the smallest product component, which directly implements the patented invention. While EMVR and SSPPU are concepts emanating from US case law, the new IEEE SA policy closely follows the idea of the SSPPU and holds that FRAND royalty rates should be assessed by reference to the price of the smallest saleable standard-compliant product. This policy will apply to SEP owners and implementers of IEEE standards anywhere in the world, underlining the necessity of analyzing the usefulness of the concepts of EMVR and SSPPU for determining a FRAND royalty rate.

In this section, we will discuss the overarching legal and economic principles that determine whether a specific end product or component price is an appropriate royalty base for the purpose of FRAND calculation. We argue that it is necessary to move beyond the concepts of EMVR and SSPPU. There is considerable controversy regarding the role of these tests. In particular, EMVR and SSPPU are often erroneously understood as describing two alternative royalty bases (the end

[209] *Ericsson v D- Link,* 773 F.3d 1201 at 1226 (Fed. Cir. 2014).

product and a component price). Framing the analysis of the royalty base as a choice between end product and SSPPU is misleading and not particularly useful. First, the end product and the SSPPU are often not the only existing alternative bases. Second, the SSPPU often itself comprises various features, so that using the SSPPU as a royalty base is insufficient to implement the apportionment required by the EMVR. Third, using the SSPPU as the royalty base may undervalue the specific technology (Stark, 2015). Ultimately, the value of an invention lies in the idea itself, and the benefit that idea imparts not to a particular chip or component, but rather to the ultimate user of the final product. More generally, EMVR and SSPPU should not be understood as describing two alternative bases at all; rather, they represent two separate, orthogonal tests.

The EMVR analyzes the role of the patented feature for the demand for the end product, whereas the SSPPU analyzes the existence of a separate market for any smaller component practicing the patent. These tests are totally orthogonal to each other, and therefore are neither mutually exclusive, nor do they exhaustively describe the set of available bases. The choice of the royalty base is not limited to a choice between two bases, nor is the application of the EMVR and the SSPPU sufficient to identify the most appropriate base.

Our approach to the analysis of a royalty base for FRAND determination encompasses a four-step methodology. The proper application of the EMVR and the identification of the SSPPU are an important but insufficient first step, leaving a substantial margin for choosing different royalty bases. This renders the application of the other three steps pivotal in our effort to narrow down the choice of an adequate royalty base. In detail, we suggest to examine each royalty base (price of the end product or any smaller component) using the following four criteria:

a) Examine whether the suggested base (end product or component) satisfies the EMVR. Examine whether the suggested base (end product or component) is the SSPPU.

EMVR and SSPPU, if properly understood, are useful, because they both define the lower bounds, i.e., the smallest component that provides a market price signal, which can probably be used as a base.

If the end product (or compound component) satisfies the EMVR, the patented feature really accounts for the entire value of the product or component; there is no need to do any apportionment, and the rest of the analysis does not apply. If the product or component does not satisfy the EMVR, the patentee must apportion the value to the patented feature, "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."[210]

If the patented technology is the SSPPU, it is impossible to use the price of a smaller component as a royalty base. This does not dispense the patentee from apportioning the value of the SSPPU to the patented and non-patented features by lowering the rate, but the SSPPU is the smallest unit providing any information on market prices that could be used to calculate the value of the patented technology. The SSPPU is the lower bound of the range of component prices providing meaningful market information on the value of the patented feature. Apportionment beyond the value of the SSPPU must rely on non-market based information, such as consumer surveys (through conjoint analysis).

[210] *Ericsson Inc. v D-Link Sys. Inc.,* 773 F.3d 1201 at 1226 (Fed. Cir. 2014).

In this understanding, EMVR and SSPPU still have a role, but they don't rule out bases that satisfy neither the EMVR nor the SSPPU, and they don't give any priority to a base only because it satisfies either the EMVR or SSPPU. Showing that a base is larger than a base satisfying either the EMVR or SSPPU should not preclude reference to the larger base. That a patented feature fully accounts for the value of a component does not mean that the value of the component fully accounts for the value of the patented feature. Similarly, showing that a component is the smallest patent-practicing component that is independently traded does not do anything to prove that the price of the component measures the full value that the patented feature adds to the infringing product. EMVR and SSPPU define two lower bounds to the range of possible royalty bases, and can only constitute a first step in the analysis.

Overall, EMVR and SSPPU provide little guidance as to how the courts should assess whether a particular price or price difference is an adequate base for measuring the incremental contribution of a patented technology to the value of a good. This brings us to the next three steps.

b) Examine whether the price of the chosen base accounts for the value of the technology.

This is the informativeness requirement. If not met, the base simply does not account for the value of the technology. There is then no need to pursue the analysis any further, because no methodology can take you to a reasonable royalty starting from a price that does not account for the value of the technology.

The price of a component smaller than the end product is informative only if the price of the component reflects the cost of accessing the technology, or the component maker has substantial market power.[211] In particular, the price that the infringer has paid for the infringing component is an informative royalty base only in particular circumstances. This is only the case if the component is produced with market power, and production costs and the value of other features of the product are negligible. These are very restrictive conditions that are not likely to be met in many SEP cases.

The price of a non-infringing component is a very good indicator for the value of the technology, because it is determined after incorporating the cost of accessing the technology. Furthermore, it is a good indication of the royalty that an infringing end product maker (that has used an infringing component instead of the available non-infringing component) should pay. Indeed, the end product maker could have lawfully accessed the patented technology by purchasing the non-infringing component. The price difference between the infringing component and the non-infringing alternative would thus be a good basis for estimating the value of the patented feature. There are only few examples where courts were able to identify prices of non-infringing components. In *LaserDynamics v. Quanta Computer,* the court considered the price of the infringing component as well as the price of a replacement batch sold by a licensed manufacturer. The substantial price difference between the licensed and unlicensed components accounts for the value of the technology, and would be a good indication for the amount the infringer would have agreed to pay in a hypothetical licensing negotiation.[212]

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[211] Note that this discussion is not restricted to the smallest saleable component, but applies to any component smaller than the entire product.

[212] Even though the district court considered the price of the non-infringing replacement batch, and the Federal Circuit did not challenge the use of this price as one reference point, unfortunately neither court explicitly recognized that it was the fact that the

The price of an unlicensed component does not necessarily account for the value of the technology (Baron, 2016). If the component manufacturer has substantial market power, the price he charges the end product maker for the component is an indication of the end product maker's willingness to pay for access to the patented feature embedded in the component. A firm with market power can set a price that reflects the value of the product. If the component manufacturing industry is sufficiently competitive, the price of the component reflects nothing else than the marginal cost of producing the component. If in addition the component maker is not licensed to the patent, there is no reason to expect the cost of producing the component to reflect the incremental value of the technology. In the case of computer chips, "basing a royalty solely on chip price is like valuing a copyrighted book based only on the costs of the binding, paper, and ink needed to actually produce the physical product. While such a calculation captures the cost of the physical product, it provides no indication of its actual value."[213]

The price of the end product always accounts for the value of the end product and all of its features. While it is true that competition between unlicensed end product manufacturers drives down end product prices as well, and a part of the value of the end product is captured by the consumer surplus, the price of the end product accounts for the share of the value of the product, which is captured by the end product maker. This share constitutes the basis of the end product maker's willingness-to-pay in a hypothetical negotiation. The manufacturer would not have been willing to pay more for a licensed use of the patent than the incremental profit he could make from the use of the patent in the industry. If this level of profits is deflated by strong competition and widespread patent infringement by competing end product makers, the reasonable royalty must be reduced accordingly.

The royalty base: an applied economic model[214]

The ex ante negotiation benchmark can be used to define an upper bound to a reasonable royalty. We therefore must compare the factual, observable profit made by the infringer with the counterfactual profit that he would have made without using the technology.

We can write the infringer's profit as:

$$\pi_I = q(p - p_c - c)$$

Where q is the quantity of sold end products, p is the observable end product price, p_c is the price of the component implementing the patented feature (paid by the end product maker to a component supplier), and c is the end-product maker's per-unit cost (we assume that cost is independent of the use of the technology, i.e., the incremental cost of producing the product with the patented feature is fully captured by p_c).

We can compare this profit to the non-infringement profit, i.e., the profit that the same end product maker would have made had he not used the technology

$$\pi_{NI} = \hat{q}(\hat{p} - c)$$

component was licensed that made it a valid reference point; *LaserDynamics, Inc. v Quanta Computer Inc.*, 694 F. 3d 51 (Fed. Cir. 2012).

213 See the district court decision, *CSIRO v Cisco*, 2014 WL 3805817 at *11.

214 This is an excerpt from Baron, *The appropriate royalty base for calculating reasonable royalty rates. An economist's perspective.* Working paper, 2016 (forthcoming).

Where $\hat{q}$ is the counterfactual quantity of products that he would have sold if the products did not implement the patented feature, and $\hat{p}$ is the counterfactual price of this product. We assume $0 \leq \hat{q} < q$ and $c \leq \hat{p} < p$ (the patented feature adds value to the product, and the end product maker would make a non-negative profit even without using the patented feature). His profit from using the technology can then simply be written as

$$\pi_I - \pi_{NI} = q(p - p_c - c) - \hat{q}(\hat{p} - c)$$

Dividing by q gives the maximum per unit royalty rate compatible with a royalty the infringer would have agreed to pay in a hypothetical ex ante negotiation

$$\dot{r} = p - p_c - \frac{\hat{q}}{q}\hat{p} - \left(1 - \frac{\hat{q}}{q}\right)c$$

A reasonable royalty requiring less information can however be defined as the difference between the observable price of the infringing end product and the counterfactual price of the same product if it did not incorporate the patented feature, minus the price of the component implementing the patented feature.

$$r_{reasonable} \equiv p - \hat{p} - p_c$$

This is a reasonable royalty, because it is always lower than the maximum amount that the infringing end product maker would have agreed to pay in the hypothetical ex ante licensing negotiation:

$$\dot{r} - r_{reasonable} = p - p_c - \frac{\hat{q}}{q}\hat{p} - \left(1 - \frac{\hat{q}}{q}\right)c - p + \hat{p} + p_c$$

$$= \left(1 - \frac{\hat{q}}{q}\right)(\hat{p} - c)$$

This is always bigger than 0 ($\frac{\hat{q}}{q}$ is between 0 and 1, and $\hat{p} - c \geq 0$).

The difference between the end product price and the price of the same product not including the patented feature, minus the cost of implementing the patented features, thus constitutes a reasonable royalty, provided that the counterfactual price of the product without the patented feature can be properly identified.

The price of the infringing component does not always provide an appropriate base for calculating the reasonable royalty. A royalty based on a component price can be excessive even if the only function of the component is to implement the patented feature. We define $r_{Component}$ as a royalty based on the component price paid by the infringer:

$$r_{Component} \equiv p_c$$

$$\dot{r} - r_{Component} = p - 2p_c - \frac{\hat{q}}{q}\hat{p} - \left(1 - \frac{\hat{q}}{q}\right)c$$

We know that $-\frac{\hat{q}}{q}\hat{p} - \left(1 - \frac{\hat{q}}{q}\right)c < 0$. Hence, for a sufficiently large component price, and in particular for $p_c \geq \frac{1}{2}p, r_{Component}$ cannot be a reasonable royalty. The simple reason is that the price of the component is a cost to the end product maker. Basing the royalty payment on the price of the component is asking him to pay once again the price that he has already paid for the patented feature, instead of asking him to pay what he hasn't paid yet.

While the price of the end product always accounts for the value of the patented feature, this does not mean that it is always possible to identify this value from the price of the end product.

c) If this is the case, examine whether a method exists to reliably isolate and identify the value from this price.

Once the informativeness principle is satisfied, the selected royalty base must also satisfy a practicability requirement which states that it must be possible to separately identify this value based on the chosen price.

When inferring the incremental value of the technology from the price of the end product, retrieving information on incremental profits can be assessed by considering demand for products with patented features and contrasting that demand with demand for the same product without the patented features (see, Allenby et al., 2014). This is an identification problem, and more complicated than a mere factual price comparison of different products. The latter is a source of error for two reasons. First, prices in a market are jointly determined. The existence of the product including the patented feature can (and often does) deflate the price of other products that may be used for comparison. Absent the infringement, the other goods would be sold at a higher price. Second, firms often choose to include the most advanced patented features in their most expensive goods. This may result in an endogeneity problem: the infringing good may be more expensive than other goods for reasons totally unrelated to the patented feature. It is the fact that the good is more expensive that explains why it includes the patented feature, not the use of the patented feature that explains the price difference.

Another common situation also represents a fundamental challenge to identification. If an end product maker has a substantial brand value, differences between the prices of products sold by the same firm typically overstate the value of the incremental features of the more expensive good. The price of the more expensive good reflects the willingness to pay of consumers with a higher valuation of the brand, whereas the price of the less expensive good reflects the willingness to pay of consumers with a lower valuation of the brand. The price difference between the two products thus includes not only the value of the incremental features, but also a share of the brand value.

The risk of measurement errors resulting from the use of end product prices furthermore scales up if a patented feature only drives a very small share of the value of the end product, or is implemented in a "component of a component of a component". While the informativeness requirement places no bound on the number of layers between the SSPPU and the appropriate base, for reasons of practicability it is therefore advisable to keep this number as low as possible.

Inferring the incremental value of the technology from the price of a component smaller than the end product equally reveals some bottom-up identification challenges. As stated above, a particularly appropriate royalty base is the price of a non-infringing component observed in a different, comparable transaction. The price difference between an infringing and a non-infringing component is a satisfactory royalty base, because the end product maker could have avoided the need to obtain a license by using a non-infringing component. Nevertheless, it must be kept in mind that the real test is once again a counterfactual observation. The true comparison price must be the price that the end product maker would have paid if he had had to purchase a non-infringing component. This may be more or less than what was charged to other end good makers buying non-infringing components (the accused infringer may have had to pay more if he makes more valuable end goods, or less if he has more bargaining power). Also, the existence of the infringing component drives down the prices that can be charged for the non-infringing components.

There may be many industries in which there are no suitable price observations of non-infringing components, because the patent or similar patents are not commonly licensed to this specific component manufacturing industry. In these

cases, the price of a component is unlikely to even include the value of the technology, so that there is no methodology that could adequately measure the value of the technology on this base.

The identification challenges may be overcome using consumer surveys, in particular through conjoint analysis. In order to analyze the consumers' willingness to pay for a patented feature, the US courts have increasingly relied on consumer surveys to measure the value of a patented feature in damage calculations.[215]

d) Assess whether the reference to the base nevertheless invites for confusion and may mislead the jury in its decision.

If a base carries information on the value of the technology, and it is practically possible to identify and isolate that value from other factors contributing to the price of that base, it is also necessary to make sure that the reference to the base does not induce a cognitive bias. This last requirement relates to the psychology of courts and juries, and states that care must be taken not to mislead the jury about the value of the technology by establishing a reference to the value of a base.

If the purpose of citing the final good price is to make the damage award look small in comparison, reference to the end good price is prohibited under an evidentiary rule clearly laid out by the Federal Circuit. At its core, the purpose of this evidentiary rule is to ban frivolous references to the value of the non-infringing features of the good that purposefully mislead the jury. When the reference to the end product price does not fall under the evidentiary rule, because the choice of the end product price as a base is motivated by factual evidence, a very large base still has the potential to "skew the damages horizon". Juries may be disinclined on grounds of "fairness" to grant very low rates: "The disclosure that a company has made $19 billion dollars 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."[216]

Symmetrically however, an appropriate compensation may be a very large share of the price of a component implementing the patented feature (and not restricted to values below 100%, as we have seen). Juries may also be disinclined on grounds of fairness to grant very high royalty rates, especially rates higher than 100%. The absence of bias requirement could apply in particular if several calculation methods pass the other tests, or if a royalty calculation can also be based upon additional reference points (such as comparable licenses). In these cases, it can be a judgment call whether adding another reference point may be helpful. If the additional reference point relies on a very small or very large base that requires either a very high or very low rate to yield a reasonable royalty, it may be a good idea not to allow this additional information to be presented as evidence.

4.1.4.3. Comparable licenses

The other main source of empirical information that can be used to implement the FRAND framework in practice is the price of comparable licenses. Comparable licenses can reveal the likely outcome of a hypothetical ex ante negotiation. If a

[215] See, e.g., *Summit 6, LLC v Samsung Electronics Co., Ltd.*, 802 F.3d 1283 (Fed. Cir. 2015).

[216] *Uniloc USA, Inc. and Uniloc Singapore Private Limited v Microsoft Corp*., 632 F. 3d 1295 at 1320 (Fed. Cir. 2011).

license can be found that was concluded under conditions sufficiently similar to the conditions of the hypothetical ex ante negotiation, the outcome of the hypothetical ex ante negotiation can be expected to be similar to the outcome of this factual licensing negotiation.

Comparable licenses reflect an agreement of similarly situated patent holders and implementers. Comparable licenses thus provide an indication of one rate within the bargaining range between the willingness to pay of implementers and the willingness to accept of patent holders. If a truly comparable license can be found, and the comparable license was concluded ex ante, the price of this license can be deemed to be a FRAND rate (even though there may be many other FRAND rates).

Part of the evidentiary procedure is the assessment of both the technical and economic comparability of existing licenses and whether these are probative of the hypothetical negotiations or not (cf. also the threshold of the Georgia-Pacific factors no. 1 and 2). For instance, comparative licenses that involve the same parties, relevant technology, and are close in time to the date of the hypothetical negotiation have been deemed "sufficiently comparable".[217] On the premises that prior licenses are almost never perfectly analogous to the infringement action, i.e., allegedly comparable licenses may cover more patents, include cross-licensing terms, cover foreign intellectual property rights, or be calculated as some percentage of the value of a multi-component product, adjustments for non-comparable licenses are deemed necessary: district courts performing reasonable royalty calculations are "cautioned [...] and must account for differences in the technologies and economic circumstances of the contracting parties."[218] In that spirit, where expert testimony explains to the jury the need to discount reliance on a given license to account only for the value attributed to the licensed technology, the mere fact that licenses predicated on the value of a multi-component product are referenced in that analysis is not reversible error.[219]

With reference to existing licenses and related policies, the Georgia-Pacific factors 1-3, 6 are relevant. Comparable licenses, patent pool rates, cross-licensing agreements present useful benchmarks. On the opposite end of licensing practices that are detrimental to implementers such as royalty stacking, the aggregate burden on the standard is or can be a practical parameter in top-down approaches to royalty determination: defining first a royalty rate for the entire standard, and then splitting it within a licensed portfolio is a means of preventing the risk of stacking too much royalty if per patent (or portfolio) royalty rates are determined one by one without consideration of the final effect at a more aggregate level. Further adjustments related to multi-component products and worldwide portfolio licensing burden the value apportionment with additional challenges, particularly in view of the ex post centrality of the standard in a multi-component or packaged licensing; network externalities that impact de facto essentiality as a proportion to the downstream product and its correlation to the value of the patented technology (more valuable patents are more likely to be declared essential; declared but not judicially validated essentiality does not automatically increase the incremental value or drives the rate determination); combinatorial value of SEPs (complementarity v. substitutability, "fixed-proportion" production of downstream products); portfolio bundles of SEPs with non-SEPs/ patented with unpatented features/ infringing with non-infringing components etc. The above complexities may result in a shift of the burden of proof towards SEP holders. In any case, a reasonable royalty should be based on

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[217] See, e.g., *SSL Services, LLC v Citrix Sys., Inc.*, Appeal No. 2013-1419, -1420 (Fed. Cir. October 14, 2014).
[218] *VirnetX, Inc.v. Cisco Systems, Inc.*, 767 F.3d 1308 at 1330 (Fed. Cir. 2014).
[219] *Ericsson v D- Link,* 773 F.3d 1201 at 1228 (Fed. Cir. 2014).

the disaggregated value of the patent(s) in suit and the demand attributable to the patented feature.

The most significant challenge to the use of comparable licenses is that there are usually no licenses concluded ex ante, prior to standard setting, and courts use comparable licenses concluded ex post. These ex post negotiations take place after infringement has already taken place, and are thus conducted in the shadow of litigation.

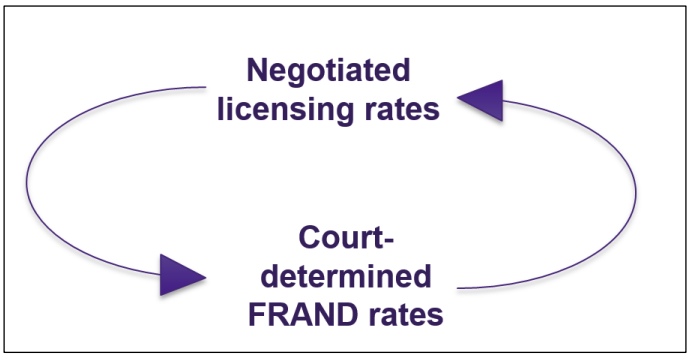
Setting the royalty calculation in the broader context of litigation involves considering to what extent assumptions of essentiality, validity and infringement may inform the royalty calculation; and to what extent existing licenses were the result of the (implicit, explicit or realized) threat of an injunctive relief. Court proceedings offer an independent venue for continuing the negotiations by other means – the courts interpretation of FRAND commitments impacts the ability of the SEP holder to impose a given rate or of the infringer to "hold-out". The ex post context of litigation proceedings under the (realized) threat of filing a motion for prohibitive orders or pending validity/infringement proceedings with uncertain outcome allows insight into the specific dynamics of the case, e.g., it informs on the aspect of de-facto essentiality, strength of patent/patent-portfolio, litigation score, shifts in the bargaining power of the parties, evolving commercial relationship and opportunistic behavior, aggressive enforcement strategies etc.

Observing these factors does not imply modelling FRAND negotiations according to ex post determinants, but it may help provide adjustments against potential fallacies inherent to the hypothetical negotiation construct while preserving the appropriate incentives to invent and participate in the standardization process. In practice, some European and US courts have examined essentiality, validity and infringement or at least taken into account the probabilities related to these outcomes.

From an economic point of view, the use of comparable licenses concluded ex post, after beginning of the infringement, presents almost unresolvable complications. Comparable licenses are a good indication of the value of the patented feature if they signal the ex ante willingness to pay of an implementer to obtain access to the patented feature. If the license is negotiated ex post, after the implementer already incurred sunk implementation costs, the license may reflect more than this ex ante willingness to pay, and also include a hold-up value. This risk has led some commentators to reject licenses negotiated under threat of injunction as a comparable license, because these licenses may indeed reflect a hold-up value.

On the other hand, if the license is negotiated ex post, and the alternative for the implementer to signing the license is continued infringement, the price of the license does not reflect the ex ante willingness to pay of the implementer for access to the patented feature, but only the willingness to pay to forego the available remedies for patent infringement. This induces a risk of perfect circularity. The willingness to pay of the implementers for licenses to patents that they already have used is determined by their incentive to forego litigation with a resulting damages award. The willingness to pay of implementers for SEP licenses, and hence the observable royalty rates, are thus a function of the expected damages awards. At the same time, damages are calculated as a function of prevailing royalty rates.

***Figure 6**: Circularity problem resulting from the use of comparable licenses*



This is a situation leading to multiple equilibria: if the parties of licensing negotiation expect that damages will be very large, patent holders will ask for and implementers will consent to higher royalty rates. As damages are calculated with respect to the negotiated royalty rates, damages are indeed large, so that the beliefs of the parties are correct. If, however, parties expected damages to be low, implementers will only consent to and patent holders will accept lower royalty rates, leading to lower damages awards. A large number of different rates could thus arbitrarily become the prevailing reasonable royalty rates; and there is no particular reason to expect that these royalty rates fall in the FRAND range.

4.2. INTERPRETING FRAND IN THE CONTEXT OF LITIGATION

4.2.1. Overview

In Section 4.1., we established that the theoretical concepts underpinning the definition of FRAND do not determine a FRAND rate, but a range of rates that can be considered FRAND.[220] In many instances, it is plausible that this range is very large. Furthermore, we have seen that implementing the FRAND framework requires complex hypothetical analyses, comparing factual outcomes to counterfactual states of the world in order to understand the ex ante competition between features and the bargaining position of the parties in a hypothetical ex ante negotiation. This implementation is necessarily based on strong assumptions and on limited empirical data, which can only provide information on some aspects of the FRAND range, but not shed light on the entire range. Finally, even if the entire FRAND range could be inferred from available empirical data, there is no accepted methodology for singling out a unique FRAND rate from this range.

Given these significant limitations, some commentators do not come to terms with the vagueness of the FRAND commitments: "[…] Without some idea of what those terms are, reasonable and non-discriminatory licensing loses much of its meaning." (Lemley, 2002); "From the perspective of a potential product vendor, the theoretical reasonable royalty rates suggested by most commentators thus seem no less indeterminate than the vague FRAND commitment that they seek to clarify." (Contreras, 2013).

[220] By comparison, Contreras (2012) highlights that the term "reasonable" per se implies that there is not a single acceptable royalty rate in a given situation (industry, type of technology, firm scale, nature of transaction), but that royalties may span some *range* of "reasonable" values within the limitations imposed by FRAND commitments.

The difficulties of determining a FRAND rate based on the accepted legal concepts and evidentiary methods do however not necessarily imply that the FRAND obligation lacks content. Contreras (2012) carves out a list of overarching principles that should underlie any FRAND solution:

1) Certainty is preferable to uncertainty concerning the cost of implementing a technical standard. Greater certainty regarding the cost of implementing standards should be beneficial to those who are considering the design and eventual adoption of standards.

2) There is a meaningful upper limit on reasonable royalty rates. There are some finite and objective limits on the level of royalties subject to a RAND commitment, definable by criteria other than the wishes of the patent holder.

3) Information regarding RAND licensing terms should be available *before* adoption of a standard. Despite the various criticisms of ex ante disclosure policies as they are currently understood, general notions of efficiency and fairness still seem to tilt the balance toward a need for greater transparency of royalty rates and other terms for SEP licenses.

4) Individual RAND commitments must be constrained by the *aggregate* royalty burden on a standard. Royalty stacking being a issue of magnitude rather than one of disclosure, it is critical that, in the context of technical standards, any assessment of the "reasonableness" of an individual patent holder's royalty rate take into account the overall number of SEPs applicable to a standard and the aggregate royalty burden on the standard.

5) Non-SEPs must *not* be bundled with SEPs. The so-called bilateralist argument that vendors almost always wish to license non-SEPs in addition to SEPs, thereby rendering RAND commitments irrelevant, is often contradicted by established practice in certain industries and could be answered by expanding the universe of SEPs to include commercially essential patents.

6) SEPs should not be used to block implementation of a standard unless the recovery of monetary compensation is impossible. If a patent holder is found to have offered a royalty that is reasonable within the meaning of its RAND commitment and its actions for monetary damages have been unsuccessful or cannot be maintained due to legal or jurisdictional obstacles, then injunctive relief preventing the further manufacture and sale of the standardized product by the defaulting vendor would be appropriate.

7) RAND commitments should travel with the patent. It is widely acknowledged that RAND commitments made by a patent holder with respect its SEPs should bind any subsequent holder of those SEPs

Bearing these guideposts in mind, it is important to recognize that, although the licensing terms for SEPs are generally determined in bilateral negotiations, these negotiations take place in the shadow of litigation. Both the prospect of a judicially defined FRAND rate – typical for the US practice – as well as the threat of injunctions – mostly in the European context - have significant impact on the determination of FRAND licensing terms during bilateral negotiation. The following sections look into this aspect against the background of divergent approaches and evolving trends across the various jurisdictions.

4.2.2. Enforcing the FRAND commitment

4.2.2.1. Third-party determination of FRAND rates

In Section 4.1., the discussion of the FRAND framework renders clear that the determination of a FRAND rate for a specific dispute is costly and complicated. The significant cost of producing the evidence and analysis required to make an informed decision raises the question of the best allocation of resources devoted to this activity. Different mechanisms are available for this task, and in particular judicial adjudication, bilateral negotiations and arbitration. Each of these mechanisms has its relative advantages, and an effective mechanism for FRAND determination must most likely rest on some combination of these tools.

Highlighting the effectiveness of bilateral licensing, Epstein et al. (2011) argue that the flexibility inherent to FRAND obligations is both beneficial and necessary, in that it enables parties to negotiate efficiently to differing outcomes based on their individual interests, priorities, and negotiating resources. Geradin (2014), for example, sees in the abstract – and thus flexible - notions of fairness and reasonableness strength rather than a weakness. He perceives the lack of precision of FRAND in the IPR policies of most SSOs as an intentional, desirable feature that allows contracts to be concluded in a context where it is not possible, or would be excessively costly, to address all future contingencies.

Typically, the determination of a reasonable royalty lies in the discretion of the parties that negotiate the licensing terms of a standard-related technology. In case of an impasse in negotiations, though, the lack of mechanisms for dispute resolution within the SSO context - coupled with the lack of a clear methodology for the calculation of FRAND - has led to parties choosing court litigation as a last resort. Although some commentators point out the adverse effects of judicially defined royalties, which could seriously undermine the current set of well-functioning private coordination activities in the IP marketplace, competition and consumer welfare (e.g., Epstein et al., 2011), most scholars see the role of courts in defining FRAND royalties in a positive light (e.g., Contreras, 2013; Layne-Farrar & Wong-Ervin, 2014). Or, as Judge Davis of the US Federal Circuit pointed out in *Ericsson v. D-Link*: "The 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 […] This creates a situation that is ripe for judicial resolution."[221]

In addition to bilateral negotiations and judicial adjudication, many observers believe that arbitration is a promising middle way, and proposals to strengthen the role of arbitration have gained increasing attention. Lemley and Shapiro (2013) argue that FRAND licensing terms should systematically be determined through arbitration. Under their proposed policy, the SEP owner is only entitled to enforce his patent through litigation if a standard implementer is unwilling to enter into binding arbitration. The authors favor final-offer arbitration. This system, in which the arbitrator can only choose between two offers made by the two sides, encourages parties to enter into arbitration with a reasonable offer that has a high likelihood of being deemed acceptable.

The attractiveness of arbitration resides in its lower cost as compared to litigation. Nevertheless, unlike an arbitrator, the judicial system has the authority to declare that a patent is invalid. Such a decision produces a positive externality for other standard implementers who no longer have to bear licensing costs or judicial fees to seek invalidation of the patent themselves. The possibility that the failure to agree on licensing terms may result in invalidation of a patent furthermore

[221] *Ericsson v D- Link,* Case no. 6:10-CV-473, Memorandum Opinion and Order (August 6, 2013), at *50.

exercises downward pressure on royalty requests in bilateral licensing negotiations (Choi & Gerlach, 2015). Gupta et al. (2015) argue that the possibility of patent invalidation through courts creates an inverse Cournot effect, by which a patent holder may lower its rates to force other patent owners to also lower their rates or else to face the risk of litigation. It is thus not clear that proposals making arbitration mandatory and restricting access to litigation would result in lower royalties and more efficient licensing negotiations.

Overall, the analysis of any instrument designed to reduce the vagueness inherent to the FRAND commitment must take into account the different roles of adjudication, arbitration and bilateral negotiation. In this light, it is thus not necessarily a symptom of failure if judges are not put in the position to determine the unique FRAND rate in a case of dispute. Courts are not necessarily the best place to determine prices, and their intervention should be limited to the cases in which bilateral negotiation has failed. The trend to increasing sophistication in the methodologies used by courts bears the risk to increasingly shift the burden of price determination on the judicial system, and to crowd out the necessary contributions of the disputing parties to market-driven instruments of price determination. For very similar reasons, Larouche et al. (2014) argue that mandatory arbitration does not support clarity in the SEP licensing market, because it risks undermining the incentives of parties to invest resources in the process of complex bilateral negotiations.

4.2.2.2. The role of injunctions in the FRAND determination

In addition to determining royalty rates, courts can grant SEP owners injunctive relief. The availability of injunctive relief crucially determines the incentives of the different parties to actively participate in licensing negotiations. On the one hand, if SEP owners can obtain injunctions against willing licensees, they may be in the position to force standard implementers into licensing agreements, which exceed the boundaries of the FRAND range. On the other hand, placing systematic and strong restrictions on the availability of injunctive relief may undermine the incentives of standard implementers to enter into licensing negotiations.

The availability of injunction turns out to be pivotal in the hold-up versus hold-out controversy. Jacob (2013) argues for instance that the stance of competition authorities vis-à-vis the grant of injunctions on SEPs breaches the right of the patent holder's access to the courts, and necessarily invites implementers to engage in hold-out.

Several theoretical papers aim to shed light on this issue by modelling FRAND negotiations "in the shadow" of patent litigation (Langus et al., 2013; Ratliff & Rubinfeld, 2013; Choi, 2014). All papers share the same premises that litigation starts when a first offer of royalty rate is rejected by one of the parties, and that the task of the court is then to determine what is the FRAND royalty rate. However, they use different assumptions regarding the initial proponent and the availability of injunction at subsequent litigation stages, leading to different results in support of either a hold-up or a hold-out effect. Comparing the different mechanisms at play is therefore useful to better figure out how the threat of injunction may influence the outcome of FRAND negotiation.

- Langus et al. (2013) posit that it is the implementer who makes the initial offer. They also assume that the implementer has a second chance to offer a FRAND rate in case the court deems the first offer non-FRAND, so that injunction becomes available only if the court believes that the second offer too is not FRAND. As a result, Langus et al. conclude that the litigation process favors the implementer and that "hold-out" is likely to occur in equilibrium.

- Ratliff & Rubinfeld (2013) posit that the SEP holder makes a first offer. If the implementer rejects that offer, the court has to determine a FRAND rate. The implementer has then the option to accept or reject the FRAND rate determined by the court, and injunction becomes available only if she chooses to reject. As a result, the implementer has nothing to lose by refusing the initial offer, which confers her with an unfair advantage in negotiation. Indeed, litigation creates an option either to accept the initial offer (if that offer is deemed FRAND by the court) or to benefit of a lower rate determined by the court (if the initial offer is deemed excessive by the court), and the threat of injunction is never activated in practice.
- Choi (2014) similarly assumes that the SEP owner makes the initial offer, and that a rejection by the implementer triggers litigation. However, a key difference with Ratliff & Rubinfeld (2013) is that injunction becomes directly available if the court considers that the initial offer was FRAND. Choi (2014) moreover assumes that the court's decision on FRAND is not fully predictable, so that a rejection of the initial offer necessarily generates a potential injunction threat. He concludes that this threat systematically tips the balance of bargaining power towards the SEP owner, and therefore advises that the court be more lenient towards implementers when considering injunction, especially when it is less able to assess the FRAND rate precisely.

Some scholars (Scott-Morton & Shapiro, 2015) and the FTC (2011) argue that even without a threat of injunction, the rules guiding the judicial determination of the FRAND royalty rate in the US could be sufficient to deter hold-out. Their argument is that a court is supposed to consider the litigated patent as valid and infringed when it sets the "patent damages royalty rate", while the likelihood of invalidation and/or rejection of the infringement claims would be taken into account in the context of an ex ante FRAND negotiation, thereby leading to a lower negotiated FRAND royalty rate. As a result, "a target firm that refuses to pay a FRAND rate bears the risk that it will pay a much higher patent damages royalty rate if the patent is ruled valid and infringed" (Scott-Morton & Shapiro, 2015).

This view however requires that courts be well equipped to determine a FRAND royalty rate in a specific case of dispute. If the royalty rates determined by courts do not accurately reflect the royalty rates that would have resulted from a bilateral negotiation, there is a risk that judicial determination crowds out bilateral negotiation as the principal forum for determining royalty rates. The alternative is to specify the conditions under which a standard implementer is deemed unwilling to contribute to the success of bilateral licensing negotiations, and to preserve SEP owners' access to injunctive relief in these - and only these - cases. This approach limits the participation of courts in the costly activity of price determination, and strengthens the incentives of parties to negotiate an agreement.

4.2.3. Divergent approaches in the implementation of FRAND

4.2.3.1. United States

Over the past few years, US courts across various jurisdictions have increasingly dealt with the definition of FRAND within the context of patent litigation and the calculation of damages. If a FRAND agreement is construed as an enforceable contract, and the litigation continues to a final judgment, the court may be asked to determine a reasonable royalty under the contract. Patent law inherently gives patent owners a right to exclude others from practicing their invention, so when a court determines that an injunction is not appropriate but the non-owner was infringing the patent, the court may set an ongoing royalty rate to provide a

reasonable compensation to a patentee who has thus given up his right to exclude the infringer from practicing the patent.[222]

Our comparative case law analysis under Part 3 has demonstrated that, despite an emerging consistent approach to the definition of FRAND, this definition does not often provide sufficient guidance for the determination of actual royalty rates in specific disputes. The US courts have therefore developed additional methodologies and evidentiary rules for the determination of single FRAND rates, which either appear competing or have not always been applied with the same consistency. Various commentators have reviewed the respective methodologies in order to inform theory, practice and policy around their possible implications on price competition and the efficiency of the standardization process (e.g., Contreras, 2013; Layne-Farrar & Wong-Ervin, 2014).

In particular, the outcome of FRAND disputes in the US has been significantly determined by rules restricting both the choice of the royalty base and the selection criteria for comparable licenses. Rules or concepts such as the Entire Market Value Rule (EMVR) or the Smallest Saleable Patent Practicing Unit (SSPPU) have neither been specifically developed for FRAND cases nor do they have a clear link to the theoretical analysis of FRAND. The application of such restrictive evidentiary rules in the context of FRAND litigation is used to limit the number of accepted criteria for the determination of a FRAND rate, thereby significantly shrinking the FRAND range and – with it – the scope for disagreement on a rate. In the previous sections, we have examined in depth the prevalent methodologies in court practice and suggested a consistent framework regarding the application of the different concepts. At the same time, however, we have demonstrated that the application of these concepts may often be at odds with an economically consistent implementation of FRAND. In practice, the implementation of the suggested framework encounters significant challenges: i) the determination of a FRAND rate involves a complex analysis of counterfactual outcomes; ii) it requires substantial empirical data, which is often difficult to produce and provides only limited or partial information on the FRAND range; and iii) even if there is reliable and conclusive information on the FRAND range, these concepts fail to determine a single specific rate. In other words, there is no commonly accepted methodology to single out a unique rate from this potentially very wide range.

4.2.3.2. Europe

Most FRAND cases before the European courts are cases where the SEP holders sue the infringing party for injunctive relief in violation of Article 102 of the Treaty on the Functioning of the European Union (TFEU) while patent infringement and, possibly, validity proceedings are pending – either as part of the same procedure or separately due to bifurcation such as the German legal system. Because FRAND dispute and patent dispute may have to run in parallel, damage claims in European FRAND cases are rare or the court will refuse to adjudicate on the matter while validity is being challenged. Against this background, bringing both a FRAND and a validity dispute to the courts may have significant strategic implications for the potential licensee; if the patent is declared valid, its bargaining position in the FRAND negotiations is weakened against a strong patent and comprised against other licensees who have accepted a FRAND offer from the patent holder.

In any case, the European legal system does not foresee a unilateral cause of action to ask a court to set the FRAND rate for an SEP (or a patent portfolio).

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[222] *Paice LLC v Toyota Motor Corp.,* 609 F. Supp. 2d 620 at 624 (E.D. Tex. 2009).

Hence, the national courts do not deal with questions around the incremental value rule in determining FRAND rates; whether methodologies for determining FRAND royalty rates or damages must take into account concerns about patent hold-up and royalty stacking; and whether the appropriate royalty base is limited to the SSPPU. Market conditions as well as substantive law issues equally account for the limited case law on FRAND licensing in Europe: There is no harmonized approach with regards to the nature and enforceability of FRAND commitments. For instance, German and Dutch law regard FRAND commitments as a merely pre-contractual obligation to negotiate in good faith, and it is not clear which law should apply (OECD, 2014).

In the aftermath of the decision of the Court of Justice of the European Union (CJEU) in the case *Huawei v. ZTE*, which provided guidance to SEP holders that seek injunctive relief in order to avoid abuse of their dominant position, automatic injunctions without further examination of the parties' conduct during negotiations are no longer the norm in the national jurisdictions. Given that the CJEU has not provided any guidance on how FRAND royalties should be determined, the question arises - where injunctions are denied - whether national courts may impose FRAND royalties for damages and which methodology they should apply. Here, useful benchmarks such as comparable licenses, the technological and economic importance of the invention, the interaction between royalty base and rate amount and sales volume are used as valuable-establishing factors that influence the amount of the rate (see, for an overview, Harguth & Carlson, 2011).

Regarding the particularities of German litigation, Judge Kühnen (2017) of the Düsseldorf Court of Appeal examines the nexus of IP and antitrust law in the context of FRAND, walks us through the negotiation framework and highlights the implications of the parties' conduct on the outcome of the infringement proceedings. He also offers guidance to the courts regarding the calculation of FRAND royalties. Below are some important takeaways of his analysis:

- The SEP holder is obliged to offer a license on FRAND terms prior to seeking injunctive relief. This offer has to be concrete and substantiated to the extent required by the circumstances of the individual case. The FRAND terms would have to be determined in writing by the SEP holder (when making the offer) and include a specific license rate as well as any other terms that are customary in the industry. It is incumbent on the SEP holder to establish that its offer is FRAND. This may require disclosure of existing licenses and other confidential information. If the SEP holder initiates infringement proceedings prior to the FRAND offer, it may have its injunction request rejected or be confronted with a suspension of the proceedings and a temporary loss of its right to injunctions.

- Prior to infringement proceedings – and once alerted about a possible infringement - the alleged infringer has to declare its willingness to receive a license offer; the declaration of willingness may be a general one and does not have to specify the licensing terms. The declaration must not contain conditions, which are not FRAND-compliant. If the SEP holder does not respond to this declaration with a concrete offer or its offer is not FRAND, conduct will be deemed abusive and the court will deny injunctions. Should the SEP holder respond with a FRAND offer, the alleged infringer is obliged to either accept that offer or to respond with a counteroffer on FRAND terms – or otherwise lose its right to successfully raise a FRAND defense. Throughout the negotiations, the alleged infringer maintains its right to challenge the validity/essentiality of the patent at issue or ask for a declaration of non-infringement. Neither side may engage in delaying tactics.

- The purpose of determining a FRAND royalty is not to provide an adequate compensation to the SEP owner for the use of its patents, but to achieve a balance of interests. The court may use different methodologies for the royalty calculation such as cost-benefit analysis or comparable licenses. In the absence of comparable licenses, the court has to rely on the data points and market-related information provided by the parties in support of the proposed rates. Judge Kühnen cites concrete examples for the calculation of royalty rates as well as the apportionment of value for an SEP portfolio; factors relevant for this "undocumented" ("vorlagenfrei") calculation are the number of SEPs/non-SEPs, the various degrees to which the underlying technology drives the sales of the end-product ("first class", "second class", non-practiced bundles with defensive use), essentiality and sales data. Albeit not binding, the calculation examples include a ceiling cap of about 1/3 of the net selling price of the highest-priced standard-compliant product and apportion a higher share of the total royalties for "first-class" SEPs as opposed to the merely nominal royalties apportioned for "second-class" SEPs. Irrespective of the chosen methodology, the ultimate purpose of the royalty calculation is not to achieve mathematical accuracy, but an approximation based on certain values and estimates for the sake of procedural efficiency.

- From an evidentiary standpoint, the burden of proof on the SEP holder becomes fact-intensive as it shifts from a mere submission of comparable licenses to a long list of measuring points, e.g., number of SEPs owned, ratio between "first class" and "second class" patents, share of the overall SEPs needed for a given product its portfolio represents etc.

Although most scholars believe it fairly improbable that German courts would imminently adopt novel arguments or develop certain methodologies on FRAND, the impact of CJEU jurisprudence as well as the emerging parallel litigation in the UK and Germany mark a trajectory from established previous positions to possible adjustments dictated by the evolving SEP landscape. Nevertheless, European jurisdictions are expected to refrain from adopting the methodological view of their US counterparts, leaving the actual determination of FRAND rates to the parties: Instead of developing tools that allow courts to specify royalty rates, European judges opt for a set of conditions that assess the FRAND-compliance of the licensing parties during the conduct of negotiations. In particular, courts evaluate whether an SEP owner made a specific, written offer for a royalty rate, whether the alleged infringer's counteroffer took place in a timely manner, or whether an implementer who refused a patent holder's licensing offer demonstrated that he would readily enter into an acceptable licensing agreement (e.g., by paying accruing royalties into escrow). Courts in Korea and Japan follow a similar approach.[223]

The converging practice to tie the grant of an injunctive relief to the conduct of both parties places emphasis on the good faith negotiations toward an actual result over the initial offer. Admittedly, the willingness of the parties and the conditions under which bilateral negotiations take place are subject to an evolving body of case law and it remains to be seen whether a unified framework will ultimately emerge. Nevertheless, this approach is flexible enough to allow for a wide span of licensing terms that pass the FRAND test, so that courts may shift

[223] Seoul Central District Court, August 24, 2012, Case no. 2011 GaHap 39552, *Samsung Electronics Co., Ltd. v Apple Korea Ltd*; *Apple v Samsung*, Japanese IP High Court, Decision of May 16, 2014, Case No. 2013[Ne] 10043. This is an appeal case from the judgment of Tokyo District Court, February 28, 2013 [Case No. 2011 [Wa] 38969].

focus more towards the FRAND-compliance of the parties' conduct during the negotiations rather than the actual outcome. In this respect, the fact that the implementation of FRAND does not lead to a unique royalty rate does not mean that it is void of legal content. On the contrary: the said approach recognizes that the idea of FRAND as a range also accommodates different interpretations regarding its economic function, allowing the parties to determine and substantiate the respectively proposed rates based on objective criteria.

5. PUBLIC POLICY ANALYSIS

5.1. PREMISES FOR POLICY ACTION

Based on the comprehensive overview of SEP licensing terms and the underlying legal and economic considerations we have laid out in the previous sections, we have carved out the following policy-relevant aspects of FRAND:

FRAND is a range

The theoretical concepts behind FRAND and the empirical data that is available to determine FRAND rates for specific patents and products merely allow for the determination of a (potentially wide) FRAND range – not a unique FRAND rate. The FRAND commitment does not determine future licensing rates that will be negotiated between patent holders and standard implementers with scientific precision.

Many commentators see this inherent "vagueness" of FRAND as a weakness. There are several proposals to replace the allegedly "vague" FRAND commitment with more specific obligations. Lerner & Tirole (2014, 2015) suggest replacing FRAND commitments with more explicit royalty caps to be announced before a standard is set. They argue that SDOs will not provide such policies spontaneously, given that SDOs are competing to attract the owners of valuable patented technologies. The authors thus argue that government intervention is required to promote policies with pre-announced royalty caps. Rysman & Simcoe (2011) propose a very different institutional framework, which they call Non-Assertion After a Specified Time (NAAST). In their proposal, patent owners commit to no longer enforcing their SEPs after an initial phase in which they are free to charge any royalty they want. According to the authors, their proposal reduces uncertainty and reliance on litigation, while preserving the balance between the interests of patent owners and implementers.

In practice, explicit royalty caps or ex ante disclosure of the most restrictive licensing terms play only a limited role in the current landscape for SEP licensing. FRAND continues to be by far the most important regulatory instrument, and policies allowing or requiring more explicit commitments complement rather than replace the role of FRAND. Future policies for SEP licensing will probably continue to provide an important framework for FRAND commitments. Further developing FRAND as a regulatory instrument for the future of SEP licensing requires that we understand and acknowledge that FRAND, by design and by necessity, defines a range - not a rate.

FRAND is a range that accommodates various approaches regarding its legal nature

There are two prevalent views on the legal nature of FRAND obligations: contractual and antitrust. From a contract law perspective, the courts regard FRAND as an incomplete contract or preliminary commitment with third party beneficiaries. The prevalent view here is that the FRAND commitment creates an obligation for the SEP owner to offer every potential implementer the right to use the patented technology on reasonable conditions that are negotiated in good faith. This interpretation leaves room for a wide span of licensing terms that are compliant with the FRAND obligation, so that courts may shift their focus more towards the parties' FRAND compliance during the negotiations rather than towards the outcome. From an antitrust perspective, there can be two different approaches to FRAND:

a) The enforcement of the FRAND obligation can be seen as a remedy to the competitive harm that could result from the horizontal agreement through standard setting. In this case, the FRAND obligation can be interpreted as a commitment of the SEP owner to a specific conduct, which will be specified by courts and antitrust authorities over time. At this point, it is worth highlighting that there is no clear definition of conduct remedies in EU Competition Law or the respective laws of the Member States. As opposed to antitrust sanctions and damages, the topic of competition law remedies has gone largely unexplored by legal and economic literature;

b) A common interpretation in the context of antitrust ties the FRAND obligations to antimonopoly law or, in the EU context, to Art. 102, Treaty on the Functioning of the European Union (TFEU). Following this interpretation, non-compliance with FRAND equals an abuse of a dominant position. In this case, FRAND allows for a potentially wide range of behaviors and terms that are non-abusive without any rate specifications.

FRAND is a range that accommodates different approaches regarding its economic function

In the economic literature, two approaches stand out:

a) In search of a welfare-maximizing royalty rate, economists establish that the primary purpose of FRAND is to provide optimal incentives to both developers and implementers. The idea behind this interpretation is that the SSOs select their IPR policies with a view to maximizing the value of their standards;

b) The second approach analyzes FRAND as a response to specific market failures resulting from complementarity (royalty stacking) or incomplete contracts (hold-up). In this regard, the role of the economist is to analyze the counterfactual royalty rate that would have resulted if the licensing process had been perfectly competitive. As we have shown in the analytical framework above, both views converge: neither the concept of FRAND as welfare-maximizing nor the concept of FRAND as restoring competitive price setting define a unique FRAND rate.

The determination of the FRAND range is challenging and often error-prone

The boundaries of the FRAND range are determined by a comparison of factual data with counterfactual equilibria such as the development of an alternative standard not including the patented feature, alternative uses of the standard, etc. Important aspects of these counterfactual scenarios that are crucial for FRAND definition are not fully determined without adding further assumptions, e.g., regarding the nature of the competitive process between features in the process of standard development. Available data such as product market prices and comparable licenses can provide some information on the upper bounds of the range (product market prices) or some individual points out of the wider range of acceptable agreements (comparable licenses) only, but they neither reveal the entire FRAND range nor identify a single FRAND rate. In order to arrive at a single FRAND rate, courts have developed evidentiary rules that place restrictions on the methodologies that can be used for calculating FRAND rates (e.g., EMVR, SSPPU, restrictions on comparable licenses), but they are often at odds with the principles of FRAND.

There are limits to what courts can do or should be expected to do

Evidentiary rules and sophisticated methodologies developed by the US courts for the calculation of FRAND royalties are not particularly useful in the European context. These tools are designed to assist the US courts in determining a single FRAND rate. In contrast, in the context of injunctions, European courts have focused on defining the conditions under which the conduct of the negotiating parties is incompatible with their FRAND obligations. The increased reliance of firms on the judicial system for the determination of FRAND rates risks undermining their incentives to agree the price of intellectual property through bilateral negotiations. The judicially defined rates are generally based on 1) the prices of infringing components, which may bear little information on the value of the technology, and 2) comparable licenses that reflect the parties' assumptions regarding the outcome of litigation rather than their valuation of the patented technology. It's hard to imagine that substantial methodological progress could be made starting from these premises. An economically sound approach is only possible once it is recognized that the ex ante-driven methodological challenges that courts need to overcome to determine ex post an appropriate royalty rate are simply overwhelming.

Against this background, policies that support market mechanisms and conditions conducive to bilateral negotiations and their proper conduct as early on as possible can enhance clarity around the definition of FRAND and restore legal certainty in the field of SEPs.

5.2. SEP LICENSING IN THE EUROPEAN POLICY FRAMEWORK

5.2.1. FRAND as a strategic lever – impact of SEP licensing on incentives

Recent court and antitrust decisions around the world, including the reforms currently taking place in Asia in the field of standardization and antitrust, are shaping the global landscape of SEP licensing and the meaning of FRAND. The principles and economic guideposts underlying these decisions are finding their way into the strategic and tactical decisions of SEP holders and implementers, rewriting the "playbook" for conducting negotiations and establishing FRAND terms in view of the evolving legal, regulatory and economic perspective. The benchmarks and clarity provided by courts and antitrust authorities, coupled with the evolving practices of privateers and non-practicing entities, put pressure on innovators and implementers to reassess the potential gains and risks of their standardization strategies and current business models. Also, the various approaches to, and divergent outcomes of, FRAND disputes across national jurisdictions worldwide – due not so much to fundamental disparities on what constitutes FRAND as to differences in litigation profiles, competition dynamics and political priorities – have a significant impact on the incentives to innovate, implement and participate in standard setting.

The interpretation of SEP-licensing terms in the context of FRAND adjudication, related evidentiary challenges, antitrust actions and legislative reforms must be taken into account, namely:

1. considerations of patent hold-up/hold-out
2. ex ante framework of the hypothetical negotiation
3. value of the patented technology prior to standardization
4. incremental value of the technology
5. existing next-best alternatives
6. choice of royalty base

7. assumptions of essentiality, validity and infringement
8. threat and predictability of injunctive relief
9. willingness of the parties to negotiate in good faith
10. legal standard of proof and the type of evidence required in the proceedings
11. regulatory framework pertaining to business practices by non-practicing entities and portfolio bundling.

The above aspects have a major, cumulative impact on a wide range of interlocking strategic, financial and tactical decisions for innovators and implementers along the value chain (both roles are often assumed by the same firm), namely:

1. Positioning the firm in the market, exclusively, by focusing either on the development or the implementation of standard-related technology or, vertically, by expanding activities along large portions of the supply chain from R&D over to manufacturing and distribution of downstream products as way to avoid the hold-up problem;
2. Developing technical solutions related to a specific standard, e.g., 4G or 5G WiFi standards or chip components, that is both essential to the functioning and interconnectivity of a wide range of devices as well as decisive for customer demand;
3. Deciding on timing and cost of R&D/implementation investments as a way of mitigating losses and regulating bargaining power – also through the lens of the ex ante benchmarks of the hypothetical negotiation;
4. Participating and collaborating with other firms in the context of standardization as a way of controlling lock-in effects and competing alternatives. The decision to refrain from participating in the collaborative process or even withdraw entirely the membership from a given SDO in view of changes in the IPR policy that reframe the terms of FRAND is also a method that allows firms with unique market positions and long-established licensing practices to mitigate additional uncertainty tied to the interpretation of the new rules by various stakeholders. The decision may also be based on other motives such as directing the standard development towards technological solutions where the respective companies are strong and can offer specific services or infrastructure;
5. Deciding on quality, scope and cost of patenting activities as a way of increasing IPR leverage and the strength of patent portfolios;
6. Attending to patent quality and the technical superiority of the patented solution over prior art increases the impact of the stand-alone value of the SEP on the bargaining range and renders patent portfolios less vulnerable to validity and infringement challenges;
7. Deciding on the timing and scope of ex ante disclosure along the lines of the IPR policies of the respective SDO as a way of balancing the burdens (frequent patent reviews in connection with standards in which the participant has no interest) with the benefits (desire to participate in the development of only some of the standards that the SDO creates) associated with participation in a given SDO. The scope of ex ante disclosure pertaining, e.g., to patent applications, patent claims versus whole patents, patent transfers etc., is intended to inform working groups and potential implementers about the potential patent landscape of various technical directions, and to enable them to assess the advisability of working around patent-heavy approaches. In the case of FRAND-encumbered standard-essential patents, the prescribed or voluntary choice on the scope of disclosure has important ramifications beyond the standardization context – especially with regards to the

informational value of the disclosed information for the negotiation and, later, litigation process;

8. Declaring essentiality and specifying the timing and scope of licensing commitments by performing portfolio reviews/business analysis, identifying SEPs with increased licensing potential and evaluating the adoption of various licensing schemes for different SEPs. In the case a SEP holder decides to license on FRAND terms, it will do so in full awareness that respective commitments will set the FRAND-encumbered patents apart from the firm's other IP assets in terms of market, competition, licensing and litigation impact;
9. Deciding on the starting date and conduct of the negotiations of SEP licensing as a way of establishing "willingness" and control leverage and costs during the bargaining process early on. The effects of the CJEU decision *Huawei v. ZTE* on the requirements of what constitutes willingness to negotiate in good faith establish a more balanced distribution of the burden of proof between the negotiating parties. This conditions their approach to injunctive relief, delaying tactics and unsubstantiated FRAND offers/counteroffers;
10. Deciding whether to license the SEPs to an 'Original Equipment Manufacturer (OEM)' or, further downstream, to a physical or internet retailer. In the smartphone industry, the licensing point is typically the OEM, namely the handset manufacturer, due to the existence of vertically integrated firms with strong market presence. On the other hand, innovation specialist firms advocate a shift of the licensing point further upstream, namely at the chipset level. This would be a way of controlling the apportionment of their SEPs in the context of the incremental value rule or the SSPPU choice of royalty base and also to strengthen their own defenses against an SEP portfolio assertion by a third party against the OEM's products. Shifting the licensing point further upstream allows the chipmakers to maintain various licensing schemes, depending on the end-products of their downstream clients. However, there are practical difficulties attached to the traceability of the SSPPU in a wide range of complex devices related to vertical industries (transport, health, energy etc.) and the technologies surrounding the Internet of Things (IoT);
11. Outsourcing licensing activities or transferring patent portfolios of bundled SEPs to non-practicing entities as a way of controlling costs, efficiencies and patent hold-out. The threat of patent hold-out is said to increase the pressure on market leading innovators to delegate their licensing activities to privateers. This could be more likely in markets where competition is strong than in markets characterized by increased concentration with limited risk of implementers seeking to exploit market weaknesses or holding out commercial rivals;
12. Balancing the costs associated with the length and possible outcome of SEP litigation over potential profits from downstream products before resorting to third-party adjudication or (forcibly) bringing negotiations to a conclusion through settlement;
13. Deciding where and when to litigate based on the predictability of favourable outcomes (forum shopping);
14. Adjusting world-wide licensing, pricing and bundling practices in view of regulatory restrictions and frequency of antitrust investigations across various jurisdictions.

Obviously, in light of the evolving case law around the meaning of FRAND and the highly dynamic character of the SEP markets, it is still early to talk of legal certainty or fully assess the impact of SEP licensing on incentives and firm strategy. Equally there is a number of open questions in the legal and economic literature about the effect of an active market for patents on incentives for

investment, litigation, and standard-setting. However, the added value of the above considerations lies in our ability to develop a full understanding of the interdependencies of the licensing terms as well as the underlying trade-offs - with the ultimate purpose of capturing the critical policy components inherent to the legal and economic analysis of FRAND.

5.2.2. FRAND as a regulatory lever – policy recommendations at the European level

The objectives set out in Horizon 2020, the EU Competition Rules on Horizontal Cooperation Agreements, the Digital Single Market Strategy and other initiatives converge into a single agenda: fuel and support innovation in its dual function as a private and public good, from the development and implementation stage up to manufacturing and the use of the embedded technology by millions (as in the case of ICT). The aim to ensure incentive compatibility of related programs and measures while preserving market conditions in healthy competition reveals the linkages between case law, economics, licensing practices and policy action. Tensions at the interface of standardization, patents and market dynamics have sparked a lively debate on the academic frontlines and also the evolution of legal reasoning across multiple jurisdictions in the context of SEP litigation and antitrust intervention. From a policy perspective, the key issues identified in our interdisciplinary analysis of FRAND and the impact of SEP licensing on the vested interests among stakeholders can be summarized in the following set of recommendations at the European level:

5.2.2.1. Incentive-based approach to FRAND

In view of the unique implications of standard-essential patents for widespread innovation, interconnectivity and the maximization of social welfare, the fair balance of interests among SEP holders and implementers has become a central notion in recent case law and antitrust intervention. To ensure fair licensing conditions, the need for a balanced framework for negotiations between right holders and implementers of SEPs is advocated in the context of the European Digital Single Market (DSM), one of the Commission's ten priorities that aims to generate up to EUR 250 billion of additional growth in Europe before 2020. The Commission intends, through the DSM, "to boost competitiveness through interoperability and standardization. Standardization has an essential role to play in increasing interoperability of new technologies within the Digital Single Market." In the digital economy, SEPs are an increasingly important feature in standardization and a key element of the business model for many industries eager to monetize their investment in research and innovation.

The understanding of the interlocking incentive structure of FRAND strengthens its meaning as a commercially viable percept beyond the mere prevention of patent hold-up or the scope of IPR enforcement. In this sense, FRAND is not "broken" nor should it be "fixed". It would be more accurate to say that it needs to reflect the current market diversity and dynamics within an enlarged circle of stakeholders. The latter confirms that FRAND as a range has been able to accommodate various business models while facilitating worldwide access to standard-compliant products and services for millions of consumers and households. Against this background, innovators deserve market-based financial returns as much as implementers deserve market-based licensing terms. Economically consistent policymaking should take the incentives of both sides into account in order to promote healthy competition at the micro level with beneficial impact at the macro level.

5.2.2.2. More clarity on FRAND through a common framework

FRAND has the potential to control opportunistic behaviour, enhance competition and evaluate licensing arrangements under a "reasonable" framework. The FRAND principles offer a powerful tool to affect norms on a systemic level.

At this level, the EU approach can be described as horizontal. In its December 2010 Horizontal Guidelines, the European Commission states that it is for the relevant rights holders to assess for themselves whether their terms, and in particular their royalties, comply with their FRAND commitment. In analyzing a FRAND commitment, the EC stresses that an assessment of whether royalties are unfair or unreasonable should be based on whether a royalty "bears a reasonable relationship" to the economic value of the patent or other right. However, the Horizontal Guidelines do not address the meanings of "fair", "reasonable" and "non-discriminatory".

Greater clarity on the terms of FRAND has been recently provided by the CJEU in *Huawei v. ZTE* to the licensing parties and the courts in the context of injunctions. The national courts have followed through and tied the grant of injunctive relief to the conditions specified in the Court's proposed framework. Focusing the FRAND analysis on the requirements of willingness in the context of bilateral negotiations, the CJEU jurisprudence has paved the way to a common framework conducive to negotiations between the licensing parties. Based on the principles of FRAND (see above, Section 4.1.), the policy premises (Section 5.1.) and the strategic and economic implications of SEP licensing (Section 5.2.1.), informed policy action should be designed to deepen and expand that common framework by addressing specific types of licensing conduct and clarifying the conditions under which FRAND compliance can be excluded or presumed – the devil is in the details where FRAND is concerned.

European policy action should encourage more clarity and flexibility in the definition of FRAND. Articulating a common set of criteria and guidelines for practice – anchored in a clear definition of FRAND – could facilitate private negotiations; enhance due diligence on behalf of the parties; limit the need to seek a third-party determination of a FRAND rate and, in the case of litigation, help courts set convergent standards while allowing flexibility on a case-by-case basis. To that end, policy guidance for the various aspects of FRAND should focus on identifying behaviour and rates that clearly fall outside the FRAND scope (i.e., define what is not FRAND), rather than supporting economic guideposts and evidentiary rules that isolate a single rate. After the courts, antitrust authorities play a significant role by sanctioning conduct that is incompatible with firms' patent rights or FRAND obligations.

However, the implementation of the FRAND range in practice should not aim to calculate a single royalty – this has proven to be at odds with economic considerations and the diversity of established legal traditions across the various jurisdictions. Against this background, the European approach, which ties FRAND compliance to the conduct of the negotiating parties, is more likely to result in economically efficient royalty rates. It encourages parties to do their due diligence, and to negotiate licenses as early as possible by avoiding delaying tactics and opportunism.

The objective of these efforts is not to address the amount of specific royalties, which has been the focus of US jurisprudence, or propose specific methodologies and constructs in the footsteps of IEEE or the Federal Trade Commission in its 2011 Report, The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition. Instead, they aim to use the court teachings and principles of FRAND as a springboard to pre-empt undue leverage, remove unnecessary barriers in the market for the licensing of SEPs and, ultimately, shift firm strategy from merely aspiring to "win the game" to recalibrating the mind-set for the

overall benefit of the system in the long run. There is more to FRAND than royalty calculation.

5.2.2.3. Governance in the 5G markets

The impact of SEP licensing on the evolution of standardization practices in the long run begs the question: who should clarify FRAND? Courts and antitrust authorities around the world have done so and, beyond evaluation of the specific outcomes, they have induced a certain degree of transparency by adopting sophisticated methodologies and other benchmarks for the calculation of FRAND royalties in a landscape of imperfect SDO policies and undisclosed licensing terms. Moreover, there has been a tendency for large manufacturers to make unilateral promises for FRAND licensing to promote transparency and reduce legal uncertainty. During the last few years, commercial entities and SDOs have also initiated alternative patent licensing methods such as ex ante royalty caps or royalty-free arrangements. At the same time, the majority of SDOs avoid specific interpretations of FRAND through their statutes and bylaws and emphasize their role as a mere platform on which the parties concerned can resolve any discrepancies regarding the licensing of standard-essential patents.

SDOs are encouraged to increase efforts towards a common framework for FRAND licensing through enhanced clarity and predictability. Against this background, the new IEEE policy provides a more specific interpretation of FRAND and assesses specific methodologies of calculating a FRAND rate. By taking a stance on these issues, the IEEE addresses the much broader societal, legal, and economic impact of standardization thereby redefining to some extent the mission of SDOs in the global setting – also with a prospect towards 5G, Internet of Things (IoT) and the design of autonomous systems.

The impact of the IEEE initiative on the governance of standardization is significant, even though its counterparts, including major European standardization bodies such as CEN, CENELEC and ETSI, have decided to leave the determination of FRAND rates to the negotiating parties. In a recent position paper, CEN and CENELEC "stress that FRAND has no precise pricing content, but instead is a 'comity device' designed to promote good faith negotiation between patent owners and prospective licensees"; and "do not support initiatives to provide guidance on, or impose compliance with, FRAND pricing, valuation and rate-setting methodologies."[224]

Nevertheless, the development and deployment of 5G means that SDOs will have to work in tandem. In view of the next generation of mobile standards, standard setting on a global scale and market-led (rather than business-led) SDO policies will determine the success of innovation. Considering the increased influence of societal groups and vertical industry players (transportation, life sciences, energy, etc.) involved in standard setting, a well-coordinated relationship between 5G players and these actors will challenge the governance of standard setting and render 5G infrastructure a booster for vertical markets.

Hence, there is a need for SDO policy coordination in general and for IPR policies coordination in particular. Within the European regulatory environment, for instance, the competition authorities can use Article 101 TFEU and perhaps Article 102 TFEU to nudge SDOs to modify their IPR policies in order to, at the very least, ensure intra-technology or intra-standard competition in products implementing an SDO's standards (OECD, 2014; Bekkers et al., 2014). For the time being, ETSI has initiated ad hoc consultations in order to gather useful

[224] http://www.cencenelec.eu/News/Policy_Opinions/PolicyOpinions/EssentialPatents.pdf

outcomes for a possible review of its IPR policy. The effort to embed FRAND rules the IPR policies of standard-setting organizations could in itself improve the standardization process. Timing is, however, important. Increased clarity around the meaning of FRAND at the SDO level may enjoy broader acceptance once a clearer legal situation has emerged (cf. CRA Report, 2016).

In this regard, critical issues around SDO governance, including recommended policy action, will be at the heart of a new study commissioned by the Joint Research Centre (JRC) of the European Commission. A report on this study is due to be published in 2018.

The IEEE policy change

IEEE-SA updated its policies in 2015 in order to give some meaning to what may constitute a "Reasonable Rate" and also to add clarity to the notion of non-discrimination, the availability of Prohibitive Orders and permissible demands for reciprocal licenses. Being confronted with evidence that its 2007 policy changes were overly ambiguous (Karachalios, 2015), the new IEEE rules cap FRAND royalties at the ex ante incremental value of the technology in question and foresee the calculation of FRAND on the basis of the smallest saleable unit in which the patented technology is embedded. Specifically, a "reasonable rate" is defined as the appropriate compensation to the patent holder for the practice of an essential patent claim excluding the value, if any, resulting from the inclusion of that essential patent claim's technology in the IEEE Standard (network effect of the standard). The amendments provide additional clarity by recommending the consideration of three non-mandatory factors: 1) the value contributed "to the value of the relevant functionality of the smallest saleable Compliant Implementation that practices the Essential Patent Claim," 2) the value contributed "in light of the value contributed by all Essential Patent Claims for the same IEEE Standard practiced in that [smallest saleable] Compliant Implementation," and 3) "Existing licenses" that "were not obtained under the explicit or implicit threat of a Prohibitive Order" and "otherwise sufficiently comparable" circumstances and resulting licenses. With this licensing framework, IEEE is the first SDO that weighs in on the meaning of FRAND by adjusting existing economic and case law doctrines to fit the purpose of its policies to serve the broader public good.

The IEEE approach to the notion of reasonable royalty has been welcomed as much as criticized (especially by chip manufacturers with large patent portfolios). According to a recent report (CRA Report, 2016), licensors are unanimously against an approach of this kind, as they perceive that such rules would limit their private right to define commercial policies within the scope of the law. In particular, it is perceived that any rule defined at the SDO level might lead to effectively lower royalties than would otherwise be rightfully obtainable. In contrast, implementers take a far more favourable view on SDO-based FRAND policies, as this is viewed as providing some protection against unreasonable royalty requests. Both sides, however, acknowledge the difficulty of defining an overarching principle that takes into account all the specific contingencies in a particular licensing context or does not compromise the flexibility inherent to ex post assessments on a case-by-case basis in court.

Albeit controversial, the updated IEEE policy 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 (US DoJ, Antitrust Division, Letter dated February 2, 2015).

5.2.2.4. Complementing FRAND with other instruments

Clarifying the legal content of the FRAND obligation is an important step towards assisting negotiations on SEP licensing terms. However, the complex issues at the interface of IPR and standardization and a proper balance between the interests of the manifold parties involved cannot be achieved through a single instrument. SDOs and other actors have various means at their disposal to further support the bilateral process of licensing negotiations. In particular, SDOs can make a significant contribution by increasing patent transparency in standardization working groups. According to the outcome of the Public Consultation on Patents and Standards held by the Commission from October 2014 to February 2015, there is broad support for early patent disclosure during standard setting. Transparency enhancing measures of this kind would help SDOs and their technical committees make informed choices and notably avoid situations where adopted standards cannot be implemented for lack of necessary licenses.

In addition to requiring IPR disclosure and licensing commitments, several SDOs such as IEEE SA and the DVB consortium have adopted policies to encourage patent pool formation. Patent pools are often regarded as a promising solution to several of the perceived or real market failures in SEP licensing, particularly the risk of royalty stacking. Despite the appeal of patent pools from a theoretical perspective, their role in the SEP licensing market remains limited (see box below). The DVB consortium is also part of a group of SDOs, which specify policies for alternative dispute resolution (ADR). These are only few examples illustrating that SDO approaches to SEP licensing often involve a complex policy mix.

Patent pools, a solution to anti-commons and royalty stacking?

The economic literature consistently recommends the creation of a patent pool as a solution to the anti-commons and royalty stacking problems (see, e.g., Shapiro, 2001; Lerner & Tirole, 2004). Patent pools make it possible for several patent owners to offer a single joint license for a bundle of all their essential patents. The royalty stream collected by the pool is then split between the pool members following a sharing key defined ex ante. The expected benefit is twofold:

A pool keeps transaction costs down by establishing a one-stop shop for a large number of SEPs that relate to the same standard. While the required number of licensing contracts under bilateral licensing may be as high as M*N, where M is the number of SEP owners and N is the number of implementers, an encompassing pool may reduce the number of required contracts to N.

A pool eliminates the royalty-stacking problem by setting a unique royalty rate for the bundle of all essential patents. This royalty rate corresponds to the optimal monopoly price that would have been set by a unique licensor if the ownership of essential patents had not been fragmented. It is expected to be lower than the stack of individual royalty rates, and to generate higher profits for patent owners thanks to wider implementation of the standard.

Because patent pools could also be instrumental in the formation of cartels, their creation is subject to regulatory approval by antitrust authorities (Gilbert, 2004; Lerner & Tirole, 2004). Competition law requires that independent experts assess the pooled patents ex ante, so as to prevent pool members from foreclosing competition by tying non-essential patents to the licensed bundle. A complementary safeguard mechanism is to allow members to engage in independent licensing, so as to screen out collusive patent pools (Lerner & Tirole,

2004; Chiao et al., 2007). However, the effectiveness of these screening mechanisms remains controversial (due in particular to the difficulty of defining essentiality in practice), and some observers argue that pools frequently include patents that are not truly essential (Gilbert, 2004).

Despite their potential benefits, patent pools often fail to emerge in practice. Some patent holders may find it difficult to articulate pool membership with their business model (Layne-Farrar & Lerner, 2011), and prefer for instance to seek bilateral cross-licensing agreements (Bekkers et al., 2014). Individual patent owners may also refuse to share the royalty mitigation effort (Aoki & Nagaoka, 2004; Brenner, 2009), or fail to reach an agreement on a common royalty-sharing scheme (Lévêque & Ménière, 2008; Peters, 2011). As a consequence, patent pools have been created only for a limited number of ICT standards so far. For instance, Bekkers et al. (2014) find that little more than 40 patent pools related to ICT standards had been created by 2013. Moreover, many patent pools actually involve only a few patent owners. Because they cover only a limited share of essential patents, these small pools do not effectively address royalty stacking. They may even amplify the problem if they are used by a group of small patent owners as a more aggressive means of licensing a bundle of minor and/or legally weak patents (Bourreau et al., 2015; Choi & Gerlach, 2015).

5.2.2.5. Advocacy at global level

The incentives that drive today's ICT markets and the practices of portfolio licensing are established globally. In this context, FRAND obligations lie behind reasonable access to increasingly important standards related to 5G and Internet of Things technologies that amplify the benefits for competition and consumers globally.

Hence, decisions taken at a regional level and isolationist policies with an exclusive focus on local economies could disrupt global markets and undermine the integrity and reliability of FRAND commitments crucial to innovation. While competition and antitrust policies will continue to be shaped at a regional level, global advocacy and the ongoing dialogue of European policymakers with their counterparts in the US, China and the rest of the world could counteract the potentially distortive effects of domestic policies by exploring common ground and identifying best practices that safeguard the interests of society as a whole.

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