

JRC SCIENCE AND POLICY REPORT

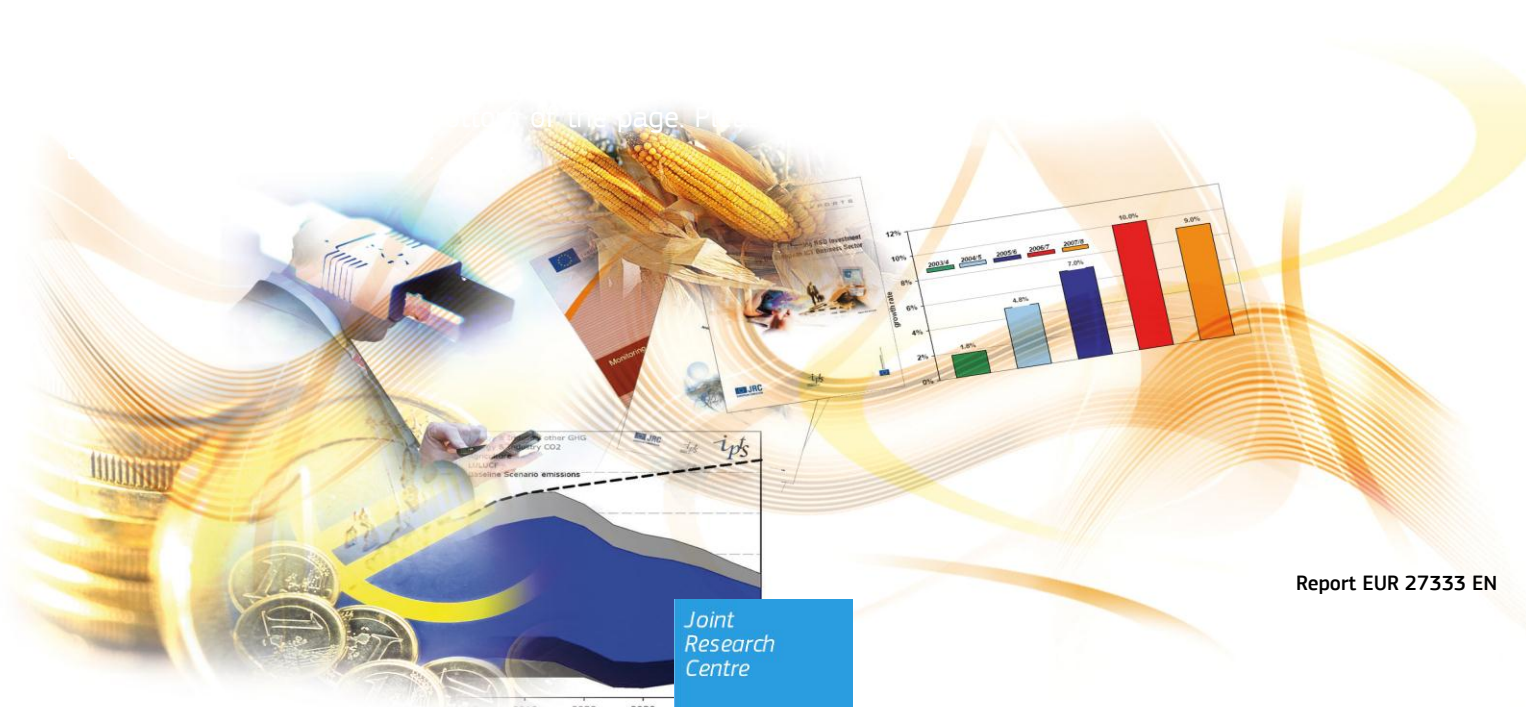
Fair, Reasonable and Non-Discriminatory (FRAND) Licensing Terms

*Research Analysis of a
Controversial Concept*

Author: Yann Ménière

Editor: Nikolaus Thumm

2015



European Commission

Joint Research Centre

Institute for Prospective Technological Studies

Contact information

Address: Edificio Expo. c/ Inca Garcilaso, 3. E-41092 Seville (Spain)

E-mail: jrc-ipts-secretariat@ec.europa.eu

Tel.: +34 954488318

Fax: +34 954488300

<https://ec.europa.eu/jrc>

<https://ec.europa.eu/jrc/en/institutes/ipts>

Legal Notice

This publication is a Science and Policy Report by the Joint Research Centre, the European Commission's in-house science service. It aims to provide evidence-based scientific support to the European policy-making process. The scientific output expressed does not imply a policy position of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication.

All images © European Union 2015

JRC96258

EUR 27333 EN

ISBN 978-92-79-49280-8 (PDF)

ISSN 1831-9424 (online)

doi:10.2791/348818

Luxembourg: Publications Office of the European Union, 2015

© European Union, 2015

Reproduction is authorised provided the source is acknowledged.

Abstract

The complexity of standards in Information and Communication Technology (ICT) creates a tension between the need to reward the owners of Standard Essential Patents (SEPs) that may cover standard specifications and the need to make standards available to all for public use. In the last few years, this tension has crystallized into a difficult debate on licensing principles that must be Fair, Reasonable and Non-Discriminatory (FRAND or FRAND licensing). The purpose of this report is to provide a balanced account of the current controversy relating to the FRAND licensing of standard essential patents and to explore future research topics in this area. It draws on the arguments that arose at an expert workshop held under Chatham House rules at the Institute for Prospective Technological Studies (IPTs) and on an extensive review of the related literature.

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-IPTS and DG CONNECT of the European Commission. This project aims to improve understanding of innovation in the ICT sector and of ICT-enabled innovation in the rest of the economy.^[1]

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 Single Market policy agenda 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 are:

1. 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;
2. to 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
3. to explore and suggest how policy makers could make ICT innovation in the EU work better.

The complexity of standards in Information and Communication Technology (ICT) creates a tension between the need to reward the owners of Standard Essential Patents (SEPs) that may cover standard specifications and the need to make standards available to all for public use. In the last few years, this tension has crystallized into a difficult debate on licensing principles that must be Fair, Reasonable and Non-Discriminatory (FRAND or FRAND licensing).

The purpose of this report is to provide a balanced account of the current controversy relating to the FRAND licensing of standard essential patents and to explore future research topics in this area. It draws on the arguments that arose at an expert workshop held under Chatham House rules at the Institute for Prospective Technological Studies (IPTS) and on an extensive review of the related literature. The focus is on ICT industries as a whole, including the fields of telecommunications, computers, software, Internet and consumer electronics.

^[1] For more information, see the project website:
<http://is.jrc.ec.europa.eu/pages/ISG/EURIPIDIS/EURIPIDIS.index.html>

Table of Contents

Preface	1
Executive Summary	3
Formal ICT standards, innovation and patents.....	3
Origins of the FRAND controversy	3
Towards a FRAND clarification.....	4
Beyond FRAND: transparency, quality and governance.....	4
Perspectives for research	5
1. Introduction	7
2. Formal ICT standards, innovation and patents	9
2.1 The economic role of ICT standards.....	9
2.2 Standard setting and innovation.....	9
2.3 Essential patents and SSO IPR Policies	10
3. Origins of the FRAND controversy	11
3.1 More SEPs from more contributors	11
3.2 The evolution of licensing practices	13
3.3 Economic arguments and their implications	14
4. Towards a FRAND clarification	17
4.1 A reasonable approach	17
4.2 A closer look at the SEP licensing process.....	17
4.3 FRAND is in the details.....	18
5. Beyond FRAND: transparency, quality, and governance	21
5.1 Market transparency	21
5.2 Patent density and patent quality	21
5.3 SSO governance and innovation.....	23
6. Perspectives for future research	25
References	27
Annex	29
List of workshop participants	29
International Expert Workshop Agenda.....	30

Executive Summary

The complexity of standards in Information and Communication Technology (ICT) creates a tension between the need to reward the owners of Standard Essential Patents (SEPs) that may cover standard specifications and the need to make standards available to all for public use. In the last few years, this tension has crystallized into a difficult debate on licensing principles that must be Fair, Reasonable and Non-Discriminatory (FRAND or FRAND licensing). The purpose of this report is to provide a balanced account of the current controversy relating to the FRAND licensing of standard essential patents and to explore future research topics in this area. It draws on the arguments that arose at an expert workshop held under Chatham House rules at the Institute for Prospective Technological Studies (IPTS)¹ on 27 October, 2014 and on an extensive review of the related literature. The report does not present any individual positions.

Formal ICT standards, innovation and patents

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 Setting Organisations (or SSOs). 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 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 object of making standards available to all for public use. In order to address this tension, most SSOs have defined intellectual property rights (IPR) policies whereby SSO members must commit to licensing their 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.

Origins of the FRAND controversy

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 were 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. By contrast, there are now more SEP owners and implementers with different business models and a larger variety of licensing practices. This trend goes also back 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 fuelled controversy as regards 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 put in doubt 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

¹ IPTS (the Institute for Prospective Technological Studies) is one of the 7 research institutes that make up the European Commission's Joint Research Centre.

excessively high royalty stack. Moreover, the fact that licensing takes place ex-post standardization 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 has been pivotal in public debates as 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 behaviour as an abuse of dominant position, thus opening the door to the intervention of competition authorities in matters of FRAND licensing.

Towards a FRAND clarification

There is wide consensus in the industry that formal standardization has played a key role in supporting the fast development of ICT over the last few decades. SSOs have produced increasingly sophisticated standards and enabled high degrees of competition and interoperability between ICT products. They have also managed to effectively involve new entrants from various countries and sectors. In order to preserve their ability to promote voluntary cooperation between all stakeholders, revisions of their IPR policies should thus be discussed and approved by consensus between SSO members, rather than imposed from the outside.

As a matter of fact, discussions of this kind have already started, in order to provide more guidance to stakeholders and courts about how to better approach FRAND licensing. Industry actors generally agree that the flexibility of FRAND licensing contracts should be preserved to accommodate the variety of actors and business models related to ICT standards. Reaching consensus on the determination of fair and reasonable royalties is far more difficult. In the absence of solid empirical evidence on the “hold-up”, “hold-out” and “royalty stacking” problems, the main challenge for SSOs is to better frame the process of FRAND bargaining in order to prevent biases in favour of one or the other negotiating party. Practically, discussions have been progressively narrowed down to a few technical but high-stake issues – such as the conditions for using injunctive relief against patent infringers, the appropriate methodology for determining FRAND royalties, or the choice of a relevant royalty base. These issues are presented in more detail later in the report.

Beyond FRAND: transparency, quality and governance

The debate around FRAND is also related to a broader set of issues concerning ICT standards. One of these issues is the lack of transparency regarding licensing conditions, which raises transaction costs by preventing the benchmarking of FRAND licences. Possible solutions include the public disclosure of reference licensing terms by SEP holders, or the collection and disclosure of information on SEP licensing terms for actual contracts between (anonymous) parties.

The high density of patents around ICT standards is another important source of transaction costs – all the more so as a significant part of these patents are legally fragile and correspond to minor inventions. Tighter collaboration between SSOs and patent offices appears to be a promising solution that could mitigate this problem. However, there is a lack of policies addressing in a combined approach, patent prosecution and patent quality on the one side and the treatment of standard essential patents in SSOs on the other side. In this respect, the partnerships established between the European Patent Office on the one hand, the European Telecommunications Standards Institute (ETSI), or the Institute of Electrical and Electronic Engineers (IEEE) on the other hand constitute an example of good practice. These partnerships, which enable patent examiners to use fresh information from SSO working groups, could be extended to other SSOs and patent offices, with wider support from public authorities.

Finally, the deep evolution of standardization raises the long-term issue of the governance of SSOs and their ability to support efficient collaborative innovation for the development of standards.

Related questions include the articulation between private R&D activities, the need to balance efficiency and inclusiveness in decision making, the ability of SSOs to interact with each other, and the sources of their legitimacy in a global environment.

Perspectives for research

In the absence of solid empirical evidence on the royalty stacking, hold-up and/or hold-out problems, the strong polarization of the FRAND debate is partly due to its focus on purely theoretical arguments. A first research track would therefore be to better study actual licensing practices in order to understand how the legal framework and companies' business models may influence their outcome. This would also comprise the analysis of the quality and relevance of respective patent portfolios and the different ways of how to establish essentiality in negotiation procedures. This approach would make it possible to test and refine theoretical arguments on the limitations of the FRAND principles and to formulate recommendations for their enhancement. However, the collection of related empirical evidence will remain difficult without support from policy makers, SSOs and/or companies involved in standardization.

The joint development of standards by SSO members is another vast research field that deserves further investigation. At this stage, priority should be given to the collection of empirical evidence on SSOs and their internal processes and governance rules (e.g., membership rules, decision making, IP policies). This research should document the diversity of existing models, highlight their evolution over time, and enable the classification and benchmarking of different types of SSO. On this basis, further steps could aim to better understand how SSOs are able to attract members, how they interact with each other, and how collaborative innovation could be efficiently supported.

1. Introduction

The technological complexity of standards in information and communication technologies (ICT) creates a tension between the need to reward the owners of essential patents that may cover standard specifications, and the need to make standards available to all for public use. The licensing on Fair, Reasonable and Non-Discriminatory (FRAND) terms epitomizes this tension and has been intensively debated over the last few years.

This debate has been highly polarized because it involves huge stakes for the companies that take part in the development of standards (hereafter, the standard developers) and those that produce and commercialize standard-compliant products (hereafter, the implementers) (Harkrider, 2013). On the one hand, owners of essential patents claim royalty rewards for the high cost and high risk of investing in research and development to create an ICT standard. On the other hand, standard implementers claim that high royalty costs put at risk their ability to develop and market standard-compliant products.

This FRAND debate has strong implications for ICT innovation and barriers. ICT standards are a means for ICT companies to organize major technology upgrades on the industry scale while preserving interoperability and market competition. Their joint development is thus a key catalyser of innovation and technology diffusion in the field (Baron & Schmidt, 2013). Because FRAND licensing principles largely determine the balance of interest between different stakeholders in standardization, they play a central role in preserving the ability of the whole industry to agree on such common standards.

Against this background, the purpose of this report is to present a balanced and neutral account of the origins, content, and implications of the FRAND debate, thereby isolating and highlighting the real issues at stake, and also to suggest possible improvements.

The focus is on ICT industries as a whole, including the fields of telecommunications, computers, software, Internet and consumer electronics. Indeed, interoperability standards are ubiquitous in these fields. However, it is worth noting that FRAND licensing practices are not systematic in all of them. For instance, standard essential patents are usually licensed royalty free in the internet area, as a consequence of its specific industrial organization and business models. Moreover, FRAND licensing is not equally controversial in all the industries that practice it. So far, most tensions have been concentrated in the telecommunications industry. It is nevertheless an important issue, especially as ICT standards are expected to spread to other industries (smart grid, car, home or e-health) in the near future.

The rest of the report is organized in five sections. Section 2 provides a quick overview of the economic functions of ICT standards and the role of SSOs and FRAND licensing in facilitating their development and adoption. Section 3 shows how the rapid development of the ICT industry has changed licensing practices and has led to the current controversy on the interpretation of the FRAND licensing principles. Section 4 examines more closely how FRAND licensing takes place in practice and highlights the key technical issues underlying the controversy. Section 5 identifies a number of more general issues that significantly affect the efficiency of the FRAND licensing processes. The last section offers some conclusions on possible future research on this topic.

2. Formal ICT standards, innovation and patents

Before entering into the FRAND debate itself, it is useful to present first what ICT standards are, how they are developed, and what role FRAND licensing is expected to play in this context.

2.1 *The economic role of ICT standards*

A standard is a document that sets out requirements for a specific item, material, component, system or service, or describes in detail a particular method or procedure.² The value of a standard stems from its implementation by a large number of companies within a given industry. As such, standards perform various economic functions (Swann, 2000), including:

- The provision of a minimum level of quality,
- The provision of information including standard service descriptions,
- The reduction of variety, allowing for economies of scale in production,
- Interoperability or compatibility between different parts of a product, system or network.

Standards are especially frequent in ICT industries due to the strong need for interoperability in this field. As an example, a laptop computer incorporates about 251 interoperability standards (Biddle et al., 2010). Modern communication networks are similarly organized around a number of pivotal interoperability standards such as the second generation or “2G” (GSM/GPRS), third generation or “3G” (UMTS), and fourth generation or “4G” (LTE) standards in wireless communications.

Some ICT specifications become de facto standards simply by widespread use and broad market acceptance of a given proprietary technology.³ However, many interoperability standards are “formal” standards that have been agreed on collaboratively by all stakeholders in the industry. These formal standards facilitate the deployment of new technologies by supporting interoperability on the widest possible scale and by avoiding the cost, uncertainty, and delay of a competition between rival proprietary standards. They also ensure that the standard remains neutral once established in the market, thereby creating a level playing field for competition in the market for standardized products and components.

2.2 *Standard setting and innovation*

Formal standards are set (and regularly updated) by Standard Setting Organisations (SSOs hereafter). SSOs include large established organizations – such as the European Telecommunications Standards Institute (ETSI) for communications or the Institute of Electrical and Electronics Engineers (IEEE) for electronics – but also a variety of ad hoc informal organizations – or industry consortia – that have the same purpose but focus in general on complementary topics (Blind and Gauch 2008). They are open to all relevant stakeholders, have open and published processes, and typically publish and make standards documentation available for use by all without discrimination.

The ICT standards that they produce cannot be reduced to a small set of simple specifications such as those of rail gauges or electric plugs. They are in fact complex technology platforms that take

² See <http://www.cencenelec.eu/standards/DefEN/Pages/default.aspx>

³ Adobe's PDF computer file format and Microsoft's Office Open XML format are well-known examples of de facto standards. With the Acrobat Reader program available for free, PDF first has become the de facto standard for printable documents. It was subsequently endorsed by the International Standardization Organization (ISO) as a formal standard in 2005. Microsoft's Office Open XML format is a de facto standard for MS-Windows users. It is competing with the OpenDocument format, another de facto standard for UNIX users. In the mobile industry, Google's Android operating system can also be seen as a de facto standard that has been adopted by a large number of manufacturers.

the participating companies years to jointly develop. Many of the technological challenges faced by the industry (e.g. data coding and transmission for wireless standards) are directly solved at the level of the standard. As a result, standardization in ICT is a highly R&D-intensive activity, entailing considerable investments by the different participants.

The role of SSOs is to support and organize this particular form of open innovation. The main originality of this process is that, unlike R&D joint ventures, there is no contract that *ex ante* defines the respective contributions of the participants (Baron et al., 2014). Participants follow the standard setting process by regularly meeting in SSO working groups. They may develop proprietary (usually patented) technology ahead of these meetings, in order to submit it for inclusion in the standard (Berger et al., 2012). SSO members then discuss the technical merits of available solutions and decide by consensus which one shall become a specification in the standard.

2.3 Essential patents and SSO IPR Policies

The Standard Essential Patents (or SEPs) that cover established standard specifications play an important role in companies' incentives to invest in 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. The role of the patent system is to incentivize innovation by conferring on inventors a time-limited right to exclude others from using the invention. The potential profits from these rights strongly motivate people to risk money in research and innovation. Since SEPs are infringed by any implementation of the standard, they must therefore be licensed by any manufacturer of standard compliant products and can generate revenues on a very large scale if the standard is successful.

However, essential patents still create a tension between the need to make the standard available to all for public use and the ability conferred on the patent holder to exclude others from using the standard. In order to address this tension, most SSOs have defined *ad hoc* intellectual property rights (IPR) policies by consensus between their members, as defined by the International Organization for Standardization (ISO), on the basis of transparency criteria as set by the European Commission. The main pillar of these policies is that participants in the standardization process must commit to licensing their standard essential patents either on Fair, Reasonable and Non-Discriminatory (FRAND) terms or royalty free for some SSOs. The main implications of the FRAND commitment are that:

- Holders of essential patents are bound to license their SEPs for the manufacture, sale, and use of standard-compliant products, on terms that do not differ from those applied to another licensee in similar conditions.
- The licensing terms and the royalty rate charged for essential patents must adequately and fairly reward SEP owners for the value of their innovation. In other words, the licensing terms should appropriately reward the patent holder for investing in the development of his innovation and making it available.

FRAND commitments are voluntary contracts between each SEP owner and the SSO, with standard implementers as third-party beneficiaries. Some SSO IPR policies tie the commitments with SSO membership while others request that participants disclose the patents they believe are standard-essential along with a FRAND licensing commitment for each disclosure. The latter approach is more frequent, especially in large SSOs (Bekkers et al., 2014). It has the advantage of informing SSO members and future implementers about who owns SEPs for a given standard.

3. Origins of the FRAND controversy

IPR policies were discussed and adopted in most SSOs during the 1990s. They have subsequently provided a framework for the development and implementation of many ICT standards. The economic context has changed enormously since then, as a result of the fast development of the ICT industry. In this section, we present the consequences of this evolution on standardization and SEP licensing practices.

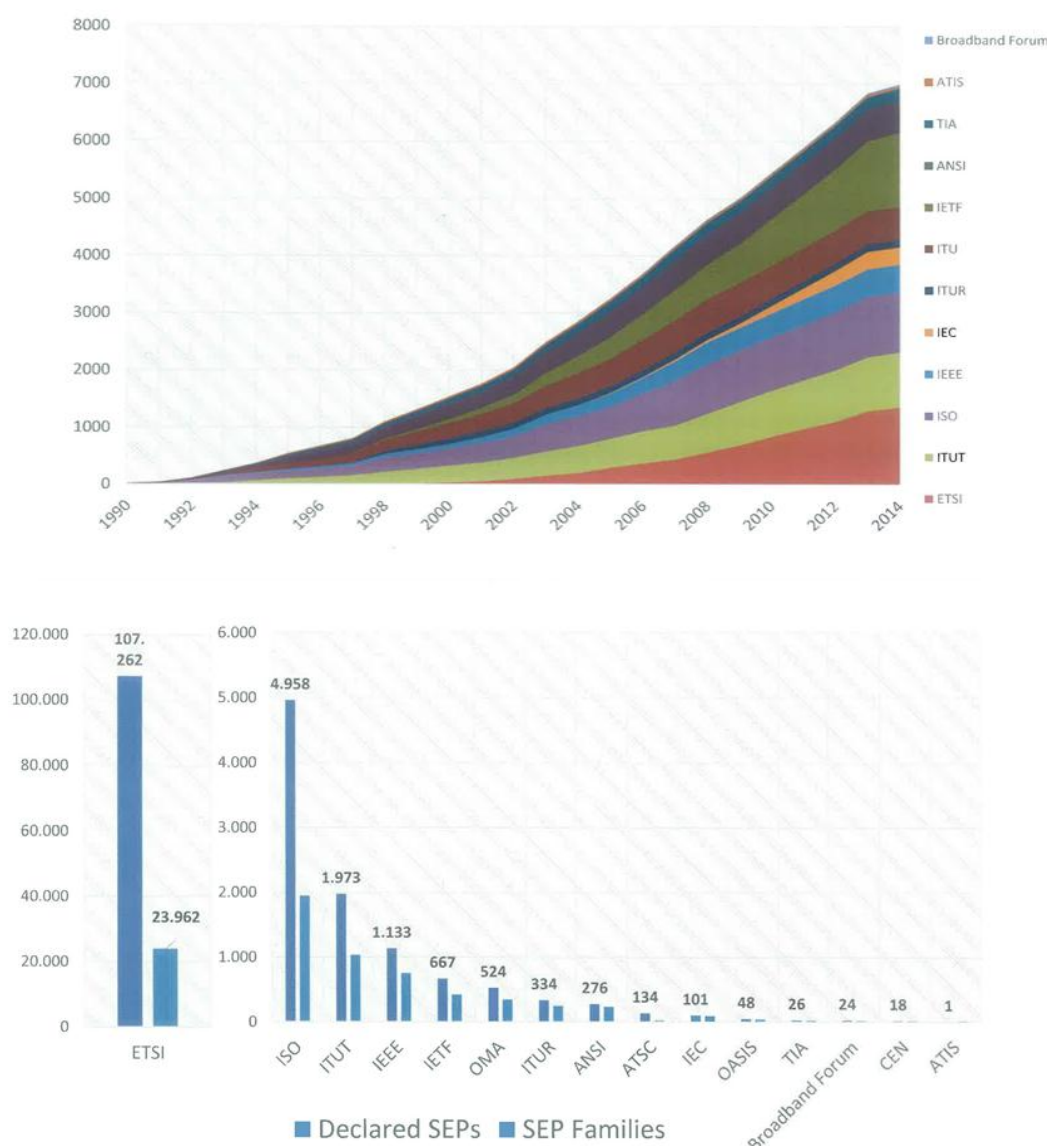
3.1 *More SEPs from more contributors*

A first noticeable trend is the rapid growth in the number of SEPs over time. The large number of SEPs reflects the technological complexity of ICT standards, 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). This trend goes also back 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 shown in Figure 1, the cumulative number of SEP declarations at various SSOs steadily increased between 1990 and 1992. One can observe that ETSI has a much higher number of cumulative SEP declarations. This is partly due to the technological complexity of wireless communication standards and also to the fact that ETSI participants make blanket statements⁴ much less frequently than in other SSOs. 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. 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 SSOs (Goodman & Myers, 2005; Cyber Creative Institute, 2011).

The growing number of SEPs reflects the need to continually improve and replace standards in order to keep up with the pace of technological improvements. Since these improvements require R&D investments, the number of SEPs that must be licensed to implementers also tends to increase over time. As an example, modern smartphones incorporate three successive generations of wireless communication standards (namely GSM, UMTS and LTE), each of which outstrips the previous one in terms of technical performance and available functionalities. Therefore, manufacturers have to license additional SEPs for each of them.

⁴ Blanket commitments are commitments to license one's SEPs on FRAND terms, but without providing a list of these SEPs.

Figure 1: Cumulative SEP Declarations per SSO over time



Source: IPLytics, 2014⁵

Another important trend is the growing number of SEP-declaring organizations, and consequently of SEP licensors for a given standard. The ETSI database of SEP declarations for the LTE standard reveals, for instance, that 104 patent holders had declared essential patents for this standard in 2014 (versus 36 in 2011). Of the top twenty contributors in terms of number of SEPs, twelve had already been involved in the development of GSM. They include two network operators, nine manufacturers from Europe, North America and Japan, and Interdigital, a company specialized in R&D that does no manufacturing. The remaining eight companies entered the mobile industry much more recently. They include two North American manufacturers, five Asian manufacturers, and ETRI, a Korean research organization.

⁵ While great care has been taken in the preparation of these figures, the ETSI IPR Database contained only 16070 unique SEP Families as of 18/04/2015, and not 23962 as it appears on Figure 1. At the 22nd ETSI IPR Special Committee on 21-23/04/2015, these figures were presented under the agenda item "Increase transparency" which is of great importance to the European Commission and several actions were agreed to address reported figures accuracy issues.

3.2 The evolution of licensing practices

The growing number of SEP holders is but one facet of a more general transformation of ICT industries that has also impacted SEP licensing practices. Back in the 1990s when SSOs started adopting IPR policies, standard setting involved fewer companies – all from industrialized countries – that were usually the main SEP holders and implementers at the same time. These companies typically engaged in cross-licensing their extensive patent portfolios, and therefore had to pay few royalties to each other. By contrast, outsiders faced substantially higher royalty costs.

The pattern has changed radically over the last decade with the entry of new actors and more vertical specialization on both sides of the market for SEPs licenses. The increasing complexity of standards brought in a number of R&D-oriented companies whose interest was the wider propagation of their standard essential technology. At the other end of the industry, the successful entry of new manufacturers– many of which were from developing Asian countries –induced a severe erosion of incumbent manufacturers in markets for standard compliant products.

As compared with the 1990s, the presence of more SEP holders (n) and implementers (m) mathematically results in an even larger number ($n*m$) of licensing contracts per standard. In practice, these licensing agreements frequently encompass broad patent portfolios and may thus not be restricted to SEPs. The variety of licensing practices has also increased, due in particular to discrepancies between the patent positions of companies and their respective weights in downstream markets:

- Bilateral (one-way) licensing has become more frequent due to vertical specialization on both sides of the market. Licensing represents a key source of revenue for technology developers – including SMEs (Simcoe et al., 2009) – which tend to specialize in upstream R&D. In some cases, different patent owners may also create patent pools and jointly license their SEPs in order to save transaction costs and foster the adoption of the standard.
- Cross-licensing remains frequent between vertically-integrated companies and can still generate significant cost advantages for patent-rich incumbents with respect to new entrants. This in turn creates an incentive for new entrants to build or strengthen their own portfolios in order to obtain more balanced licensing agreements.
- In recent years, patent-rich incumbent companies facing the loss of market share have also started seeking quicker monetization of their patents by selling part of their portfolios to third parties. Buyers include new entrants that seek to strengthen their IP positions but also non-practicing entities that specialize in extracting settlement agreements or court-awarded damages from allegedly infringing operating companies.

These developments show that patents in general, and SEPs in particular, are now more clearly perceived as a direct and significant source of profit and/or competitive advantage. At the same time, the variety of licensing practices has made it more difficult to identify a consensual approach to FRAND licensing. In recent years, patent litigation has also significantly increased (especially in the US) in highly competitive and fast moving areas such as the smartphone ecosystem. It is worth noting that SEPs account for only 11% of the patents involved in these conflicts in the US, next to utility patents, differentiating patents, non-essential ‘implementation’ patents (Gupta & Snyder, 2014). Nevertheless, their involvement in litigation has drawn much attention, fuelling controversy on the interpretation and effectiveness of FRAND commitments in the current industry context.

Table 1: Summary of smartphone litigation

	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.

3.3 Economic arguments and their implications

The FRAND controversy has been fuelled by a number of economic arguments that put in doubt the ability of FRAND commitment to ensure that royalty rates for SEPs are in fact “reasonable”. Critics pinpoint two types of issues grounded in economic theory and stemming respectively from the fragmentation of SEP ownership around a standard (royalty stacking) and ex post licensing-fee negotiations (hold-up and hold-out):

- **Royalty stacking.** This concept claims that FRAND commitments are not sufficient to keep cumulative royalty rates at reasonable levels when there are several licensors of essential patents on the same standard (Shapiro, 2001; Lerner & Tirole, 2004). Each licensor is expected to seek too high a royalty rate, ignoring the fact that stacking high royalties would hamper the demand for standard compliant products. For example, 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). Economic theory predicts that royalty stacking leads not only to excessive prices for users but also profit losses for licensors. It recommends patent pools as a way for SEP holders to profitably address this problem by charging a unique royalty rate for the whole SEP package.
- **Patent hold-up.** This concept claims that FRAND commitments made during the standard setting process are too loose to effectively prevent SEP owners from unduly leveraging market power when the time comes to negotiate a license (Shapiro, 2001; Lemley & Shapiro, 2007). Ex-post market power stems from the essentiality of patents that irrevocably ties them to the standard and also stems from implementers locking themselves into investments (e.g. in R&D and/or manufacturing equipment) in standard related equipment/knowledge before licensing-in the SEPs. It may thus enable the SEP

holder 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. If so, another important consequence is that the risk of hold-up can undermine ex-ante incentives for implementers to adopt and invest in standards.

- **Patent hold-out.** A more recent counter argument put forward by SEP owners is that FRAND commitments in fact deprive licensors of the market power that patents usually confer (Geradin, 2010). SEP holders are bound by their commitment to concede a licence and therefore they cannot easily threaten to refuse a licence. Against this background, 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 commit “hold out” or “reverse hold-up”, not only by using essential technology without a license but also by deliberately choosing not to seek a licence. If this happens, patent “hold out” can induce royalty losses for SEP holders, and significantly reduce their incentives to invest in the development of standards. Typically, hold-out practices are combined with the challenge of validity and essentiality of SEPs in front of a court.

The hold-up problem in particular has been pivotal in public debates for some years, in the wake of a few emblematic litigation cases.⁶ Although its magnitude remains questionable in the absence of solid empirical evidence, hold-up has become a popular argument in SEP disputes. It provides a consistent framework for the interpretation of FRAND commitments (as a commitment not to commit hold-up) and for the definition of FRAND royalties (as reflecting the incremental value of the technology as compared to the best alternative available ex ante).

Another key implication of the hold-up notion is that it qualifies the SEP holder’s behaviour as an abuse of dominant position. It thus makes it possible to expand FRAND defences by contract law to include antitrust law. In the context of growing numbers of patent disputes in the smartphone ecosystem, this led a number of competition authorities to seek to curb the SEPs holders’ bargaining power in negotiations. The European Commission issued two anti-trust decisions in 2014 which indicate that injunctive relief should not be sought against a “willing licensee”.⁷

Concerns about the ex post market power of SEP holders have finally led some scholars in law and economics to propose deep reforms to the pricing mechanisms for SEP licenses. They suggest that SSOs could organize ex-ante competition between rival technologies during the standard setting process by inviting patent holders to bid on royalty rates (Swanson & Baumol, 2004) or royalty caps (Lerner & Tirole, 2014). The choice of essential technologies would then reflect both the performance and proposed price for the technology.

⁶ The hold-up argument has been invoked in relation to standard essential patents in two types of cases so far. In a few deception 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. In the other cases – such as *Broadcom v. Qualcomm* in 2007 and the subsequent cases – the SEPs are clearly identified, and implementers contend that the royalties claimed by SEP owners constitute a breach of FRAND commitments because they exceed 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.

⁷ More specifically, the European Commission first adopted on 29 April, 2014 a decision which finds that Motorola Mobility’s seeking and enforcement of an injunction against Apple before a German court on the basis of a smartphone SEP constitutes an abuse of a dominant position prohibited by EU antitrust rules in view of the particular circumstances in which the injunction was issued. On the same day, it rendered commitments offered by Samsung Electronics legally binding under EU antitrust rules. According to these commitments, Samsung will not seek injunctions in Europe on the basis of its SEPs for smartphones and tablets against licensees who sign up to a specified licensing framework.

4. Towards a FRAND clarification

4.1 *A reasonable approach*

SSOs have played a discrete but key role in supporting the tremendous development of the ICT industry in the last few decades. They have produced increasingly sophisticated standards that have made it possible to preserve high degrees of competition and interoperability between ICT products. At the same time, their main achievement has been to effectively involve new entrants from different countries and sectors in a context of globalization and technology convergence. It must be emphasized that SSOs, though some of them are very old, remain fragile institutions. Their functioning is fundamentally based on voluntary participation and consensus between heterogeneous participants, which can only work if these participants perceive a long-term benefit in cooperation.

Against this background, there is wide consensus in the industry that SSOs work rather well and should be protected from sweeping reforms initiated from the outside. In particular, introducing ex-ante price competition between technologies would imply a radical revision of the functioning of most SSOs and put at risk their ability to support collaborative innovation between their members. There is certainly room for improving SSOs' IPR policies and practices. However, any such move has strong implications for the internal balance of SSOs and should thus be initiated, discussed and approved by consensus among SSO members. As a matter of fact, many SSOs have already initiated discussions of this kind. At the moment, their priority is to update and clarify existing IPR policies, not to shift to a new model of standard setting.

Recent litigation cases reveal the urgent need to clarify the meaning of FRAND commitments in a renewed industry context, especially as ex-post licensing will prevail in the foreseeable future. There is little doubt that in any given case, a range of different licensing terms and royalty rates could be considered as FRAND without substantially undermining the incentives for the parties to invest in standard development or implementation. However, what the appropriate process and method is for picking one royalty rate or another remains unclear, which generates wasteful transaction costs and, in some cases, litigation. Future court decisions may gradually reduce this uncertainty. Meanwhile, it is the role of SSOs' IPR policies to provide more guidance to stakeholders and courts about how to approach FRAND licensing, while at the same time these IPR policies require SSOs not to intervene in licensing negotiations, nor to take position on the essentiality, validity, enforceability or infringement of any declared SEP.

4.2 *A closer look at the SEP licensing process*

In this perspective, it is useful to explain in further detail how FRAND licensing actually works in practice. As already mentioned, there is a consensus in the industry on the principle that the “Non-Discriminatory” part of the commitment does not mean that licensing terms should be identical for all but rather that “similarly situated” licensees should have access to the same licensing terms (Geradin, 2014). Licensing arrangements should accommodate at least the respective market positions, patent portfolios and business models of the parties. Keeping FRAND flexible is also important because these parameters are hardly predictable ex ante. Setting in stone ex ante a model for FRAND licenses is thus not advisable. Nevertheless, a clearer reference benchmark could provide a useful starting point for negotiations that would subsequently lead to differentiated outcomes. The US Department of Justice has, for instance, proposed that licensors offer a “cash-only” option for licensing their SEPs to prospective licensees (DoJ, 2012).

It is clearly more difficult to reach a consensus on the “Fair and Reasonable” part of the FRAND commitment, as it directly affects the balance of interests between the negotiating parties (and thus their respective incentives to invest ex ante in standard development and implementation). In

practice, each licensing agreement proceeds from a negotiation process, in which the balance of negotiating power may not be as severely biased as the hold-up argument suggests. Indeed, both parties have actually sunk investments in the standard (respectively in R&D and implementation) when the negotiation takes place. Moreover, the ability of SEP holders to refrain implementers from using the standard is bound by their commitment to concede a licence, thus supporting the “hold-out” argument. So far, there is no empirical evidence that clearly breaks the tie between the “hold-up” and “hold-out” arguments. However, in both cases unbalanced SEP licensing agreements would possibly result from flaws or “grey zones” in the process of FRAND negotiations. Thus, one of the main objectives of on-going discussions within SSOs is to address these problems by better framing the process of FRAND bargaining.

Another pending issue is how to articulate the determination of FRAND royalty rates with global licensing conditions at the standard level. Even well-balanced bilateral negotiations may not guarantee a fully efficient outcome if the royalty stack eventually stifles demand for standard-compliant products. Although solid empirical evidence is lacking here too, royalty stacking may stem from the multiplicity of independent licensing contracts, which then erode the profits of all licensors and licensees. In practice, vertically-integrated implementers can alleviate this concern by cross-licensing their patent portfolios. This solution is as yet unavailable for pure implementers that have to pay cash for licensing SEPs. Patent pools are also seen as an effective means to address royalty stacking (Shapiro, 2001; Lerner & Tirole, 2004), but they are local solutions that cannot be generalized easily.

4.3 *FRAND is in the details*

The general economic issues raised by SEP licensing have crystallized into a number of precise technical issues that divide the community of stakeholders in standardization. Recent discussions have already made it possible to solve some of them, such as the transfer of FRAND encumbrance along with SEP ownership. Several other important issues still remain open, revealing vested interests among stakeholders, but also opportunities to clarify (or not) the rules of the game for the benefit of all.

- ***Injunctive relief.*** The ability of SEP holders to seek injunctive relief against infringers is certainly the most disputed issue, echoing the general controversy regarding “hold-up” as opposed to “hold-out” arguments. On the one hand, there is concern among implementers that SEP holders may abusively wield the threat of injunction to extract more value than their technology is actually worth. On the other hand, SEP holders argue that the threat of injunction is necessary as a last resort to involve implementers in a negotiation before a trial. Beyond these stances, it is generally admitted that FRAND commitments do not imply that injunction should be prohibited, but rather that it should be allowed only when the infringer is unwilling to accept a FRAND offer to negotiate in good faith. This view is supported by the refusal of courts in most major countries (including the U.S. since 2006) to automatically issue injunctions based on the mere finding of patent infringement.

The real pending issue thus concerns the definition of criteria for establishing that an infringer is unwilling to accept a FRAND offer, keeping in view that the objective is to reduce legal uncertainty and transaction costs. This issue is compounded by potential interferences between the working of national courts and competition authorities, following the latter’s statements that seeking injunctive relief against an infringer who is willing to negotiate could also be considered as an abuse of dominant position. A number of legal scholars therefore argue that the intervention of antitrust authorities is not needed and can in fact be counterproductive (Lemley, 2007; Jacob, 2013).

- ***Royalty rate.*** Since SSO IPR policies usually do not indicate how to calculate FRAND royalty rates, different methods have been developed for their determination by third parties in the case of litigation. Though all of them basically proceed by analogy to the outcome of a “hypothetical negotiation” between the SEP owner and the implementer, these methods

may yield significantly different results (Geradin, 2014). The choice of one or another method can thus affect the balance of interests between SEP holders and implementers, especially as court decisions in turn provide reference points for other negotiations.

The “Ex-Ante Incremental Value” rule is a first approach. It states that a FRAND royalty rate should reflect the incremental value of the patented invention over the next-best alternative available *at the time the standard was defined* (which corresponds to the maximum amount that a licensee would have been willing to pay in a hypothetical negotiation at this moment). As already mentioned, this approach to FRAND chiefly aims to address the hold-up problem by isolating the intrinsic value of the technology from the ex-post value of practising the standard. The US FTC and the DG Competition of the European Commission support this approach. (EC, 2011; FTC, 2011) However, the rule has proved hard to implement in practice because substituting two patents within a standard is not that easy and would change the standard’s performance and value along several different dimensions. SEP holders also object to the fact that the method amounts to simulating tough price competition between technologies after inventors have sunk their R&D costs, which gives all the bargaining power to the licensee. In their view, it therefore fails to preserve inventors’ incentives to invest in R&D and to contribute their inventions to the standard-setting process (Sidak, 2013).

The “Georgia Pacific factors” provide an alternative method⁸ for the calculation of reasonable royalty damages for patent infringement. Like the “Ex-Ante Incremental Value” rule, this method simulates a hypothetical negotiation between a willing licensee and a willing licensor. However, a key difference is that this negotiation is assumed to take place at the time the infringement began (and therefore *after* the implementer has adopted the standard) which is more advantageous for the licensor. The method provides a non-hierarchical list of 15 factors that aim to replicate the different parameters of a real negotiation and allow for a high degree of freedom in the determination of royalties⁹. These factors include a set of relevant comparable factors – such as royalties received by the patentee for the same patent or rates paid by the infringer for the use of other comparable patents – but also considerations related to the invention’s incremental value – such as its importance as compared with available alternatives or the portion of the infringer’s profit that can be attributed to the infringed patent.

So far, courts have determined FRAND royalty rates in only a few cases, and in the two most important ones they opted for adapting the “Georgia Pacific” approach to a FRAND context rather than directly using the “Ex Ante Incremental Value” rule. In his 2011 *Microsoft v. Motorola* decision, US Judge Robart decided to apply the hypothetical negotiation ex-ante standardization. He then sought to adjust it for the importance of the SEPs to the standard and infringing product and for “unresolved disagreement” on the infringement and validity of the SEPs. This led him to use comparators (including some from patent pools) to eventually define a royalty rate below the one usually asked for the same SEPs by the patent holder (here, Motorola). In his 2013 *Innovatio* judgement, US Judge Holderman opted for a quite different interpretation of the “Georgia Pacific” factors, by proceeding “top down” rather than focusing on the stand-alone value of the infringed patent. He first sought to determine which portion of the income generated by the relevant infringing product is actually available to pay royalties on SEPs and then decided which portion of this income should accrue to a particular patent holder, given the relative size and importance of its SEP portfolio as compared with the set of all relevant SEPs.

⁸ This method was elaborated by a US Court in the landmark case of *Georgia-Pacific Corp. v. United States Plywood Corp.*

⁹ A complete list of the 15 factors is available in Annex.

A key issue in these decisions is how exactly the “Georgia Pacific” approach should be adapted to take into account the patent holder’s obligation to license its technology on FRAND terms. In its recent *Ericsson v. D-Link* decision, the US Court of Appeal of the Federal Circuit (CAFC) rejected the idea of applying a “one-size-fits-all” modified version of the “Georgia Pacific” factors to all cases of FRAND-encumbered patents. Instead, it ruled that the “Georgia Pacific” approach should be applied on a case-by-case basis, keeping in mind that the royalty for SEPs should be apportioned to the value of their technological contribution and not the value of their standardization. In particular, the CAFC affirmed that concerns about hold-up and royalty stacking should not be taken into account unless the accused infringer provides evidence on their “record in relation to both the FRAND commitment and the specific technology referenced therein”.

- **Royalty base.** The choice of a base for calculating FRAND royalties is another debated issue. The base could be the entire market value of infringing products (for instance, smartphones) or that of the infringing components that actually perform the standard functionalities (for instance, the baseband processor of a smartphone). SEP holders usually have a preference for the entire market value approach because it enables them to increase the net sales base by going after the most downstream manufacturer.

However, the choice of one or another base should be neutral if FRAND royalties are determined according to the value of the technology covered by the SEPs. In this case, the royalty rate should be adapted to the chosen base so as to precisely capture this technology value. Case law has also established limits on the entire value approach by seeking to establish “sound economic connection” between the claimed invention and the royalty base. The notion of “smallest saleable patent-practicing unit” has emerged as a focal point because it facilitates the practical market valuation and monitoring of the royalty base.

5. Beyond FRAND: transparency, quality, and governance

On-going discussions in SSOs and new court decisions will hopefully make it possible to gradually clarify the implications of FRAND licensing commitments. However, the FRAND debate represents only part of a broader set of challenges in the complex and quickly evolving world of ICT standards.

5.1 Market transparency

The market for SEP licenses suffers from a lack of transparency regarding licensing conditions. This is a significant factor of transaction costs, uncertainty and inefficiency, as it prevents the comparison process that usually underlies price formation mechanisms in efficient markets. Of course, standard essential patents are not interchangeable and cannot be considered substitutes competing in the same market. Nevertheless, it is easier to compare SEPs (and the related licences) than ordinary patents because their value stems precisely from standard essentiality. Such comparisons are actually common practice to determine FRAND royalties.

Enhancing transparency on FRAND licensing contracts could thus be a means to facilitate negotiations and the resolution of disputes by providing parties with easy access to relevant market benchmarks and a wider view of global SEP licensing conditions for a given standard. It would also ensure that FRAND licences are effectively “non-discriminatory”. However this idea is difficult to implement in practice, partly because the variety of licensing arrangements makes them difficult to compare. But the main obstacle is certainly the reluctance of stakeholders to waive (even partially) the confidentiality of their agreements, especially if this undermines their bargaining power in future negotiations.

A number of solutions have been suggested to address these concerns (Bekkers et al., 2013):

- The first one is that SEPs holders publicly disclose reference licensing terms – either on a voluntary or on a mandatory basis – as a starting point for negotiating a license on their respective portfolios. This echoes to some extent the proposal of a “cash-only” licensing option advocated by the US Department of Justice (DoJ, 2012). A few companies have also voluntarily published information on their future licensing schemes during standard setting processes at IEEE or ETSI. VITA, another SSO, has established a mandatory mechanism for ex-ante disclosure of the most restrictive licensing terms. Besides the reluctance of members of most SSOs, a serious limitation of this solution is that licensing terms announced ex ante may not provide a good measure of actual licensing terms once the SEPs are effectively licensed. Ex-ante disclosure takes place at a moment when the value of the standard is still uncertain. Moreover, the SEP holders have incentives to announce more restrictive terms if they do not want to lose bargaining power in future negotiations.
- Another solution is to collect information on SEP licensing terms for actual contracts between (anonymous) parties, and to compile this information in a database available to courts and negotiating parties. This approach could partly alleviate the reluctance of companies to disclose confidential information. Information on contracts could be provided either on a voluntary or a mandatory basis. The main challenge is to input sufficiently detailed information on contracts to provide relevant benchmarks, while preserving the anonymity of the contracting parties.

5.2 Patent density and patent quality

As illustrated by the growing number of SEP declarations, there is a high density of patents around ICT standards. Besides the sophistication of standards, the large number of declarations is partly driven by the patenting behaviour of SSO members. The commitment to disclose as early as possible all patents that they believe could be essential pushes them to over-declare. They also have strong incentives to augment the relative size of their patent portfolio in order to better leverage it in future (cross) licensing negotiations. This strategy leads to the patenting of minor

inventions (by filing, for instance, continuations and divisional applications), which often results in legally fragile patents (if granted).

Since all portfolios are inflated in more or less similar proportions, it is unlikely that the systematic filing of minor patents eventually generates more profits for individual licensors. On the contrary, the large number of patents filed around ICT standards generates extra costs of patent application. Because it tends to dilute the value of essential patents, it may also erode the incentives to invest in R&D for the development of standards. The difficulty of sorting out truly essential patents is finally a major source of legal uncertainty and transaction costs (namely screening, negotiation and enforcement costs) in the SEP licensing process. This addresses two different problems. On the one hand, it raises concerns about over patenting which might result in “patent thickets” – defined by Shapiro (2001) as “dense web[s] of overlapping intellectual property rights” – that could impede the development and marketing of standard-compliant products (EPO, 2013). On the other hand it raises concerns about a trend of over declaration of SEPs in front of standardisation bodies.

Existing SSO IPR policies are useful but imperfect instruments in this context. The requirement that participants publicly disclose patents that they believe are standard-essential is clearly helpful to mitigate the costs of searching for these patents. This is especially so when the disclosed SEPs are compiled in a public database with automatic search functionalities (such as the ETSI database). Over-declarations and blanket declarations certainly undermine the quality of this information. However, they remain preferable to under-declarations because they ensure that any potential SEP is encumbered with a FRAND commitment.

It is in the joint interest of SSO members to take further steps towards reducing the density of the “patent thicket”, especially by reducing the number of minor and legally weak patents around standards. Raising the quality of declared SEPs could be a powerful means to effectively mitigate transaction costs and legal uncertainty in the SEP licensing market, but also to reduce the global cost of filing and maintaining patents for SSO members. Various solutions could achieve this goal:

- SSO participants could change their approach to patenting by restraining themselves from filing patents of mediocre quality. An obvious obstacle is, however, that a given participant would incur an opportunity cost if the other participants do not behave in the same way.
- SSOs could also improve their disclosure policies by limiting the use of blanket disclosures, and by undertaking regular reviews of disclosed patents (for instance, once the final standard is adopted) in order to filter out non-essential ones and/or patent applications which have been rejected (Bekkers et al., 2013). A related proposal is that SSOs undertake SEP landscaping around standards.
- A straightforward means of limiting the formation of “patent thickets” is to enhance the patent examination process at patent offices by, for instance, limiting abuse of continuation and divisional practices (Lemley, 2007). The European Patent Office (EPO), usually recognized as one of the most effective patent offices regarding patent quality, launched a set of new measures in 2010 for this purpose. The America Invents Act passed in 2011 also intended to address concerns about the leniency of examinations at the US Patent & Trademark Office. In particular, it successfully developed mechanisms that make it easier to challenge poor patents after they have been granted. Such mechanisms could be usefully transposed to other patent offices (such as the Chinese one) that currently grant large numbers of low quality patents. Overall, however, there is a lack of policies addressing in a combined approach, patent prosecution and patent quality on the one side and the treatment of standard essential patents in SSOs on the other side.
- Tighter collaboration between SSOs and patent offices is another promising way to address the inflation of patents around ICT standards. ETSI and the EPO have recently engaged in cooperation of this kind in order to enable examiners at the EPO to use fresh information from ETSI working groups as prior art in order to better assess the patentability of

standard-related inventions. Similar provisions also exist between the EPO and the IEEE. This is an effective and practicable initiative that could be extended to other SSOs and patent offices, with wider support from public authorities.

5.3 SSO governance and innovation

The debate on FRAND licensing is but one consequence of a deeper evolution of standardization practices in ICT in the long-term. Over time, standard setting has become an increasingly R&D-intensive activity, involving a growing number of SEP holders and implementers with diverging business models. SSOs have managed to accommodate these changes so far. However, the deep evolution of standardization raises the long-term issue of their governance and ability to support efficient collaborative innovation for the development of standards.

The formal standardization process performed in large SSOs is often criticized for being too slow due to the difficulty of reaching consensus between large numbers of participants. Against this background, it has become frequent that key technology contributors meet in smaller consortia to develop standards. This has raised concern about “forum shopping” across SSOs in order to choose more favourable IPR policies (Lerner & Tirole, 2006). However, most consortia aim to submit proposals in larger SSOs (Cargill & Weiss, 1992) and some formal SSOs actually have policies of active cooperation with consortia. For instance, the WiMAX Forum and UMTS Forum enable tighter collaboration for companies contributing to standards developed respectively at the IEEE and ETSI. Recent studies suggest that they can thereby enhance the efficiency of the standard setting process (Baron et al., 2014).

These emerging practices reveal the need to streamline the collaborative innovation process of standards development. They also raise a number of issues relating to the governance of this process, such as the articulation between private R&D activities and the role of formal SSOs as technology integrators, the need to balance efficiency and inclusiveness in decision making, the ability of SSOs to interact with each other at a high level, or the sources of their legitimacy as standard setters in a global environment. Beyond the FRAND debate, these issues will impact on the efficient production of open standards in the future and therefore also deserve the attention of stakeholders and researchers interested in standardization.

6. Perspectives for future research

In the absence of solid empirical evidence on the royalty stacking, and hold-up and hold-out problems, the FRAND debate will remain strongly polarized because it essentially focuses on theoretical arguments. This approach may be misleading because theoretical arguments are usually derived from simplistic assumptions about the mechanisms of royalty determination (such as the existence of a unique public royalty price for all implementers or the absence of delay between the adoption of a standard and the licensing or related SEPs).

An obvious research avenue is therefore to better understand actual SEP licensing practices and their consequences for the industry. This would also comprise the analysis of the quality and relevance of respective patent portfolios and the different ways of how to establish essentiality in negotiation procedures. In particular, it seems necessary to thoroughly analyze how the companies' business models and the legal and judicial framework may determine the outcome of bilateral FRAND negotiations. Research of this kind would make it possible to better weight the different arguments on the limitations of the FRAND principles and to formulate recommendations for their enhancement. Theoretical approaches would clearly benefit from taking these factors into account. However, the main challenge lies in the production of relevant and solid empirical evidence. Addressing this empirical challenge seems difficult without further support from policy makers, SSOs and/or the companies involved in standardization and SEP licensing.

The joint development of standards by SSO members is another vast research field that deserves further investigations. At this stage, priority should be given to the collection of empirical evidence on SSOs and their internal working processes and governance rules (e.g., membership rules, decision rules, IP policies). This research should document the diversity of existing models and highlight their evolution over time. It would also enable the classification and benchmarking of different types of SSO with respect to their organization and impact on the industry. On this basis, further steps could aim to better understand how SSOs are able to attract members, how they interact with each other, and how collaborative innovation can be efficiently supported.

References

- Armstrong, A., Mueller, J. J. and D. T. Syrett. 2014. "The Smartphone Royalty Stack: Surveying Royalty Demands for the Components Within Modern Smartphones" Working Paper.
- Baron, J., Mènière, Y., T. Pohlmann. 2014. "Standards, consortia and innovation" *International Journal of Industrial Organization*, 36, 22-35.
- Baron, J., Schmidt, J. 2014. "Technological Standardization, Endogenous Productivity and Transitory Dynamics" *Banque de France Working Paper* No. 503
- Bekkers, R., Birkman, L., Canoy, M., de Bas, P. Lemstra, W., Mènière, Y., Sainz, I., van Gorp, N., Voogt, B., Zeldenrust, R., Nomaler, N., Baron, J., Pohlman, T., and A. Martinelli. 2014. "Patents and Standards: A modern framework for IPR-based standardisation". A study prepared for the European Commission Directorate-General for Enterprise and Industry. Brussels: European Union.
- Biddle, B., White, A. and S. Woods. 2010. "How Many Standards in a Laptop?": http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1619440
- Bekkers, R., Dalais, M., Dore, A. and N. Volanis. 2014. Understanding Patents, Competition & Standardization in an interconnected World. ITU. Available at http://www.itu.int/en/ITU-T/Documents/Manual_Patents_Final_E.pdf.
- Berger, F., Blind, K., and N. Thumm. 2012. "Filing behaviour regarding essential patents in industry standards", *Research Policy*, 41(1), 216–225.
- Blind, K., Cremers, K., and E. Mueller. 2009 "The influence of strategic patenting on companies' patent portfolios". *Research Policy* 38 (2), pp. 428-436.
- Blind, K., and S. Gauch. 2008. "Trends in ICT standards: The relationship between European standardisation bodies and standards consortia" *Telecommunication Policy*, 32, 503–513.
- Cargill, C. and C. Weiss. 1992 "Consortia in the Standards Development Process", *Journal of the American Society for Information Science*, vol. 43 no. 8, pp. 559-565.
- Cyber Creative Institute. 2011. Evaluation of LTE essential patents declared to ETSI. Available at: <http://www.cybersoken.com/research/pdf/lte02EN.pdf>.
- US Department of Justice (DOJ). 2012. Antitrust Policy in the Information Age: Protecting Innovation and Competition. Antitrust Policy in the Information Age: Protecting Innovation and Competition. Talk delivered by Joseph F. Wayland, Acting Assistant Attorney General Antitrust Division, at the Fordham Competition Law Institute, 21 September 2012.
- European Commission. 2011. Horizontal Guidelines for Cooperation Agreements. Available at: <http://ec.europa.eu/competition/antitrust/legislation/horizontal.html>.
- European Patent Office Economic and Scientific Advisory Board. 2013. Workshop on Patent Thickets. Report available at: [http://documents.epo.org/projects/babylon/eponot.nsf/0/B58781F239B083CEC1257B190038E433/\\$FILE/workshop_patent_thickets_en.pdf](http://documents.epo.org/projects/babylon/eponot.nsf/0/B58781F239B083CEC1257B190038E433/$FILE/workshop_patent_thickets_en.pdf).
- Federal Trade Commission. 2011. The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition. Available at: <http://www.ftc.gov/os/2011/03/110307patentreport.pdf>
- Goodman, D.J., and R.A. Myers. 2005. "3G Cellular Standards and Patents" IEEE WirelessCom 2005, 13 June 2005.
- Geradin, D. 2010. "Reverse Hold-ups: The (Often Ignored) Risks Faced by Innovators in Standardized Areas" Paper prepared for the Swedish Competition Authority on the Pros and Cons of Standard-Setting, Stockholm, 12 November 2010

- Geradin, D. 2014. "The Meaning of "Fair and Reasonable" in the Context of Third-Party Determination of FRAND Terms" *George Mason Law Review*, 21:4.
- Gupta, K. and M. Snyder. 2014. "Smart Phone Litigation and Standard Essential Patents" Hoover IP² Working Paper Series No. 14006.
- Harkrider, D. D., 2013. "Seeing the Forest through the SEPs". *Antitrust*, Vol. 27, No. 3.
- Jacob, R. 2013. "Competition Authorities Support Grasshoppers: Competition Law as a threat to Innovation" *Competition Policy International*, Volume 9 | Number 2 | Autumn 2013.
- Lemley, M. A. 2007. "Ten Things to Do about Patent holdup and Standards", *Boston College Law Review*, 48:149.
- Lemley, M. A. and C. Shapiro. 2007. "Patent holdup and royalty stacking", *Texas Law Review*, 85 (7), pp. 1991-2049.
- Lerner, J. and J. Tirole. 2004. "Efficient Patent Pools", *American Economic Review*, vol. 94:3, pp. 691-711.
- Lerner, J. and J. Tirole. 2006. "A Model of Forum Shopping", *American Economic Review*, vol. 96, no. 4, pp. 1091-1113.
- Lerner, J. and J. Tirole. 2014. "Standard Essential Patents" IDEI Working Paper, n°803.
- Shapiro, C. 2001. "Navigating the Patent Thicket: Cross-licenses, Patent Pools and Standard-Setting" in Jaffe A., Lerner, J. and Stern S. *Innovation Policy and the Economy*. Cambridge University Press, Cambridge.
- Sidak, J. G. 2013. "The Meaning of FRAND Part I: Royalties" *Journal of Competition Law and Economics*, 9, pp. 931-985.
- Simcoe, T. Graham S. J. and M. Feldman. 2009. "Competing on Standards? Entrepreneurship, Intellectual Property and Platform Technologies". *Journal of Economics and Management Strategy*, 18(3): 775{816, Fall 2009.
- Swann, P. 2000. The economics of standardisation. London, DTI (electronic resource).
- Swanson, D. G. and W. J. Baumol, 2005 "Reasonable and Non-discriminatory (RAND) Royalties, Standards Selection, and Control of Market Power", 73 ANTITRUST Law Journal 1, 51-56.

Annex

List of workshop participants

Surname	First name	Affiliation
Blind	Knut	Professor of Innovation Economics at the Faculty of Economics and Management, Berlin University of Technology
Dini	Roberto	Intellectual Property Consultant, Sisvel International SA
Dolmans	Maurits	Partner, Cleary Gottlieb Steen & Hamilton LLP
Graham	Stuart	Assistant Professor of Strategic Management at the Scheller College of Business, Georgia Institute of Technology
Heim	Mathew	Senior Director, Government Affairs, Qualcomm
Hermele	Daniel	Senior Director and Legal Counsel, Qualcomm
Hofkens	Patrick	Director IPR Policy, Ericsson
Jacob	Robin	Professor, Faculty of Laws, University College London
Karachalios	Konstantinos	Managing Director, IEEE Standards Association
Ménière	Yann	Professor of Economics, MINES ParisTech, Université Paris Sciences et Lettres
Porath	Rebekka	Standards Policy Manager EMEA in Intel's Global Public Policy Organization
Raes	Serge	Responsible for the coordination between Intellectual Property and Standardization, Orange
Tapia Garcia	Claudia	Director IPR Policy, RIPL Strategy & Portfolio Management, Ericsson
Thumm	Nikolaus	Senior Fellow, European Commission - Joint Research Centre (JRC)
Weiler	Dirk	Chairman of the ETSI General Assembly and the ETSI IPR Special Committee. Head of Standards Management & Horizontal in the Networks Business of Nokia

International Expert Workshop Agenda

STANDARD ESSENTIAL PATENTS IN INFORMATION AND COMMUNICATION TECHNOLOGIES AND INNOVATION IN EUROPE

**27 October 2014, Institute for Prospective Technological Studies, Edificio EXPO, c. I. Garcilaso 3,
41092 Seville (Room 41, 1st floor)**

09:00 – 09:30: Welcome – Introduction

Ioannis Maghiros (IPTS), Paul Desruelle (IPTS), Nikolaus Thumm (IPTS)

09:30 – 11:30: Session 1

Impact of SEP conflicts on ICT innovation in Europe

Chair: Stuart Graham (Georgia Tech)

Speakers: Dirk Weiler (ETSI), Knut Blind (TU Berlin),
Serge Raes (Orange), Patrick Hofkens (Ericsson)

Questions to be addressed:

- Is there any specific European dimension of conflicts with standard essential patents?
- What is the practical impact of patent hold up and reverse patent hold up within ICT in Europe?
- To which extent are potential conflicts limited to different interests of innovator (high patenting activity) and implementer (low patenting activity) companies?
- Are conflicts potentially focused between established (large patent portfolio) versus new comer (small patent portfolio) companies?
- How is FRAND licensing established in practice with the European Telecommunications Standards Institute
- Are FRAND licensing agreements generally more patent-by-patent licensing agreements or portfolio licenses?

11:30 – 12:00: Coffee (courtyard)

12:00 – 14:00: Session 2

Impact of FRAND licensing on innovation

Chair: Nikolaus Thumm (IPTS)

Speakers: Konstantinos Karachalios (IEEE), Sir Robin Jacob (University College London),
Stuart Graham (Georgia Tech), Rebekka Porath (Intel)

Questions to be addressed:

- How does FRAND licensing affect innovation, standard setting and adoption of new technologies?
- Does FRAND commitment affect the SEP owner's ability to seek or threaten to seek injunctive relief?
- Should a FRAND commitment travel with the patent in case of patent ownership change?
- How to define 'willingness' to commit to FRAND licensing?
- No injunctive relief for infringement of SEPs if the patentee has failed to comply with its obligations under FRAND?
- Has FRAND commitment to be considered by the court before issuing an injunction for standard essential patents?
- What is the role/dimension of standard essential patents licensed by patent assertion entities in Europe?

14:00 – 15:00: Lunch (courtyard)

15:00 – 17:00 Session 3

Defining FRAND royalty rates

Chair: Konstantinos Karachalios (IEEE)

Speakers: Yann Ménière (MINES ParisTech), Roberto Dini (Sisvel),
Dan Hermele (Qualcomm), Maurits Dolmans (Cleary Gottlieb)

Questions to be addressed:

- What is the economically efficient level of royalties overall (in view of creating innovation, spreading technology)?
- Should the societal benefits of standards be reflected in permissible royalty rates? How?
- Should FRAND royalties be based on end products (interest of innovators) or on product components (interest of implementers)?
- Are there any upper or lower bounds for FRAND licensing terms (2, 5, 10%)?
- Should royalty fixing also consider the other royalties (i.e. the royalties for patents that are not standard essential) to be paid by the licensee (should not be more than if the patent were not in the standard; the fee should only be related to what the standard essential patents had contributed)?
- Should royalties consider an ex-ante benchmark?
- Could more transparent and more harmonized rules on patent 'essentiality' and FRAND licensing terms mitigate the risk of conflicts? How?

17:00 – 18:00: Session 4

Closing session

Chair: Yann Ménière (MINES ParisTech) & Nikolaus Thumm (IPTS)

Summary, critical review and next steps.

List of the Georgia-Pacific Factors for Determining Reasonable Royalty

In the seminal case *Georgia-Pacific Corp. v. United States Plywood Corp.* (1970), a U.S. district court established a list of 15 relevant factors to determine reasonable royalty damage. These factors (listed below) provide a non-exhaustive list of relevant evidence categories to be used when the calculation of royalty damage is based on the conceptual framework of hypothetical negotiation between a willing licensor and a willing licensee.

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.

Source: *Georgia-Pacific Corp. v. United States Plywood Corp.*, 318 F. Supp. 27 1116, 1120 (S.D.N.Y. 1970), modified and aff'd, 446 F.2d 295 (2d Cir. 1971). Chapter 7, Section II.

Europe Direct is a service to help you find answers to your questions about the European Union
Freephone number (*): 00 800 6 7 8 9 10 11

(*) Certain mobile telephone operators do not allow access to 00 800 numbers or these calls may be billed.

A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server <http://europa.eu>.

How to obtain EU publications

Our publications are available from EU Bookshop (<http://bookshop.europa.eu>),
where you can place an order with the sales agent of your choice.

The Publications Office has a worldwide network of sales agents.
You can obtain their contact details by sending a fax to (352) 29 29-42758.

European Commission

EUR 27333 EN – Joint Research Centre – Institute for Prospective Technological Studies

Title: Fair, Reasonable and Non-Discriminatory (FRAND) Licensing Terms – Research Analysis of a Controversial Concept

Author: Yann Ménière

Luxembourg: Publications Office of the European Union
2015 – 32 pp. – 21.0 x 29.7 cm

EUR – Scientific and Technical Research series – ISSN 1831-9424 (online)
ISBN 978-92-79-49280-8 (PDF)
doi:10.2791/348818

JRC Mission

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new methods, tools and standards, and sharing its know-how with the Member States, the scientific community and international partners.

*Serving society
Stimulating innovation
Supporting legislation*

