

# GSR

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# Background paper

*THE ROLE OF STANDARDS IN A DIGITAL ECONOMY*

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# 1 THE ROLE OF STANDARDS IN A DIGITAL ECONOMY

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## **1. Standards and the (digital) economy**

More than ever before, standards are being recognized as pivotal for economic and social growth in our increasingly 'digital' world. This is reflected in the attention that policy makers are now devoting to the phenomenon. In the European Community (EC), for instance, standards and interoperability represent 'Pillar II' of the *Digital Agenda for Europe*.<sup>1</sup> In the United States (U.S.), standards are a key component of the *Strategy for American Innovation: Securing Our Economic Growth and Prosperity*.<sup>2</sup> Many economies around the world are paying a similar amount of attention to standards, including China, a country that is increasingly important in the world of standards.<sup>3</sup>

But standards have been around for a long, long time. Why this sudden interest? It is already understood since long that standards have an impact on markets in a variety of ways. From the perspective of the user, developer or implementer (micro perspective), there are advantages and disadvantages associated with standards, also at a higher economic level, as Table 1 shows. On the positive side, standards encourage technical change, innovation and competition, as well as facilitating international trade. But at the same time, standards can transfer power, obstruct market access, and hamper competition. However the positive effects seem to outweigh the negative ones underlined by the fact that policy makers in general strongly support standardization. As a safeguard, competition law, international trade agreements (e.g. the World Trade Organization, WTO) and other regulations have been established to minimize any negative effects. While several scholars have worked on quantifying the economic impact of standards,<sup>4</sup> the phenomenon is so multifaceted that it is hard to overestimate its effect on the economy and society.

**Table 1: Some pros and cons of standards, from the perspective of users, developers and implementers**

<i>Advantages of standards</i>	<i>Disadvantages of standards</i>
Increased network value for users	Reluctance towards newer and better standards
Lower switching costs	Loss of variety
More suppliers	Less competition early in product life cycle
More competition later in product life cycle	Protection of markets; entry barrier
Lower prices	Bias to large vendors
Greater offer and lower prices of complementary goods	Bias to large purchasers
Less risk of tying	Costs to rival vendors
Easier evaluation of offerings	Greater power for standards sponsor
Allows for certification	Higher costs associated with over-standardization
Facilitates market liberalization	Higher costs associated with gateways
Easier interchangeability of products or services	Costs of setting the standard
Easier communication between actors	Congestion costs
Less duplicity	Limiting performance or functionality
Easier combination of products or services	
Reduces risk of choosing a future loser	
Lower risk for one-supplier dominated markets	

Source: Author.

While the above aspects are not new, this paper argues that they are now increasingly important for the economy. The reason is that markets and the economy as a whole are becoming more and more dependent on what are known as compatibility standards. These are standards that define in detail the interaction between devices and services in order to achieve successfully work together. In networks and platforms, they ensure that various suppliers can participate. Here, the words 'networks' and 'platforms' are used in a very broad sense, ranging from telecommunications networks, where, for instance, a mobile phone needs to interact with a network infrastructure, via software networks, where applications need to be compatible with the operating system and underlying hardware, to a content network, where a consumer will expect a movie disc to play properly in a DVD player.

While interoperability standards were traditionally the domain of telecommunications, Information Technology (IT) systems and consumer electrics (as reflected by the examples listed above), this is changing rapidly. More and more industry sectors and societal important areas need deployment compatibility standards to meet new challenges and requirements. Examples are smart grids, e-health, public transport, road safety, and intelligent transport systems. In fact, nearly every sector introducing 'smart' systems relies heavily on compatibility standards. Sometimes these sectors use existing IT or telecom standards as 'enabling technologies' (like the use of existing mobile communications standards for the European eCall road safety program, where each new car will have a functionality to automatically call for emergency services when involved in a crash). In other cases, however, new, 'genuine' compatibility standards need to be developed to serve emerging sectors.

This section ends with a brief explanation of how standards are *created*. In fact, there is no single method or mechanism for their creation. Roughly speaking, one can distinguish three types of standards, each created in their own way: proprietary standards, open standards, and consortium standards. Proprietary standards are set by a single firm or organization not seeking or allowing input from others. It does make the standard available to others, to allow them to supply complementary

assets such as devices, software, or content. But the firm retains control over the specifications, and often sets the rules by which others can participate. Since standardization is in principle a voluntary activity, any firm is allowed to develop proprietary standards, although most firms will only do so if they believe they are strong enough to succeed in developing such a standard. Illustrative examples can be found in the fields of computer operating systems, software, and game console platforms. Open standards, in contrast, are set by standard setting organizations that have rules about open participation in the process, a consensus-based procedure for decision making, the open availability of standards' specifications,<sup>5</sup> and often rules about eventual patents covering their standards (Section 4 discusses these in more detail). This category includes a number of very large organizations that are developing standards in broad technological domains and many different domains. Examples are the International Telecommunication Union (ITU), the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), the Institute of Electrical and Electronics Engineers (IEEE), and the European Telecommunications Standards Institute (ETSI). Several of these large organizations are officially recognized by the authorities in one way or another. It is worth noting that there is a long and interesting debate on what 'open' actually means in the context of standardization, and which organizations are 'open'.<sup>6</sup> The third category of so-called consortia (or fora), belongs somewhere in between the previous categories. It is a diverse category, though. For instance, some are open to any interested participants, while others restrict access to invitees only. Consortia are often established in the belief that a smaller group of like-minded organizations can more quickly achieve an outcome that is satisfactory for everyone.

## ***2. The challenging relationship between patents and standards***

Standardization is thus a mechanism that aims to promote innovation and boost the economy. Likewise, the patent system is a mechanism with exactly the same aims. However, when these two mechanisms intersect, tensions rise. This is due to the standardization system being based on the assumption of commonalities, of equal access to all stakeholders and a fair playing field in implementing the standard, whereas the patenting system is based on a temporal monopoly and exclusion of others to implement technologies. The opposing principles of sharing and excluding do not easily mix, as will be shown in our following discussion on the intersection of patents and standards.

The idea that the implementation of standards could require the use of patented technology is hardly new. As early as 1932, a committee of the American National Standards Institute (ANSI) made the following recommendation: *"That as a general proposition patented design or methods not be incorporated in standards. However, each case should be considered on its own merits and if a patentee be willing to grant such rights as will avoid monopolistic tendencies, favorable consideration to the inclusion of such patented designs or methods in a standard might be given".*<sup>7</sup> The recommendation was adopted unanimously, and marked the creation of what may have been the first formal patent policy relating to standards.

While the inclusion of patented technologies might have been an incidental matter in the past, it is more and more common nowadays. An increasing part of the overall knowledge base in our society is patented, and since the 1980s, there has been a clear upsurge in the number of patent applications, both in the U.S. and (later) elsewhere in the world. This upsurge is particularly visible in China; a country where only relatively recently a modern patent system was introduced, and a country with firms and organizations that increasingly recognize the value of patents. Since standards often aim to include state-of-the-art technologies, it should not come as a surprise that many of these are in fact patented.

Including patented technology in standards is certainly not a bad thing as such. When drafting a standard, the Technical Committee – or other entity entrusted with this work – is often given a set of design requirements containing conflicting elements. As an example, let us consider a standard for mobile telecommunications. Here, the design requirements will typically aim to achieve: (1) a high

data rate ('speed') for data services, (2) a large, continuous coverage area, (3) allowing the user to move at high speeds, perhaps as fast as a high-speed train, (4) consuming little power in order to optimize battery life, (5) requiring a minimum number of cell sites or antenna towers, (6) being robust to noise and other types of interference, and (7) low costs for both base stations and terminals. Obviously, there are a number of trade-offs between these requirements, and some technologies might be better at solving these trade-offs than others. Again, given the high propensity to patent prevailing in many 'high tech' sectors, it is likely that many attractive technological solutions are already patented (or that companies developing these to address certain challenges in the standard, patent them right away). Patented technologies may then be chosen to be included in a standard because of their attractiveness. In some cases, a patented technology may even be the *only* feasible means of realizing the functional requirements of the standard in question. In other cases, the patented technology may not be the only solution but still the best way to achieve the standard requirements, by offering a higher performance or making the implementations more cost-effective, etc.

When considering patented technology in the context of standards, a central concept is that of a standard-essential patent, often abbreviated as SEP. A simple, layman's definition is that a patent is essential if it is *indispensable* to any company wishing to implement a technical standard. The text of the standard is drafted in such a way that it is simply not possible to implement the standard according to the specification without using the technology protected by the patent. Hence, the definition of standard bodies' SEPs often reads something like: "*there are no technical alternatives for implementation available that do not infringe the patent in question.*"<sup>8</sup> While there may be (and usually are) many more patents that are valuable for standards-based products, these are not necessarily essential according to the above definition. For instance, a patent on an integrated antenna for a phone might be very valuable, but will not be essential as long as the specifications in the standard do not require this.

As suggested, including patented technologies in standards might be a good thing, as these can improve the standards' performance, cost-effectiveness, or environmental friendliness, to name but a few things. In such cases, the cost of including these patented technologies – licensing costs but also the resource-consuming licensing negotiation processes – may be worth the standard's additional value. However, if such patents are included without contributing substantially to the standard's value, it could be considered suboptimal from the public perspective (yet perhaps optimal from the individual patent owner's perspective). Such patents can unnecessarily raise the cost of implementing the standard (costs which may or may not be passed on to the consumer), and have consequences for the competition, market entry, and more.

Before specifically addressing concerns about patents in standards in the following section, let us first note that such patents have become a very common phenomenon. The recently compiled OEIDD<sup>9</sup> (Open Essential IPR<sup>10</sup> Disclosure Database) of essential patents in thirteen large standard setting bodies includes no fewer than 17,000 identified USPTO (U.S. Patent and Trademark Office) or EPO (European Patent Office) patents. While these are self-declarations that may be prone to both under-reporting and over-reporting (see below), there are good reasons to believe the actual number of essential patents is considerably higher.<sup>11</sup> It should also be noted that the distribution of essential patents is highly skewed. The above thirteen standards bodies have produced many thousands of standards, but only about 6 per cent cover essential patents.<sup>12</sup> Moreover, within those standards that do cover SEPs, the distribution of SEPs is also highly skewed. Most standards cover one or two USPTO or EPO essential patents, while a small set of around two dozen standards covers over a hundred essential patents each. Among these 'large' standards are telecommunications standards (e.g. the ETSI GSM, W-CDMA and LTE standards), wireless LAN standards (e.g. the IEEE 802.11 'Wi-Fi' series and 802.16 'WiMax' series), and audio and video compression standards (e.g. the ITU-T H.222/H.262 "MPEG-2" and ITU-T H.264 "AVC").

### 3. Concerns about patents in standards

While including patented technology in standards can have considerable benefits, as shown in the previous section, it also raises a number of concerns. These concerns are mostly in connection with the monopoly rights that patents provide for their owners: in principle, a granted patent gives its owner the right to exclude others from making, using, selling, offering for sale, or importing the patented invention for the term of the patent, which is usually 20 years from the filing date (subject to the payment of maintenance fees, and the patent not having been invalidated in court).

While patents can offer substantial benefits to their owners in markets that are not based on standards, competitors often have the choice whether to license the patent or not. After all, they may decide to develop an alternative technology in order to supply the market with similar products and services. They might design around the patented technology, or even develop something superior. With patents that are essential for standards, such options no longer exist. As already shown above, the mere definition of essential patents is all about these patents being indispensable. The actual or prospective implementer of the standard therefore simply has no choice but to use the patented technology, and seek a license. This gives the patent owner extraordinary power.

So what are the major concerns when incorporating patented technology in standards? The remainder of this section will discuss five potential concerns, whereas the next section considers how standard setting bodies deal with these concerns.

**1). Non-availability of licenses** – This refers to the situation where once a standard is finished and adopted, the owner of an essential patent is not willing to license it out. Firms that own patents have no obligation whatsoever to license patents in the first place (apart from some exceptions, such as compulsory licenses or if they have bound themselves to certain commitments, see below). Some firms may consider certain patented technologies to be their ‘diamonds’, which distinguish their products from others offered on the market, and do not wish these technologies to be part of a standard in the first place. Should a situation arise where there is non-availability of licenses of essential patents, then the problem is serious: the adopted standard will need to be withdrawn, with all the associated consequences such as delays in product introduction, affecting investments made by implementing firms and the standards body. In such cases the standards body may consider developing another standard which does not rely on the patented technology, but it might no longer gain the same confidence and support.

**2). Ex post patent holdup** – This refers to the situation where, once the patent is covered by the standard, and implementers are locked in, the patent holder charges a higher licensing fee than it could have bargained for before the technology was made part of the standard (e.g. ex ante). A down-to-earth definition was recently provided by three influential individuals currently or formerly working for the European Commission, the U.S. Department of Justice, and the U.S. Federal Trade Commission respectively: *‘hold-up occurs when the SEP owner approaches firms practicing the standard—after those firms have invested in developing their products that depend on the standard—with an onerous licensing demand. Assuming the patent is indeed essential and valid, the firm’s product must practice the patent in order to be interoperable, placing the firm in a poor bargaining position.’*<sup>13</sup> In such a situation, the patent holder not only charges rents for the patent’s technical merit, it also appropriates the implementers’ (high) switching costs. Patent hold-up can over-compensate patentees, raise prices for consumers who lose the benefit of competition among technologies, and deter innovation by manufacturers facing the risk of hold-up.<sup>14</sup>

**3). Royalty stacking** – Suppose a standard covers numerous essential patents. Even if each individual patent only requires a modest royalty fee to be paid (thus no hold-up), the cumulative licensing fee may be considerable. The cumulative fee might even become so high that it prohibits actual implementation, for example where the total licensing fees exceed the market value of the product.



Whether such situations will actually occur, depends of course on the actual fees demanded by the patent owners, and whether they are willing to reduce their demands in such a way that the overall fee does not hinder the implementation of the standard. There is a lively on-going academic debate about whether royalty stacking does or does not occur in practice.<sup>15</sup>

**4). Avoidance of undue discrimination** – If a patent holder decides to license out its patent, it is free in principle to decide who it will or will not license. As a matter of fact, exclusive licenses (where there is only one licensee) are a very common phenomenon. A patent owner who decides to license more than one party is free to demand different fees from different licensees. If a patent is essential to a standard, this may result in undue discrimination between implementers of the standard. A patent owner might, for instance, categorically exclude newcomers to the market (something that occurred in the early days of the GSM standard),<sup>16</sup> categorically offer better contracts to other vertically integrated firms, or exclude specific competitors.

**5). Over-inclusion** – Companies owning essential patents have a range of benefits, such as revenue generating opportunities (every implementer of the standard is by definition infringing and thus by definition a potential licensee), and a good bargaining position for cross licenses getting access to SEPs and non-SEPs, e.g. proprietary technologies or differentiating patents. Moreover, vertically integrated companies may have the advantage that the resulting standard comes close to their own technological strength, know-how, existing products or product platforms, and markets and clients. As such, it may give them competitive advantages in the product market, a head start, and less need to re-tool. All these advantages create incentives to obtain essential patents. Unsurprisingly, firms employ a range of strategies to ‘drive’ their own technologies into a standard.<sup>17</sup> This can result in what could be called ‘over-inclusion’. While a complex standard or one with a wide scope may require more technological inputs than a simple or narrow standard, it may be hard to believe that some standards really require almost 3,000 different patented technologies in order to meet the design requirements established at the outset.<sup>18</sup> Over-inclusion may drive up licensing fees (see royalty stacking, above) but also unnecessarily complicate the standard and the process to develop the standard.

Of course, one needs to balance these concerns against the benefits of patents in standards. It has already been mentioned that patented technologies can improve the standard’s performance or its cost-effectiveness. Allowing patents in standards also attracts valuable firms to participate (who otherwise might stay away, preferring to develop a proprietary standard that uses their valuable patents). Finally, allowing patents in standards makes it easier for firms to continue to invest in R&D, especially if they have a business model based on licensing revenues. In fact, in a good functioning market, one would expect such specialized technology developers to emerge, and they might be better at developing new technologies than downstream firms.

#### ***4. Current arrangements for patents at standard setting organizations***

In Section 2, it was shown that already back in 1932, the American National Standards Institute considered its stance regarding the inclusion of patented technology in standards, thus representing possibly the first formal patent policy (or IPR policy)<sup>19</sup> relating to standards.

Our society has come a long way since then. However, it was not until the late 1980s, that the incorporation of patented technology in standards began to attract wider attention. This broader scrutiny may have been in large part the product of the patent issues that surfaced regarding GSM, a mobile technology that would eventually become extremely successful.<sup>20</sup> Unfortunately, the host of the GSM standards development process had not yet adopted effective patent policies,<sup>21</sup> nor was this unusual, because in the late 1980s, most if not almost all standards setting organizations (SSOs) lacked established patent policies. The policies they did have in place were mostly summary. In the past three decades, the focus on such policies has increased and at the present time, virtually all large, estab-

lished SSOs have more or less sophisticated patent policies. Many have been amended and updated in recent years.

In practice, SSOs follow different approaches to achieve their goals, regardless of whether these goals are explicit or not. The choice of approach is often a result of consensus reached among their members, and may be impacted by culture, a specific technical context, and the composition of members who can vote or otherwise influence the decision processes. A brief description of the two main approaches is as follows:

**A. Participation-based patent policies (examples: W3C, OASIS).** Already at the outset, when a firm joins organizations as a member, it is required to commit itself to a policy requiring the licensing of any eventual essential patent under specified conditions, often defined as Fair, Reasonable and Non-Discriminatory (F/RAND)<sup>22</sup> terms or Royalty Free<sup>23</sup> conditions. Usually, such policies do have an opt-out option should firms realize the standard to be adopted requires one of their ‘diamonds’. In such cases, a policy can specify, for instance, that this patent owner may notify the SSO of non-availability of licenses within 30 days after the draft standard is published (and the policy may require the firm to step back from the working group developing the standard in question). Yet, firms cannot usually opt out if the patent covers a technical contribution they submitted themselves to the SSO. Participation-based IPR policies may have disclosure rules, but often do not. Such IPR policies are more common in smaller SSOs, especially consortia and Special Interest Groups (SIGs); these focus on relatively narrow technological areas, where participants can track their essential patent ownership relatively easily, and have agreed in advance to such licensing obligations for this (narrow) field.

**B. Commitment-based patent policies (examples: ITU, ISO, ETSI, and IEEE).** These policies seek to identify which patents are essential to a (draft) standard. This is mostly realized via a disclosure policy, which defines disclosure obligations for patents owned by members / participants and sometimes also disclosure obligations for patents owned by third parties. After an (potential) essential patent is identified – no matter whether it is owned by a member, a participant, or a third party – the patent owner is requested to submit a licensing commitment. Some SSOs or groups working within an SSO are satisfied with an F/RAND commitment, others seek a Royalty Free commitment. A party is free to decide whether or not it is willing to submit the sought licensing commitment. Although refusals are rare, they are allowed, and in such cases, the SSO rules usually specify that they should seek alternative solutions (not using the patented technology), or withdraw (work on) the standard altogether if that is not feasible. Commitment-based patent policies are more common in large SSOs – with often hundreds of working groups, members or participants have a much harder time following all the standards being created at any given time, and would not easily agree to be bound to a certain licensing obligation in a wide diversity of technology fields.

Since most large SSOs have commitment-based policies, this section will now briefly discuss the two main ‘building blocks’ of these policies: *disclosure rules* and *seeking commitments*.

The *disclosure rules* basically specify under which conditions a member or participant is required to inform the SSO that it believes to own patents which are essential to the standard, or may become essential when the final standard’s text is adopted. This information is important for at least three different reasons. Firstly, it serves as a ‘trigger’ so that such patent holders can be requested or required to make a related licensing commitment (see below). Secondly, it allows those that draft the standard to make appropriate, informed choices concerning the inclusion of technologies, for instance by comparing merit versus costs. Not all SSOs use the information in this way though. Thirdly, this information is relevant for prospective implementers regarding which companies they may want to approach to seek licenses, or know who might contact them requiring licenses, and to allow such implementers to assess the extent and value of the claimed patents. Moreover, this information can be relevant for other stakeholders such as judges, juries and competition/antitrust authorities.

The precise disclosure rules vary considerably between SSOs. Relevant issues are: (a) when a disclosure obligation is triggered (usually when an individual with knowledge about a patent participates in a standardization committee; active patent searches are usually not required for all members and all standards), (b) whether also patents owned by other parties than the firm itself should be disclosed, (c) which exact information needs to be provided, (d) the point in time these disclosures should be made, and (e) to whom the disclosed information is available. One could deal with each of these points at length, but that would be beyond the scope of this paper. Instead, the reader is referred to a recent study carried out for the U.S. National Academies of Science, which examined a number of these policies in detail.<sup>24</sup>

The second building block is about *seeking commitments*. Here, known holders of (potential) essential patents are asked whether they are willing to submit a public statement declaring they will license their patents under for instance F/RAND or Royalty Free conditions. These statements are known as Licensing Statement, Undertakings, Letter of Assurance, or Declaration of Licensing Position. Requests for such commitments can be sent to members or participants, but also to third parties if they are believed to own essential patents. None of these categories is *obliged* to issue such a statement, although they rarely refuse to do so.

In many policies, the concept of F/RAND (Fair, Reasonable and Non-Discriminatory) conditions plays a central role. Yet, few policies provide more specific definitions of this concept. This is basically left to the parties in question, and to courts and competition authorities. Table 2 shows that the monetary compensation is an important, but certainly not the only dimension of F/RAND.

**Table 2: Various dimensions associated with F/RAND**

Dimension	Issues being discussed
License fees	Are there any principles that define when a licensing fee is reasonable and/or fair? Several courts and competition authorities have now embraced the view that RAND fees should bear a reasonable relationship to the economic value of the patent prior to its inclusion in the standard. <sup>25</sup> Yet, competition authorities can only address cases within their jurisdiction (e.g. the need to establish an abuse of market power) and SSOs have not (yet) adopted such definitions.
License base	A wide variety of practices exists between industry sectors (upfront payment, per-unit or percentage). There are also different implications when markets change over time. While percentage-based fees usually do not impede a development to lower prices of end products, they may obstruct more integrated devices, such as laptops with a built-in 3G or 4G communications unit. Per-unit fees can have the opposite effect. In practice, some licensors facilitate changes with royalty caps or discounts. There have been suggestions to link the licensing base to the smallest identifiable unit, e.g. the communications unit in the above example.
Licensing conditions allowed or mandated	There is a diverse range of licensing conditions (other than the royalty fee) that may or may not be considered as non-compatible with F/RAND, such as reciprocity, defensive suspension, geographical restrictions, subject to standard compliance, etc.
(Preliminary) injunctive relief / exclusion orders	While some argue that these are the cornerstones of patent rights and litigation, others find them inappropriate remedies in the context of F/RAND because a patent owner by definition is already willing to license for money. Some advocate conditional access to injunctions.
Process	Does F/RAND need to be acknowledged for a licensor's initial offer, or only the outcome of the negotiation process? Is there a good faith obligation?

Source: Author

Finally, it is important to realize that patent policies reflect several trade-offs. On the one hand, SSOs want to minimize the afore-mentioned concerns. On the other hand, they want to attract as many participants as possible, and provide incentives for these parties to contribute knowledge, insights and technologies to the standard. After all, standards are created by participants, not by SSO staff. Furthermore, nearly every SSO is unique in terms of scope, technology area, member profile, and so on. There is no such thing as an optimal patent policy that would work for any organization. One should bear in mind that SSOs' patent policies are far from static. Many organizations have committees that monitor whether their patent policy might need updating, in response to the changing environment, to emerging questions and conflicts, and in response to criticism and complaints. In recent years, numerous SSOs have indeed made substantial changes or additions to their policies. The final section of this paper will reflect on some of these changes.

## 5. Tension and conflicts

Tensions relating to essential patents have recently become quite visible. Lawsuits between Nokia and Apple, between Apple and Samsung, and between Motorola (later: Google) and Microsoft made the headlines all around the world.<sup>26</sup>

First, it is important to emphasize that the tension and lawsuits surrounding essential patents are not new. This is illustrated by the following cases:

- In the early 1980s, an organization owned by all German TV manufacturers called IGR was the holder of an essential patent for the stereo television broadcast standard used in that country.<sup>27</sup> It granted licenses to its members, but refused to grant a similar license to Finnish TV manufacturer Solera, which was therefore blocked from the German market for stereo televisions. The European Commission began proceedings against IGR, which shortly after agreed to grant Solera a license with the same conditions as its own members.
- In the early 1990s, U.S. computer manufacturer Dell became a member of Video Electronics Standards Association (VESA), a body developing a standard for a PC graphics card bus. Although Dell on request had declared it held no patents for this technology, later, once the standard was approved, Dell informed VESA members that the technology infringed a Dell patent. Complaints were raised with the Federal Trade Commission and eventually a consent agreement was reached, prohibiting Dell to enforce its patent in the context of this standard.<sup>28</sup>
- Also in the early 1990s, the first deployment of the European GSM standard for mobile telecommunications took place. This standard would eventually be an unprecedented European technology success, with billions of users worldwide. In the absence of clear rules on essential patents for this standard, and tension between U.S. firm Motorola and a number of European companies, the former eventually refused to offer licenses for essential GSM patents to many implementers, only selecting a few large firms for cross-licenses. This is one of the main reasons why competition for GSM terminals and infrastructure was very limited in the first decade of this standard.<sup>29</sup>

The late 1990s and 2000s also brought several large legal cases concerning essential IPR. These included cases with RAMBUS,<sup>30</sup> which was accused of failing to disclose essential patents in a standardization process; InterDigital,<sup>31</sup> which was accused of massive exaggeration of the extent and value of its essential patent portfolio for mobile telecommunications; and Qualcomm,<sup>32</sup> who was accused of demanding an excessive licensing fee (although this case was dropped by the European competition authorities). All these cases reflect the tension between stakeholders, typically patent holders versus standards implementers.

But the recent cases to hit the headlines seem much bigger. In August 2012, a U.S. jury awarded Apple more than USD 1 billion to be paid by Samsung, although this case is not yet closed;<sup>33</sup> and in April 2013, a U.S. judge rejected Motorola/Google's licensing demand of over USD 4 billion annually to Microsoft for using patents on the ITU-T H.264 video coding standard and the IEEE 802.11 'Wi-Fi' standard', deciding that Motorola/Google was not entitled to ask more than 1.8 million annually for these patents.<sup>34</sup>

What is the explanation for so much tension growing over time? Firstly, there have been several general developments. Patent strategies have become more important and the number of patent applications has been soaring worldwide. Companies have also started to become more aggressive: the probability that a patent is in a lawsuit within four years of the grant date almost tripled between 1986 and 1996.<sup>35</sup> When large interests are at stake, companies choose the most effective weapons. These days, the weapons are often patents. Also, some bold firms began pioneering new business models based entirely on litigation, such as patent trolling (where a company enforces its patents against one or more alleged infringers in a unduly aggressive or opportunistic manner, knowing that the infringer it selected is already locked in to this technology and has huge switching costs)<sup>36</sup> and

privateering (where a company transfers patents to a new firm that can aggressively litigate these patents against its competitors, while often keeping control of this new firm)<sup>37</sup>.

Then there are also various developments *specific to patents in standards* that have given rise to the current conflicts, and might cause these conflicts to intensify.

- 1. Standards are becoming more relevant and successful.** More and more products rely on standards for their core functionality. Network-based technologies and platforms are making their way into almost every industry and social sector, including health, mobility, electricity, and previously mentioned sectors.
- 2. Essential patents are extremely valuable business assets.** They have substantial revenue generating potential (as said, every implementer of the standard requires a license), and represent indispensable bargaining chips when negotiating licenses with other patent owners. The gap between the 'haves' and 'have-nots' is widening.
- 4. Increasing number of SEPs.** On average, the number of (disclosed) SEPs is doubling every five years. By 2012, companies already disclosed over 40,000 essential patents, based on around 8,000 unique inventions (see also Section 2). There are reasons to believe that even these numbers are gross undercounts.<sup>38</sup> Yet, essential patent ownership remains a highly skewed phenomenon in terms of distribution.
- 5. SEPs are more often litigated than other patents.** Essential patents are found to be litigated over five times more often than otherwise comparable 'normal' patents.<sup>39</sup>
- 6. Standards-based markets have been subject to considerable dynamics.** The mobile telephony market can serve as an example here. Nokia was once the uncrowned king of mobile phones, but lost market leadership in a dramatic fashion when the market evolved from 'standard' phones to smartphones. New entrants such as Blackberry, Samsung, Apple, and others, managed to achieve huge successes, sometimes only a few years after entering a market that was already considered to be mature. Alcatel and Lucent (formerly AT&T), two incumbent giants, were hit hard by increasing competition from all around the world and were forced to merge in order to survive, Canadian Nortel went bankrupt, while former giant Motorola split itself up and sold its mobile business to Google. At the same time, Huawei from China grew in less than a decade from almost nothing to being the largest mobile infrastructure provider in the world, having overtaken Ericsson in 2012.<sup>40</sup> It will come as no surprise that these dynamics also impact firms' IPR strategy and strategic behavior with patents.
- 8. Increasing ownership transfer of SEPs.** As stated above, essential patents can be of extraordinary value for a firm, and there is a strong demand side for buying such patents. At the same time, there are various reasons why other firms are willing to sell such patents. Not only are there bankruptcies, but also firms facing financial hardship who are willing to sell parts of their essential patent portfolios. Often, the reduction in value of their own portfolio is lower than the value the sold patents represent for a new owner. So, there are both sellers and buyers in this market. Indeed, many such transactions can be observed. In 2010, a consortium including Apple, Microsoft and RIM acquired a significant part of the former Canadian firm Nortel's patent portfolio for USD 4.5 billion. This portfolio is believed to contain a large number of essential patents for 4G technology, among other standards. In 2011, Google purchased Motorola Mobility for USD12.5 billion, and many believed this was mainly done to acquire ownership of the company's patent portfolio. Nokia had at least three partial sales of its essential patent portfolio (to MOSAID, Sisvel and Vringo), Ericsson sold essential patents to Research in Motion, and IPcom (a company considered by many to be a patent troll) acquired the former Robert Bosch essential patents.

The combination of all these factors increases tension but also raises concerns about the impact of essential patents.

## ***6. The way forward – proposals for change***

Views on the current situation vary considerably, ranging from established firms who argue that incidental conflicts are business as usual and demonstrate that the F/RAND system is actually working (so certainly no need for authorities to intervene), to others that consider the current conflicts as evidence that the F/RAND system is broken. This final section will discuss the current views and activities of the authorities, list a number of suggested changes, and ends with suggestions on what is needed in the world of standardization.

Realizing the importance of standards for the economy and society, and the potential detrimental effects of problems with patents in standards, policy makers are increasingly asking themselves whether the current system of self-governance (based on what this paper simply calls the F/RAND system) is sufficient to protect the interests of society. Here, these interests include access to patents in order to implement technology, but also sufficient incentives for firms to invest in R&D, participate in standard-setting processes and contribute their knowledge, insights and technologies. Among other things, the U.S. National Academies of Science (NAS) was asked by U.S. Patent and Trademark Office to set up a committee investigating standards in topics.<sup>41</sup> The European Commission (EC) commissioned a new study on this topic in early 2013, as a follow-up to a study conducted a few years earlier.<sup>42</sup>

Competition authorities have become increasingly vocal on this topic in recent years, expressing concerns about possible abuse by holders of essential patents. The Federal Trade Commission (FTC) of the U.S., for instance, addressed antitrust aspects of such patents extensively in a 2007 policy document,<sup>43</sup> and officials of both the FTC and the U.S. DoJ stressed their concerns about possible abuse.<sup>44</sup> Both authorities have specified (among other things in Guidelines, which have a more binding nature than their name might suggest) that they believe F/RAND fees should bear a reasonable relationship to the economic value of the IPR prior to its inclusion in the standard – an important principle to prevent hold-up.<sup>45</sup> The EC seems determined to use antitrust enforcement to prevent the misuse of standard essential patents (SEPs).<sup>46</sup> In fact, since then, Directorate General (DG) Competition has opened two formal investigations against companies suspected of such abuse, one against Samsung and one against Google. In late 2012, the EC issued a Statement of Objections against Samsung over SEP abuse. In response, Samsung had to take several steps back in law cases it had instigated in Europe against implementing firms; among other things it gave up seeking preliminary injunctive relief.<sup>47</sup> And in a preliminary conclusion against Google in May 2013, the Commission found this firm in breach of European competition law by seeking and enforcing an injunction against Apple.<sup>48</sup> In the U.S., the Antitrust Division of the DoJ took this one step further and made specific recommendations to SSOs.<sup>49</sup> The FTC showed its muscles in late 2012 with a Consent Order in the matter of Google<sup>50</sup> and with a Complaint and Order against the German Robert Bosch company,<sup>51</sup> two cases both involving standard-essential patents.

On several recent occasions, DG Competition in Europe and the FTC and DoJ in the U.S. have indicated that they are working very closely on this matter and adopting a similar, harmonized and strict approach towards the abuse of SEPs. They express concerns that hold-up and other forms of abuse pose a threat to the industry and to society. They warned the industry that if it is not able or willing to address these concerns in a satisfactory manner, they would not hesitate to intervene firmly. In March 2013, high-level officials at the European Commission, the U.S. DoJ and the U.S. FTC respectively, reiterated their views, arguing that SSOs should take more steps to reduce problems associated with hold-up behavior.<sup>52</sup>

Courts have been handling quite a few cases involving essential patents. Although some cases were won for the plaintiff (i.e. the essential patent owner), or were victories for the defendant (i.e. the implementer), others ended with no clear winner or a settlement with no further public information. In several recent landmark legal cases, though, judges seem to have taken a critical stance towards what they see as abuse by essential patent owners. This seems especially true in the Motorola (Google) vs. Microsoft case.<sup>53</sup>

Finally, SSOs also have expressed concerns about the current situation. ITU, notably, convened a patent roundtable in October 2012, to investigate and discuss the current situation with patents in standards, and to explore whether policy changes were desirable. This meeting had a record attendance, but reaching a consensus was no easy matter, given the differences in interests. While some SSOs have internal committees discussing possible policy changes, other organizations seem to see little need for change at all.

So, a number of policy makers, competition authorities, courts and some SSOs are critical of patent abuse. But does this address or solve all the concerns? One limitation is that both competition authorities and court cases are ex post remedies. They might not sufficiently address ex ante issues such as market entry (or better: parties that forgo market entry because of anticipated problems) or the standard setting process as such. Taking this broader: there is often quite little consideration of the 'less visible' stakeholders: smaller companies, prospective market entrants (large or small), developing countries and, not to forget, end-users. IPR policies are usually adopted on the basis of a voting process among SSO members, where the large, incumbent players often enjoy dominance.

In fact, the set of potential issues is wider. Table 3 provides an overview of potential problems and suggested solutions –neither endorsing nor rejecting any specific item on this list.



**Table 3: Potential problems and suggested solutions**

<i>Concerns or potential problems</i>	<i>Suggested solutions</i>
P1. Implementers have insufficient protection against hold-up and ambush.	<p>S1. Rules stating under which circumstances patent owners are allowed to seek (preliminary) injunctive relief (or exclusion orders) for SEPs, or principles for when these are appropriate remedies.</p> <p>S2. Develop principles on royalty rate and royalty base, among other things, that help parties (including third parties like judges and arbitrators) to assess whether offers are F/RAND.</p> <p>S3. Mandatory dispute resolution mechanisms or arbitration (e.g. in SSOs) before parties can turn to courts. Should or could address F/RAND rate, validity, essentiality, and infringement.</p> <p>S4. More transparency on actual SEP ownership (update requirements for SEP disclosures, limiting use of blanket disclosures, stricter disclosure regime, notification of transfer, collaboration between SSOs and patent offices), allowing the construction of benchmarks.</p> <p>S5. Patent landscaping.</p> <p>S6. Rules that licensors are required to provide a cash-only option in certain circumstances (e.g. an actual dispute).</p> <p>S7. Anonymous database of royalty rates for benchmarking purposes.</p>
P2. Implementer being disadvantaged in licensing negotiations due to information asymmetry on the extent and value of licensors' SEP portfolio.	As S4.
P3. Forum shopping, where IPR owners select specific litigation/legal venues that are favorable from their own perspective (including the bifurcated German court system and the U.S. International Trade Commission ITC).	S8. Introduction and use of European Community Patent.
P4. Risk of incidental or categorical discrimination, e.g. against parties that own no SEPs.	As S6.
P5. Risk that access to SEP is made conditional for licensing out non-SEPs.	As S6. S9. Clarify reciprocity element of F/RAND.
P6. Transaction costs when dealing with numerous SEP owners.	S10. Promote patent pools.

<i>Concerns or potential problems</i>	<i>Suggested solutions</i>
P7. Risk that after SEP transfer, the new owner does not consider itself bound to earlier licensing commitments (including situations with cascading transfers and blanket disclosures).	S11. Stronger SSO rules that bind future owners of SEPs to existing commitments. S12. Use of License-of-Rights (e.g. in new Community patent). S13. Promote use and harmonization of other law theories. S14. Rules on notification of transfer of encumbered patents.
P8. Risk that SEP commitments fall apart after owner becomes bankrupt.	(S15.) Strongly dependent on national law; few solutions accept attempts to harmonize national laws.
P9. Over-inclusion of patented technologies in standards because participants have incentives to include them (and allow others to include them).	S16. Review standardization procedure & practices; more guidance and/or rules on whether or not including a patent technology is appropriate. As S5.
P10. Problems with access to licenses for patents deemed necessary in the marketplace but are technically speaking not SEPs.	S17. Widening scope of F/RAND commitment/rules on reciprocity.

Source: Author.

For many suggested solutions, it is not straightforward to determine which organization should be responsible for implementation. While some would certainly work best in the realm of SSOs, these bodies often find themselves in a position where policy changes require a positive decision by the members, who might not necessarily see any need for change. This is especially relevant as the established parties in many bodies have the majority of votes (often because decision making relies on weighted voting on the basis of revenues). Yet many changes are particularly important for (prospective) new entrants, and the status quo may result in inertia. In the recent past, even when standards bodies were discussing changes that would assumingly benefit any benign party, such proposals often met with considerable resistance from many large members. For example: while rules ensuring that licensing commitments are secured, even when patents are transferred, should be in the interest of any large implementer, at the same time many such large implementers are suffering from financial stress. Their top management wants to see positive contributions to financial results from any department, including the patent department. As a result, many of these firms consider selling patents, both essential and non-essential ones. They know they might get a better price for their assets if transfer rules remain unclear and vague, even though they realize that in the long run, they themselves could very well become a victim of such unclear transfer rules when attacked by a party that has bought patents from another seller.

Also other organizations can play a role in finding solutions that can help to alleviate the noted problems. These include courts, competition authorities, as well as some other regulators and policy makers (like those setting policies and drafting law in the area of standards or patents). But each of these is facing certain limitations in their effectiveness to address the problems at large. While the issues at stake certainly affect national telecommunications markets (like competition at the supply side of infrastructure and end user devices, and prices for end user equipment, to name two), and national telecommunications regulators should certainly be aware of these issues, there does not seem to be a primarily role for them solving these problems.

Altogether, one of the challenging issues right now is the inertia in the field of standard setting. As a result of short-term interests and boardroom pressure, members in standard setting bodies do not seem to be able to make the choices necessary for all to survive in the long term.

Standard setting bodies, and the companies that form these bodies, may need to take a long-term view and endeavor to do what is needed to make standardization a successful and vibrant mechanism for generations to come. Sometimes this means firms have to set aside their short-term interests and battles; sometimes more difficult things are required, such as changing the culture in standard-setting, and the ease with which participants allow each other to drive their patents into standards, regardless of whether the standard benefits from this choice. Ultimately, standardization has a greater goal than just serving the companies that create standards: it should serve all legitimate stakeholders, not least the end-user.

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<sup>1</sup> See the digital Agenda for Europe. Available from <http://ec.europa.eu/digital-agenda/en/our-goals/pillar-ii-interoperability-standards>

<sup>2</sup> Executive Office of the President. (2012). Memorandum for the heads of executive departments and agencies. Issued on Jan 17, 2012. Available from <http://www.whitehouse.gov/sites/default/files/omb/memoranda/2012/m-12-08.pdf>

<sup>3</sup> For China's standards policy, see Breznitz, D., & Murphree, M. (2011). Standardized Confusion? The Political Logic of China's Technology Standards Policy. Electronic copy available at: <http://ssrn.com/abstract=1767082>

<sup>4</sup> See, for instance, Knut Blind (2004). *The Economics Of Standards; Theory, Evidence, Policy*. Cheltenham: Edward Elgar Publishing.

<sup>5</sup> Here, 'open' does not necessarily mean 'free'. Many national standards organizations have a funding model based on selling these standards documents.

<sup>6</sup> See Andersen, P. (2008). *Evaluation of Ten Standard Setting Organizations with Regard to Open Standards*. Copenhagen, Denmark: IDC., and Krechmer, K. (1998). *The Principles of Open Standards*. *Standards Engineering*, 50(6), 1-6.

<sup>7</sup> ANSI Minutes of Meeting of Standards Council, Nov 30, 1932. Item 2564: Relation of Patented Designs or Methods to Standards.

<sup>8</sup> While this is the basis of almost any SEP definition, there is a large variety and diversity in the more detailed definitions across different standard setting bodies. While a discussion on these is beyond the scope of this paper, the reader is referred to Bekkers, R., & Updegrove, A. (2012). *A study of IPR policies and practices of a representative group of Standards Setting Organizations worldwide*. Washington, DC: National Academies of Science. Available from [http://sites.nationalacademies.org/xpedio/groups/pgasite/documents/webpage/pga\\_072197.pdf](http://sites.nationalacademies.org/xpedio/groups/pgasite/documents/webpage/pga_072197.pdf)

<sup>9</sup> Bekkers, R., Catalini, C., Martinelli, A., & Simcoe, T. (2012). *Intellectual Property Disclosure in Standards Development*. NBER conference on Standards, Patents & Innovation, Tucson (AZ), January 20 and 21, 2012. Available from <http://users.nber.org/~confer/2012/IPKE/Bekkers.pdf>

<sup>10</sup> IPR stands for Intellectual Property Right.

- <sup>11</sup> One reason is that many standards bodies also allow ‘blanket disclosures’ that do not actually specify the patent identities. Such disclosures can cover a single patent, but also hundreds.
- <sup>12</sup> See also Blind et al. (2011). Study on the Interplay between Standards and Intellectual Property Rights (IPRs). Final Report. Study commissioned by the European Commission Tender No ENTR/09/015 (OJEU S136 of 18/07/2009). Brussels: European Commission. Retrieved from [http://ec.europa.eu/enterprise/policies/european-standards/standardisation-policy/policy-activities/intellectual-property-rights/index\\_en.htm](http://ec.europa.eu/enterprise/policies/european-standards/standardisation-policy/policy-activities/intellectual-property-rights/index_en.htm)
- <sup>13</sup> Kühn, K.-U., Scott Morton, F., & Shelanski, H. (2013). Standard Setting Organizations Can Help Solve the Standard Essential Patents Licensing Problem. *CPI Antitrust Chronicle*, Mar 2013 (Special Issue).
- <sup>14</sup> Good discussions on hold-up in the context of standards can be found in the following two sources: U.S. Department of Justice, Federal Trade Commission. (2007). *Antitrust Enforcement And Intellectual Property Rights: Promoting Innovation And Competition* 35. U.S. Department of Justice & Federal Trade Commission, and ABA Section of Antitrust Law. (2011). *Handbook on the Antitrust Aspects of Standards Setting (Second Edition)*. Chicago (IL): American Bar Association.
- <sup>15</sup> See Lemley, M. A., & Shapiro, C. (2006). *Patent holdup and royalty stacking*. *Texas Law Review*, 85, 1991-2049, and a criticizing paper by Geradin, D., Layne-Farrar, A., & Padilla, A. J. (2008). *The Complements Problem Within Standard Setting: Assessing the Evidence on Royalty Stacking*. *Boston University Journal of Science & Technology*, 14(2), 144-167.
- <sup>16</sup> See Bekkers, R., Duysters, G., & Verspagen, B. (2002). Intellectual property rights, strategic technology agreements and market structure - The case of GSM. *Research Policy*, 31(7), 1141-1161.
- <sup>17</sup> See Bekkers, R., Bongard, R., & Nuvolari, A. (2011). An empirical study on the determinants of essential patent claims in compatibility standards. *Research Policy*, 40, 1001-1015, and Kang, B and Bekkers, R. (2013). Just-in-time inventions and the development of standards: How firms use opportunistic strategies to obtain standard-essential patents (SEPs). Paper at the 35th DRUID Celebration Conference 2013, Barcelona, June 17-19, 2013. Available at [http://druid8.sit.aau.dk/acc\\_papers/3ufqleljgg6ck8v1yrute1i67e3g.pdf](http://druid8.sit.aau.dk/acc_papers/3ufqleljgg6ck8v1yrute1i67e3g.pdf)
- <sup>18</sup> For the ETSI 3G W-CDMA standard, around 16,000 essential patents are declared by their owner. These patents may, however, refer to the same invention, and be patented more than once (in different countries or not). The USPTO and EPO patents of this set belong to 2784 unique INPADOC patent families, which can be considered as 2784 unique inventions.
- <sup>19</sup> Patents are only one form of IPR, others being copyrights, trademarks, and more. While standards can theoretically also include these other types of IPR, such situations are much more incidental and go beyond the scope of this paper.
- <sup>20</sup> For early issues on IPR in standards including GSM, see Bekkers, R. (2001). *Mobile Telecommunications Standards: GSM, UMTS, TETRA and ERMES*. Boston, MA: Artech House.
- <sup>21</sup> GSM standardization started in the European organization for PTTs called CEPT, and was moved to ETSI on the establishment of that organization in 1988.
- <sup>22</sup> In the U.S. context, the term RAND (without the ‘F’) is often used. This seems to be purely a matter of convention, not reflecting any difference in meaning or intent.
- <sup>23</sup> Some policies refer to F/RAND-RF, emphasizing that even though royalty free, there may not be any other licensing terms or conditions that would otherwise not be fair, reasonable or non-discriminatory.
- <sup>24</sup> See reference in Note 8.
- <sup>25</sup> See European Commission (2011). *Communication from the Commission (2011/C 11/01) on Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the EU to Horizontal Co-operation Agreements* (see para. 289) and FTC (2011). *The Evolving IP Marketplace: Aligning Patent Notice And Remedies With Competition*. Federal Trade Commission (pp. 191-194 and 234-245).
- <sup>26</sup> Note, however, that these cases are often not only about essential patents.

- <sup>27</sup> European Commission (1982). Xlth Report on competition policy. Brussels: EC, 63-64.
- <sup>28</sup> For sources see Bekkers, R. (2001). *Mobile Telecommunications Standards: GSM, UMTS, TETRA and ERMES*. Boston, MA: Artech House (page 248 in particular).
- <sup>29</sup> For a detailed analysis, see Bekkers, R. (2001). *Mobile Telecommunications Standards*, as well as Bekkers, R., Duysters, G., & Verspagen, B. (2002). *Intellectual property rights, strategic technology agreements and market structure - The case of GSM*.
- <sup>30</sup> RAMBUS is an American technology licensing company specialized in computer memory technology.
- <sup>31</sup> InterDigital is an American technology licensing company specialized in mobile telecommunications technology.
- <sup>32</sup> Qualcomm is a large U.S. firm known as the pioneer of the CDMA technology, which became widespread with the advent of Third Generation (3G) mobile networks. See Mock, D. (2005). *The Qualcomm Equation: How a Fledgling Telecom Company Forged a New Path to Big Profits and Market Dominance*. AMACOM/American Management Association.
- <sup>33</sup> See [www.foospatents.com/2012/08/apples-billion-dollar-win-over-samsung.html](http://www.foospatents.com/2012/08/apples-billion-dollar-win-over-samsung.html).
- <sup>34</sup> See [www.reuters.com/article/2013/04/26/us-microsoft-google-trial-idUSBRE93P0BA20130426](http://www.reuters.com/article/2013/04/26/us-microsoft-google-trial-idUSBRE93P0BA20130426).
- <sup>35</sup> Bessen, J., & Meurer, M. J. (2008). *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk*. Princeton University Press.
- <sup>36</sup> See Reitzig, M., Henkel, J., & Heath, C. (2007). On sharks, trolls, and their patent prey—Unrealistic damage awards and firms' strategies of "being infringed". *Research Policy*, 36(1), 134-154.
- <sup>37</sup> See Ewing, T. (2011). *Introducing the patent privateers*. *Intellectual Asset Management*, Jan/Feb 2011.
- <sup>38</sup> One reason is many standards bodies allow for 'blanket disclosures' (disclosures that do not indicate how many patents are owned, or which patents). At the eight larger standard bodies that allow this, more than 60 per cent of the disclosures are actually blanket disclosures.
- <sup>39</sup> Tim Simcoe showed that the 20-Year Cumulative Litigation Hazard of declared essential patents is 15.9 per cent, compared to 2.9 for the vintage class baseline. Simcoe, T. "Some Economics of Standard Essential Patents", keynote talk at the European Policy for Intellectual Property (EPIP) conference in Leuven, Belgium, Sept 27-28, 2012.
- <sup>40</sup> Who's afraid of Huawei? *The Economist*. Aug 3, 2012.
- <sup>41</sup> See <http://sites.nationalacademies.org/PGA/step/IPManagement/index.htm>
- <sup>42</sup> See reference in Note 12.
- <sup>43</sup> See Note 14.
- <sup>44</sup> See for instance: U.S. Department of Justice (2012). *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, Sept 21, 2012.
- <sup>45</sup> See European Commission (2011), *Communication from the Commission (2011/C 11/01) on Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the EU to Horizontal Co-operation Agreements* (see para. 289), and FTC (2011), *The Evolving IP Marketplace: Aligning Patent Notice And Remedies With Competition*. Federal Trade Commission (191-194 and 234-245).
- <sup>46</sup> See the speech of Joaquín Almunia, Vice President of the European Commission responsible for Competition Policy, on February 10, 2012: *Quo vadis Europa? New Frontiers of Antitrust 2012 – Revue Concurrences Paris*. Available at [http://europa.eu/rapid/press-release\\_SPEECH-12-83\\_en.htm](http://europa.eu/rapid/press-release_SPEECH-12-83_en.htm)
- <sup>47</sup> See FOSSPatents, 21 december 2012, European Commission issues Statement of Objections against Samsung over SEP abuse. [www.foospatents.com/2012/12/european-commission-issues-statement-of.html](http://www.foospatents.com/2012/12/european-commission-issues-statement-of.html).

- <sup>48</sup> See The New York Times, Business Day Technology, May 6, 2013. E.U. Rules Against Patent Move by Google's Motorola Unit.
- <sup>49</sup> U.S. Department of Justice (2012). Antitrust Policy in the Information Age. Joseph F. Wayland. Available at <http://www.justice.gov/atr/public/speeches/287215.pdf>
- <sup>50</sup> FTC. (2013). Agreement containing Consent Order in the matter of Google Inc., File no. 102 3136. Retrieved from <http://www.ftc.gov/os/caselist/1023136/110330googlebuzzagreeorder.pdf>
- <sup>51</sup> FTC. (2012). Decision and Order in the matter of Robert Bosch GmbH, a corporation [Public Record Version]. Retrieved from <http://www.ftc.gov/os/caselist/1210081/121126boschdo.pdf> See also FTC. (2012). FTC Order Restores Competition in U.S. Market for Equipment Used to Recharge Vehicle Air Conditioning Systems (press release, Nov 26, 2012). Retrieved from <http://www.ftc.gov/opa/2012/11/bosch.shtm>
- <sup>52</sup> See Note 13. Note that while this paper has a disclaimer that the views of the authors does not necessarily reflect those of the European Commission, Department of Justice, or Federal Trade Commission, these authors are among the top officials in these organisations on this topic.
- <sup>53</sup> For a commentary, see [www.patentlyo.com/patent/2013/04/so-thats-what-rand-means-a-brief-report-on-the-findings-of-fact-and-conclusions-of-law-in-microsoft-v-motorola.html](http://www.patentlyo.com/patent/2013/04/so-thats-what-rand-means-a-brief-report-on-the-findings-of-fact-and-conclusions-of-law-in-microsoft-v-motorola.html)