



**In Search of a Balanced Solution to Access to
Standard Essential Patents in the ICT Industry**

by

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1 Introduction

1.1 Background

Industrial standards generally define the characteristics of products, related processes and production methods for common and repeated use throughout the relevant industry. Standards can secure quality and safety of industrial products and services. Standards are also a common language of industry, which secure the interoperability and compatibility of the components of a product or a network supplied by different manufacturers or suppliers.¹ In a complex industrial society, standards have permeated every part of our lives. Standards usually are established by consensus in a formal, coordinated process in a standard-setting body. Key participants in a market, such as designers, technology providers, producers, consumers, other potential users, and regulatory authorities, may come together to seek formal consensus on making a standard following an established procedure in a standard-setting body.

In a science and technology -based society, standardization necessarily relies on up-to-date technological knowledge. The technical committee of a standard-setting body is always composed of experts who are knowledgeable in a particular field and who pool and expand their knowledge to create up-to-date standards. Hence, standardization in a science and technology -based society has to be backed by intense innovation. The emergence and creation of new technology is highly dependent on the patent system. A patent grants an inventor the right to prevent others from using its ideas for a limited time. As an incentive, a patent enables the inventor to earn profits that exceed the ordinary rate of return on an investment.² Since without the patent system the market would yield less than an optimum level of innovative activities, the patent system is designed to stimulate investment in research and development (R&D) and invention and to stimulate public disclosure of technological information. Patents may also signal ownership of a particular piece of technology, thereby preventing trespass by others. Furthermore, patents may stimulate commercial exploitation of technology by creating a

¹ According to the International Standard Organization (ISO) definition, standards are documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics to ensure that materials, products, processes and services are fit for their purposes (ISO 2002).

Quality and safety standards define the design or performance characteristics that products must have either to be sold on the market or to obtain “approval,” “certification,” or “listing” by a standard-setting body. Interoperability standards specify whether and how one type of product will be able to fit or communicate with other products (e.g., mobile telecommunication standards, TV transmission standards, or computer operating system interfaces with applications programs). See James J. Anton and Dennis A. Yao, “Standard-Setting Consortia, Antitrust, and High-Technology Industries,” *Antitrust LJ* 64 (1995): 247, 248, 262-63.

² Robert Cooter and Thomas Ulen, *Law and Economics*, 4th ed (Boston: Pearson/Addison Wesley, 2004), 122.

defined set of legal rights known to both parties at the outset of negotiations and making trade in technological resources possible.³

Nonetheless, a patent grants an individual the right to exploit a piece of knowledge exclusively, while a standard is intended to identify a common pool of knowledge to be used by everyone.⁴ There is an obvious tension between the private character of patents and the public nature of standards.⁵ Because standards define design or performance characteristics that products or services must have, they inevitably overlap some claims of patents. When these patents are essential to a standard, it is unlikely for anyone to bypass them in implementing the standard. When it is not possible to make, sell, use or operate equipment or methods technically which comply with a standard without infringing a patent, the patent is considered essential to the standards.⁶ The interaction between patents and standards has lately raised growing concerns in the ICT industry. These highly controversial issues include industry standards embracing patented technologies, excessive royalties for the use of standard essential patents, and the refusal to grant licenses for the use of standard essential patents.

1.2 Research questions

The issue of how best to balance standardization and getting access to essential patents is no more settled in academia than in industry. This study sets out to investigate the patent licensing practice pertaining to standards in the ICT industry, and the EU regulations on standardization and intellectual property licensing. This study is an effort to (1) evaluate the basic presumption of conflict between standards and patents, which may lead to the notion of sacrificing one for the other, (2) re-evaluate the effect of traditional approaches that aim to guarantee access to patented technology, (3) attempt to find an appropriate solution to balance standardization and access to essential patents.

³ Edmund W Kitch, "The Nature and Function of the Patent System," *Journal of Law & Economics* 20 (1977): 277, 278.

⁴ Rudi Bekkers, Bart Verspagen, and Jan Smits, "Intellectual Property Rights and Standardization: The Case of GSM," *Telecommunications Policy* 26 (2002): 172.

⁵ Rudi Bekkers, Geert Duysters, and Bart Verspagen, "Intellectual Property Rights, Strategic Technology Agreements and Market Structure: The Case of GSM," *Research Policy* 31 (2002): 1142.

⁶ Clause 15.6 of the ETSI IPR policy suggests a definition of an IPR as essential: "essential as applied to IPR means that it is not possible on technical (but not commercial) grounds, taking into account normal technical practice and the state of the art generally available at the time of standardization, to make, sell, lease, otherwise dispose of, repair, use or operate equipment or methods which comply with a standard without infringing that IPR. For the avoidance of doubt in exceptional cases where a standard can only be implemented by technical solutions, all of which are infringements of IPRs, all such IPRs shall be considered essential."

To do this, I first demonstrate that standards and patents are not inherently in contradiction. I then apply a theoretical framework of property rule and liability rule entitlements developed by Calabresi and Melamed to analyze the traditional means of access to patents. I also want to borrow a model of governing the common resources from Ostrom to explain the relationship between standardization and licensing essential patents from the perspective of governing intellectual resources. The purpose of applying these theoretical frameworks is to evaluate the current standardization and patent licensing practice more effectively in order to determine the optimal arrangement in law to balance encouragement of individuals to contribute to standardization and encouragement of exploitation of patented technology. My approach provides a framework to analyze standardization and patent licensing from angles that diverge from traditional approaches. This study will propose a theoretical base for legal policy in facilitating standardization and access to essential patents.

This book is composed of four parts. The first introduces the general issues, such as the aim of the study, background information, methodology and a road map of the study. The second part examines the European Union's standardization policy and the legal framework governing standardization. The third part examines the function of and interaction between patents and standards in the ICT industry. The fourth part examines the licensing of patents in the light of standardization circumstances.

1.3 Main contributions

This study suggested that patent and standardization does not have to be conflict from the perspective of promotion of the application of new technology, the patent policy should switch from promotion of invention to promotion of commercialization of invention. It demonstrated several defects of current SSOs IPR Rules and clarified the way to define fair, reasonable and non-discriminatory (FRAND) terms. Moreover, it extended common pool resource governing framework to the exploitation of standards and patents. Finally, it developed a cooperative approach to facilitate technology exploitation.

2 Analysis of Traditional Solutions to Access to Standard Essential Patents

2.1 Patent hold-up, patent ambush and patent wars in the mobile telecommunication sector

In the ICT industry, patents have provoked the most controversy, particularly since they tend to overlap and block the development of necessary improvements.⁷ The overlap of standards and patents in the mobile telecommunication sector especially illustrates such a complex sample.

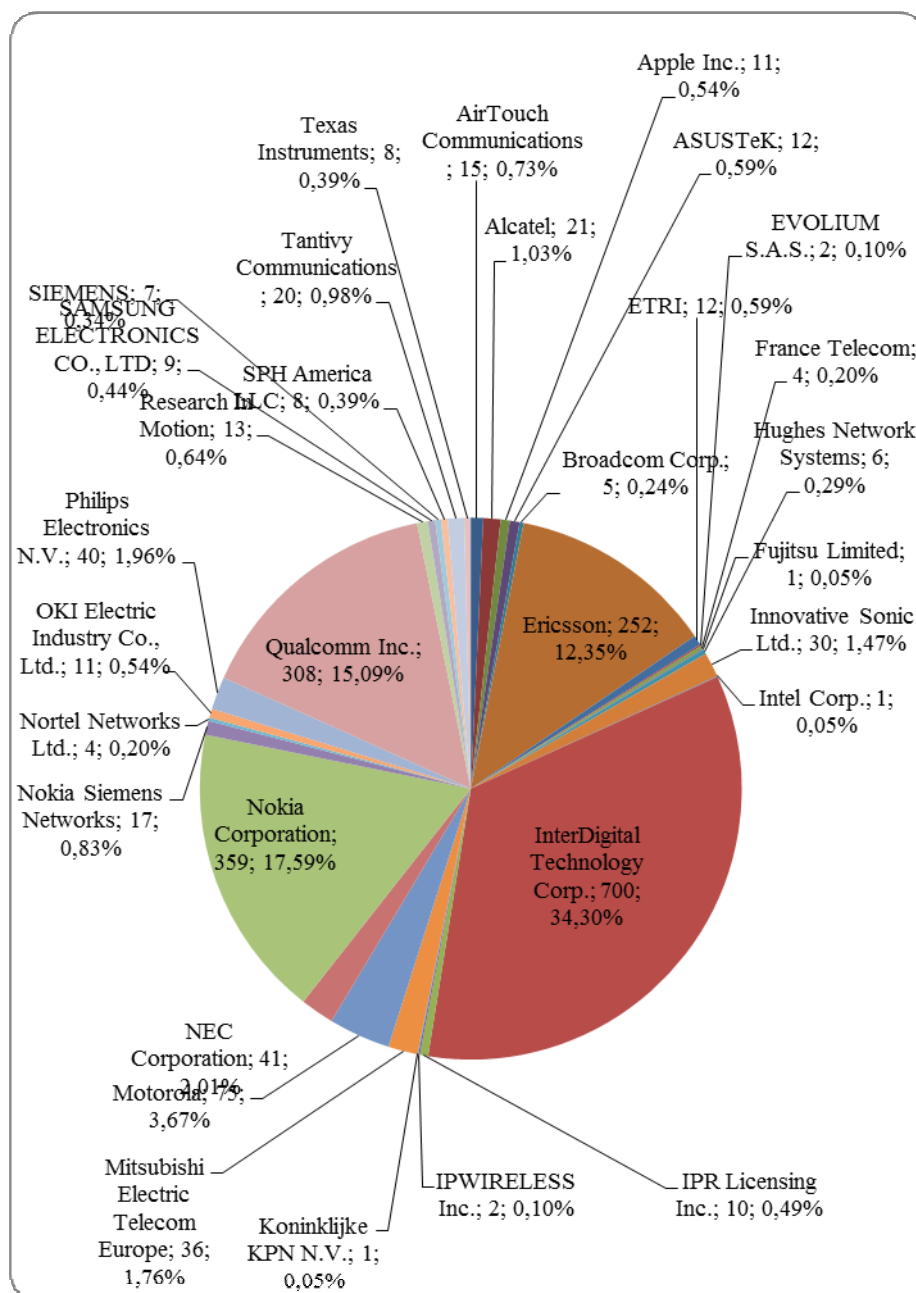
⁷ Mark A Lemley, "Intellectual Property Rights and Standard-Setting Organizations," *California Law Review* 90 (2002): 1971.

Because of the high level of R&D, investment and patenting intensity in this sector, technologies are fragmented into many separate, exclusive areas via the ownership of patents or other intellectual property rights (IPRs) on the part of many different firms, thus creating a dense web of patents.⁸ For instance, the European Telecommunication Standardization Institute (ETSI) IPR database shows that there are 4,380 patents declared as essential to the GSM standards and 8,666 declared as essential to the UMTS 3G standards in the database.⁹

⁸ Carl Shapiro, "Navigating the Patent Thicket: Cross Licensing, Patent Pools, and Standard Setting," in *Innovation Policy and the Economy* (Adam Jaffe et al., Eds., Nat'l Bureau of Econ. Research, 2001), 2001, 120.

⁹ These data were found on the ETSI IPR database, accessed April 2009, <http://webapp.etsi.org/IPR/>.

Figure: U.S. registered patents declared essential to the UMTS 3G standards



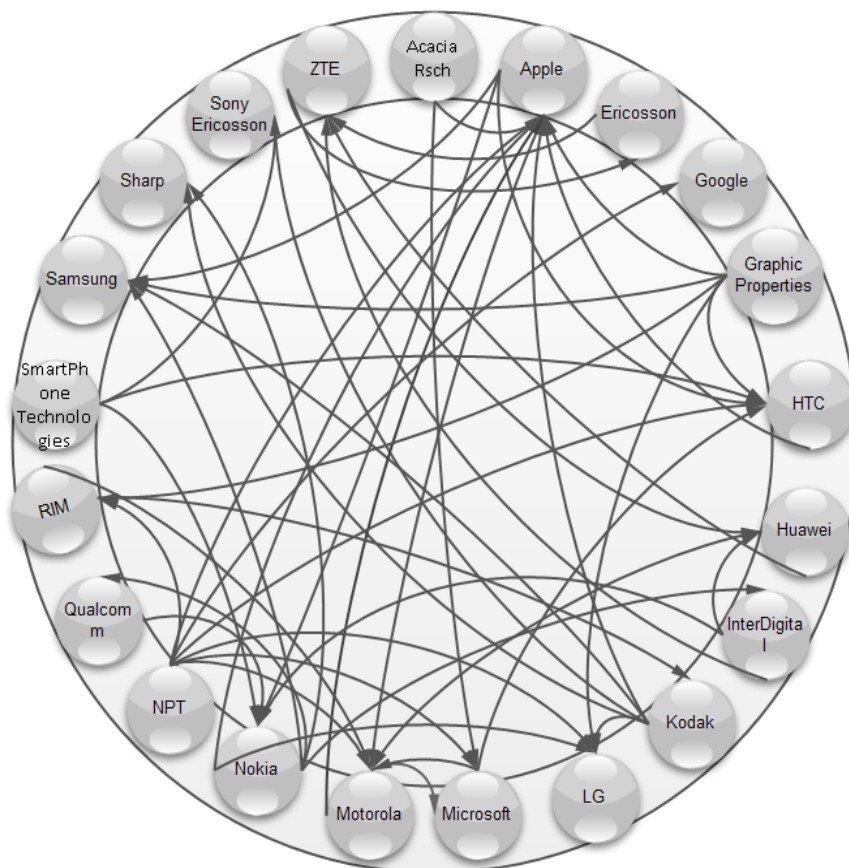
Source: ETSI IPR database, 24 March 2010.

Intense patenting and general standardization of technologies have resulted in intensive patent battles in the ICT industry in the last decade. Since 2001, almost all of the market players in the mobile technology sector have been involved in patent infringement suits.¹⁰ Since 2006, the

¹⁰ "Smart-phone Lawsuits: The Great Patent Battle," *The Economist*, October 21, 2010, http://whhttp://www.economist.com/node/17309237?story_id=17309237&CFID=156955783&CFTOKEN=16103439.

number of mobile phone-related patent complaints has increased by 20% annually.¹¹ The graphic below shows the patent infringement suits in the mobile technology sector between major players recent years.

Figure: Patent law suits in the mobile sector: 2000-2011.¹²



These patent battles indicate the high transaction cost for acquiring necessary patents, which may impede the commercialization of technology and further innovation. When a firm attempts to develop a product or service compliant with a standard, it inevitably infringes on the patents of others. Obtaining a license is thus generally necessary for any stakeholder to be viable in the market. However, firms that own patents essential to a standard may refuse to license them, thereby blocking access to the standard so as to exclude their competitors from the market, or may take the advantage of their dominant position to charge excessive royalties or impose other unfair conditions on standard implementers, especially when implementers

¹¹ Ibid.

¹² The data were collected from the reports in the Guardian and Reuters websites. This graphic does not cover all patent suits in the sector.

have made considerable investments. This dynamic is referred to as the “patent hold-up” and “patent ambush” problem.¹³

This study identifies three underlying reasons that may contribute to this situation.

First, the complexity of technology in the ICT industry demands specialization or new division of labor in the R&D field. Many firms are working on developing new technologies within a specific area. The specialization in the ICT industry results in fragmentation of the technology. Many firms exclusively control a narrow but overlapping technological field through owning patents. The fragmented technologies and dispersed patent rights make any further improvement and commercialization of these patented technologies inevitably infringe other patents.

Second, the ICT industry relies heavily on standardization, which creates a general specification to secure compatibility and interoperability. Standards embracing patent claims may aggravate patent ambush and patent hold-up problems because it may diminish alternative non-infringing technologies.¹⁴ Nonetheless, the intensive patenting and highly dispersed patent rights in the ICT industry make it difficult to avoid embracing patent claims in technical standards.

Third, the high degree of specialization in the R&D industry creates an opportunity for the new business of trading patents. Non-practicing entities (NPEs) purchase patents to build up a patent portfolio and then rely on revenues from licensing patents. The highly fragmented technologies and dispersed patent rights make the operation of this kind of business much easier than it was in the past. Because NPEs do not produce a product, they usually do not need to cross-license with other patent holders. Then NPEs may aggressively sue the patent users for the purpose of monetary revenue. This causes further difficulty for technology users in commercializing patented technology.

2.2 Current solutions: the market approach and the intervention approach

The solutions to the problems demonstrated above are diverse, but none of them alone is effective enough to work. I categorize these solutions into two groups: the market approach and the intervention approach.

The market approach emphasizes that the market may effectively allocate a technological resource to someone who can exploit it most efficiently. The effective transaction can create a

¹³ For the patent hold-up problem, see Mark A Lemley and Carl Shapiro, “Patent Holdup and Royalty Stacking,” *Texas Law Review* 85 (2007): 1991.

¹⁴ Liguozhang, “Refusal to License Intellectual Property Rights Under Article 82 EC in Light of Standardisation Context,” *European Intellectual Property Review* 32 (2010): 403.

surplus that benefits everyone. The market approach proposes to strengthen patent rights as a property rule entitlement, such as improving patent quality, providing strong protection to patent holders against infringers thereby facilitating individual bargaining and transaction. Some licensing models and business models have been developed such as cross-licensing and patent-licensing entities. The operation of these models is premised on the patent being a clearly defined property right.

The intervention approach suggests applying compulsory licensing or the rules on abuse of patents against patent holders. Since compulsory licensing forces patented technology to be shared among other relevant parties, compulsory licensing would be the simplest and most expedient way to get access to patented technology. In the case of compulsory licensing, liability rules apply to the patent. Compared to property rules, under which prices are subject to strictly individual valuation and are set by the right-holder alone, liability rules impose compensation objectively determined by authority to a right-holder where the right is infringed.¹⁵ But the extent to which liability rules should apply to patents is a controversial question. The EU approach on refusal to license IPRs emphasizes the prevention of the emergence of new product and the bar to technical development.¹⁶ The German approach emphasizes competition by substitution.¹⁷

2.3 Evaluating the benefit and cost of the market approach

The market always has transaction costs. Especially the transaction costs are high where property rights are uncertain and the boundary of rights is not clear, there are many parties to negotiate between, the parties are not familiar with each other, and the enforcement of rights is not easy.¹⁸ When these costs are high enough, transactions through the market become inefficient.

Some proposals have been made to improve the quality of patents in order to define clear property rights eligible for effective transaction. Such measures include enhancing the standard of invention, avoiding vague claims, insisting on more adequate disclosure, publicizing patent applications and improving opposition procedures, as well as improving examination quality. Moreover, the market approach endorses patents as property rule entitlements, which are backed by strong injunction relief against infringement.

¹⁵ Guido Calabresi and A. Douglas Melamed, "Property Rules, Liability Rules, and Inalienability: One View of the Cathedral," *Harvard Law Review* 85 (1972): 1092.

¹⁶ Case 418/01 IMS Health v. NDC [2004] ECR I-5039; Case T-201/04 Microsoft v. Commission, September 17, 2007.

¹⁷ German Federal Supreme Court, Standard Tight-Head Drum (Standard-Spundfass), KZR 40/02, 36 IIC (2005).

¹⁸ Cooter and Ulen, *Law and Economics*, 94.

Nevertheless, the market approach may come with three drawbacks which make it less effective. First, patent rights are far from an ideal property right.¹⁹ The function of the market approach is premised on the patent being a clearly defined property right, but patent rights are far from this, and the likelihood of improving patent quality to a significant extent in the near future is quite small. Therefore licensing of patents often involves law-suits by which parties may figure out the real and valid patent rights. This explains why many patent holders can conclude a cross-licensing agreement only after they have brought the other into a law-suit. This indicates high transaction costs which make the market approach less efficient. Second, where the number of complementary patents with respect to a product is so large that the transaction costs are very high, cross-licensing patents and patent pools which have been regarded as effective means of reducing the negotiation costs in such a situation may fail to function. The diversity of business interests and the collective action problems such as free-riding and the prisoner's dilemma, which are inherently derived from cooperation negotiations, make cross-licensing patents and forming a patent pool more difficult. Third, patent licensing entities may behave as an intermediary between patent holders and patent users, thereby lubricating patent licensing. However, patent licensing entities may involve patent trolls or patent privateering.²⁰ In the mobile technology sector, some companies outsource their patents to NPEs against competitors they specify. Moreover, patent licensing entities may gain a dominant position by aggressively acquiring patents to build a comprehensive patent portfolio. In addition, cross-licensing and patent pooling may be used by competitors to prevent competition. As a result, the market approach can raise antitrust concerns. Such practices are the by-product of the strong patent exclusivity and market approach.

Patent battles are naturally part of the market approach. Global patent battles between major players in the mobile technology sector have raised concerns about patents. Patent battles, prima facie, may increase costs and raise the threshold for companies to operate in the market. Nonetheless, the battles reflect the two facts: the intense competition for the market and innovation in this sector and the increasing patent opportunism of NPEs. Patent exclusivity is a powerful tool for sweeping away competitors. This pressure may push companies to innovate and to own more patents, which are considered effective ammunition in the competition war. In addition, patent battles also indicate the problem of patent quality. Many patents do not survive a challenge in court. Patent holders can conclude a cross-license

¹⁹ James Bessen and Michael J. Meurer, *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk* (Princeton University Press, 2008).

²⁰ IPR privateering can be defined as "the assertion of IPRs by an entity (the privateer), typically in the form of an NPE, against a target company for the direct benefit of the privateer and the consequential benefit of a sponsor company, where the consequential benefits are significantly greater than the direct benefits. The strategy, in part, relies upon the intransparencies of ownership and motivation permitted in the IP system." See Thomas L Ewing, "Indirect Exploitation of Intellectual Property Rights By Corporations and Investors: IP Privateering & Modern Letters of Marque & Reprisal" (Licentiate thesis, Chalmers University of Technology, 2011), 2-4.

agreement only when they can figure out whether the patents in question are really essential or valid through a series of law-suits.

Despite these disadvantages or costs of market approaches, property rule entitlements are still the basis for patent system to function and are the precondition for any other approaches to work. Both the invention of advanced technologies and the creation of industry standards entail considerable investment in R&D. They are not created by accident. From the standard-setting perspective, the property rules are desirable to provide an incentive for patent holders to contribute to standardization. This is necessary to create technological superior standards, which are essential to the development and utilization of technology.

In term of standardization, innovative companies may pay more attention to standard-setting activities and would be willing to contribute their technology to standards so that their patents becoming essential to standards. Through cross-licensing of patents, they can get access to each other's patent portfolio. Essential patents become the currency between companies operating in the relevant market. Those companies that do not own any essential patents or own only a few will however be at a disadvantage in the competition. Consequently, they have to pay royalties to use others' patents or stay out of the market. Essential patents become the ticket to enter the market. This may encourage companies to devote more effort and resource to developing essential technologies, but if those that do not own essential patents are excluded from market by blocked access to industry standards, the competition in the market may be reduced significantly. With respect to industry standards, what causes real harm to the industry is that essential patents are used to exclude new entrants rather than to charge a high royalty.

2.4 Evaluating the benefit and cost of the intervention approach

When the parties fail to negotiate an agreement, a surplus from exchange cannot be achieved. As a result, the resource is wasted. The intervention approach tries to minimize disagreements and failure to cooperate, therefore reducing the resulting harm. The approach suggests the law rather than market allocate property rights to the party who values them the most.²¹ This approach advocates compulsory licensing or the rules on abuse of patents to minimize the loss caused by failure in private agreement. Under compulsory licensing, legislation or a court requires patent holders to license would-be licensees to use the invention at the pre-set royalty. Compulsory licensing forces patented technology to be shared among other relevant parties. Since compulsory licensing may reduce transaction costs and increase the utilization of the patented technologies, it would be the simplest and most expedient way to get access to patented technology.

²¹ Cooter and Ulen, *Law and Economics*, 97-98.

Compulsory licensing may destroy patent holder ability to control who can use their patent, however, a regulated royalty rate will apply.²² Under compulsory licensing, patent holders could no longer exclude competitors that are willing to pay pre-set royalties from using their inventions. Patent holders can only have two advantages: receiving revenues from the licensee and the cost advantage over their royalty-paying competitors.²³ In this case, liability rules replacing property rules apply to patents.

Compared to property rules, under which prices are subject to strictly individual valuation and are set by the right holder alone, liability rules entail compensation objectively determined by an authority for an owner where a right is infringed.²⁴ But liability rules represent only an approximation of the value of the right to its original owner, and willingness to pay such an approximate value for the right does not indicate that the infringer values the patent rights more than the owner. Consequently, the allocation of technological resources may not reflect the economic efficiency.²⁵ From an economic perspective, property rule entitlements enable the right holder to maximize its benefit from its right, and utilize the right in the most beneficial way according to its own subjective valuation to enhance its welfare. A liability rule ignores the right holder's subjective valuation and disrupts the right holder's plan to exploit the right based on that valuation.²⁶ Only in exceptional circumstances therefore can patents become liability rule entitlements. Thus compulsory licensing is usually instituted as a remedy for abuse of patent, to safeguard the public interest, to restore competition, and to exploit a secondary patent.

The EU competition rules on refusal to license IPRs have highlighted blocking the appearance of a new product or technical development as one of such exceptional circumstances.²⁷ The German approach on refusal to license IPRs lay down a criterion whether competition by substitution is blocked.²⁸ However, both approaches seem to be missing one factor in identifying malpractices on the part of IPR owners, because technological superiority could be a reason that the competitors are not able to develop a new product or better technology. Being technologically superior should not become a burden for an innovator. In the light of standardization, applying a liability rule indiscriminately to essential patents would unduly impair not only its effectiveness in generating the inventive and innovative activities of creating patents but also of making high-quality standards. When applying competition law to patent hold-up, malpractice should be considered as a factor. In terms of standardization, leverage of a

²² Kitch, "The Nature and Function of the Patent System," 287.

²³ Fritz Machlup, *An Economic Review of the Patent System* (Washington, DC: US Government Printing Office, 1958), 13.

²⁴ Calabresi and Melamed, "Property Rules, Liability Rules, and Inalienability," 1092.

²⁵ *Ibid.*, 1125-1126.

²⁶ Margaret Jane Radin, "Humans, Computers, and Binding Commitment," *Indiana Law Journal* 75 (2000): 1154-1155.

²⁷ Case 418/01 *IMS Health v. NDC* [2004] ECR I-5039; Case T-201/04 *Microsoft v. Commission*, September 17, 2007.

²⁸ German Federal Supreme Court, *Standard Tight-Head Drum (Standard-Spundfass)*, KZR 40/02, 36 IIC (2005).

standard into the technology licensing market and the violation of IPR rules of standard-setting organizations (SSOs) could be examples of malpractices.

3 Alternatives to the Traditional Approaches

Access to patents has been a traditional problem with respect to the patent system since the system was first created, but these problems in the current ICT industry are derived from new R&D models and new business models, which differ from the traditional one. Specifically, the global patent explosion, the separation of technology creation from technology implementation, the convergence of many technologies in various sectors, and high standard-dependence in the industry are major reasons for these problems. The traditional approaches to access to patents may thus no longer be appropriate.

Ostrom's approach of governing common-pool resources which derives from governance of natural resources may be extended to governing standardization and access to essential intellectual property.²⁹ Industry standards or patents are intellectual resources by their nature. Unlike natural resources, which existed before exploitation, intellectual resources must be created before they can be exploited and shared. The goal of natural resource governance usually is to secure sustainability; while intellectual resource governance is to secure innovation, growth, and progress.³⁰ The governance of the standardization process and access to the essential patents needs institutions within which participants not only manage and share existing resources but also engage in producing those resources and which encourage the creation of new resources in the future.³¹

Although intellectual resources, are non-rival and non-exclusive by nature, and are therefore shareable without risk of the congestion or overconsumption that occurs in natural resources, allowing access to intellectual resources but without reward for contributors may generally diminish the motivation to contribute to creating such resources. Innovation brings about technological breakthroughs which enable the introduction of new product to the market. Because patent holders invest heavily in R&D and in filing for patents, they may favor standardization as a way to share their innovations with those who could commercialize and use the technology, and as a way to obtain a reasonable return on their R&D investment. Since the purely innovative firms rely on licensing patents and transferring technology, their interests rely on the success of the licensees and a successful and competitive downstream market, a policy that favors patent holders may prevent standards from satisfying user needs and may also make

²⁹ Michael J Madison, Brett M Frischmann, and Katherine J Strandburg, "Constructing Commons in the Cultural Environment," *Cornell Law Review* 95 (2010): 657.

³⁰ *Ibid.*, 672.

³¹ *Ibid.*, 681, 687.

standards difficult to implement. A policy that favors standard implementers and consumers may deter patent holders from participating in standardization and also may stifle innovation. Patent holders may choose not to contribute technology and may invest to support competing standards, which have a favorable IPR policy, or to establish proprietary standards. Therefore, legal policy has to strike a balance between standardization and access to patented technology. Policy must balance the interests of all stakeholders: patent holders, standard implementers, and consumers.

3.1 Cooperation through contracts

Industry may establish a cooperative scheme to exploit technological resources via agreements. Patent pools are established through private contractual agreements, by which patent holders agree to put their patents into a package for the purpose of jointly licensing their patent portfolios to pool members and other third parties. Patent holders have the freedom to join or not join a pool. In this sense, patent pools are based on property rules. The market mechanism takes effect in the process of forming patent pools. Nonetheless, the licensing of pooled technology may be subject to liability rules. Whether to join a pool or not and the share of the holder's patents can enjoy in the pool are at the patent holder's own discretion. But in licensing pooled technology, to whom a license can be granted and at what royalty rate a license can be granted cannot be determined by any members of the patent pool individually. These licensing matters are usually decided by all members collectively or by a managing entity. In special circumstances, patent pool licensing might be subject to FRAND terms and conditions, which are usually required by competition rules. In this case, the price of pooled technology cannot be determined by patent holders or the entity responsible for managing the pool. The price is restricted by the industrial common practice and the general expectation in the industry. In this sense, the pooled patents become partial liability rule entitlements.

Patent pools can reduce transaction costs and increase efficiency by codifying the complementary patents into a single package and establishing a method for valuing the patents and dividing up the licensing revenue. Nevertheless, the reality is that the patent pools are not successful in the mobile technology sector. The practice in the mobile sector shows the diversity of business interests and the collective action problems such as free-riding and the prisoner's dilemma, make forming a patent pool very difficult.

3.2 Cooperation through organizations

A collective scheme to exploit technological resources can also be developed through organizations. One example is the collective society. Nowadays standards are increasingly

developed through industrial consortiums. Standard-setting and the selection process provide an opportunity for private parties to develop institutions by which they can contract around the strong exclusivity of patent rights, bargaining from a property rule to a liability rule.³² This is a self-governing process by which SSOs allow stakeholders to jointly choose an effective technology as industry standards to create common goods for the industry. SSOs may provide a place for patent holders to establish a licensing scheme to avoid the disadvantage of strong property rule entitlement of patents. Many SSOs have established IP rules with the intention of mitigating patent ambush and patent hold-up problems related to standards. The IP rules usually include two structures. First, it requires members to declare patents they consider to be essential to a standard. Second, members make commitment that those declared essential patents they owe should be licensed to any users on FRAND terms.

Where SSOs adopt IPR rules that permit technology input providers and users to reduce the problems of opportunistic behavior and patent hold-up, this practice may help to lubricate standard implementation and technology transfer. FRAND licensing conditions in SSO IPR rules are a key element in such a self-governance structure. FRAND licensing conditions and terms may draw a balance between patent holders and standard implementers, and leave more flexibility for both parties. FRAND licensing terms impose on patent holders the obligation to grant a license if the offer requesting a license to use the right holders' technology is considered fair and reasonable, and the patent holders cannot refuse such an offer. This makes patent rights not purely property rule entitlements. Neither are patent rights under FRAND licensing terms pure liability rule entitlements either, because patent holders still have the right to decide the royalty rate, which however is limited by the general industry practice and reflects the general expectation in the industry.

Establishing a licensing scheme within or assisted by an SSO has several advantages. Members of SSOs are knowledgeable industry insiders, which usually involves repeatedly licensing patents, either as licensors or licensees. Second, the internal governance of an SSO may provide administrative support for a licensing arrangement. A patent licensing scheme created by patent holders and patent users in the framework of standardization can facilitate high-volume licensing.

Nonetheless, after investigating several major telecommunication SSOs' IP rules, this study found that there are several defects in terms of such IP rules. The first is incorrect declaration of essential patents either intentionally or inadvertently, and second the licensing may not comply with FRAND terms. Several cases related to the enforcement of FRAND commitments show that these defects may undermine the efforts of SSOs in dealing with patent hold-up and patent ambush.

³² Lemley, "Intellectual Property Rights and Standard-Setting Organizations," 1971.

To fix these problems, legal policy should therefore create conditions for improving SSO IPR rules and FRAND terms, rather than undermining the enforcement of SSO rules and FRAND licensing terms. The study proposes that leveraging industry standards to exclude competitors may be subject to compulsory license, FRAND commitments should be enforceable, and NPEs should be regulated properly to avoid patent opportunism, in addition, SSOs should bear responsibility of monitoring their IP rules. Some measures should be taken in order to make FRAND commitments enforceable. First, competition rules can impose FRAND licensing terms and conditions on licensors that gain a dominant position in the relevant market. Second, a licensor's commitments to an SSO in order to have its technology incorporated in a standard should be considered legally binding. In this case, the principle of bona fide will apply, and later violation of such FRAND commitments after its technology is successfully incorporated in a standard can invoke legal liability. Nonetheless, FRAND licensing terms should not be so interpreted as to that infringers can use the terms as a defense in patent infringement suits against injunction relief. FRAND licensing terms should still maintain great flexibility for patent right holders in deciding a royalty rate, and sustain the possibility of using injunctive relief against infringers. Furthermore, SSOs should also play a role in promoting a license of essential patents to ensure the standards they have established are accessible. Thus, it is important for a SSO to be open, transparent and to establish a properly governance structure.

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