Patent pools and non-assertion agreements: coordination mechanisms for multi-party IPR holders in standardization

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Summary

The standards setting process relies to an increasing degree on successfully integrating— or otherwise taking into consideration— up-to-date research and development results (R&D). The successful interaction between research and standards can provide important benefits to society. There is however a number of challenges that are currently hampering the successful interaction at the interface between research and standardization. One key and recurrent challenge here is the widely noted need to improve coordination between the private interests broadly associated with research investments and the collective interests which standardization implies. This paper notes that a major concern that has developed at this fault line is how to equitably deal with patents and other IPRs in the standardization frame. This involves a set of challenges, such as how to deal with the continued rise of cumulative licensing scenarios, how to ensure transparency on royalty rates, how to promote and enforce effective methods for declaration, and, more generally, how to effectively manage the IPR policies of standards development organizations, etc.

The paper focuses on patent pools in this context. These are mechanisms in which attempts are made to include all the IPR essential to a standard in a bundle. As a coordination mechanism, patent pools might facilitate access to patent and reduce uncertainty, and thus also may remove a barrier to transferring research results to standards. By analyzing patent pools that have been established in the field of consumer electronics (DVD, among others) and the field of telecommunications (UMTS), we aim to understand under what circumstances such pools work out and to what degree (if at all) they improve the interface between research and standards. We also contrast patent pools to an alternative coordination mechanism, the so-called non-assertion covenants.

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1 Introduction

The standards setting process relies to an increasing degree on successfully integrating— or otherwise taking into consideration— up-to-date research and development results (R&D). The successful interaction between research and standards can provide important benefits to society. There is however a number of challenges that are currently hampering the successful interaction at the interface between research and standardisation. One key and recurrent challenge here is the widely noted need to improve coordination between the private interests broadly associated with research investments and the collective interests which standardisation implies. This paper notes that a major concern that has developed at this fault line is how to equitably deal with patents and other IPRs in the standardisation frame. This involves a set of challenges, such as how to deal with the continued rise of cumulative licensing scenarios, how to ensure transparency on royalty rates, how to promote and enforce effective methods for declaration, and, more generally, how to effectively manage the IPR policies of standards development organisations, etc. The paper focuses on patent pools in this context. These are mechanisms in which attempts are made to include all the IPR essential to a standard in a bundle. As a coordination mechanism, patent pools might facilitate access to patent and reduce uncertainty, and thus also may remove a barrier to transferring research results to standards. As such, they may foster innovation - and in particular the diffusion aspect of innovation.

Objectives

By analyzing patent pools that have been established in two different fields, we aim to understand under what circumstances such pools work out and to what degree (if at all) they improve the interface between research and standards. We also aspire to identify the factors that determine the potential success of patent pools and (partly linked to that) the situations in which the establishment of patent pools is appropriate. We also aim to develop a better understanding of the main challenges and trade-offs are, particularly from the perspective of their potential members.

There is also a specific European aspect to this study. In the US, patent pools are been part of a wider discussion (e.g. the FCC 2002 hearings[5]), and comfort letters / clearances showing under which conditions governments allow the creation of patent pools are made public. In Europe, there is considerable less (public) information on patent pools, while the relevant pieces of regulation (particularly the 2004 EC Regulation on Technology Transfer Agreement) do not seem to be particularly clear on patent pools. Despite this unclear situation, Europe does recognise that successful standards (both the creation and diffusion) are or prime importance, not in the least because of the great success of the European standard for mobile telephony GSM, which has managed to capture 75% of the worldwide market and passed the 1,000,000,000 subscribers mark in 2004.

Theoretical context

To understand the problem of overlapping property rights and cumulative innovations, we turn to what has been called the 'tragedy of the anticommons' (see 2.2 for more details). This is a theory that mirrors the well-known tragedy of the commons. The tragedy of the commons refers to a situation where many actors have unrestricted access to a collective good (such as farmland or fishing pools), resulting in a tendency for over-exploitation and exhaustion on the longer term, damaging everyone's interests. As such, it concerns the conflict for resources between individual interests and the common good. In economics, this reasoning has often been used to argue in favour of privatisation and/or regulation; for instance by introducing property rights. Such an ownership would create an incentive to consider the value of the property in the future. Analogous, the tragedy of the anticommons occurs when rational individuals (acting separately) collectively waste a given resource by under-utilizing it. This happens when too many individuals have rights of exclusion in a scarce resource. As such, this metaphor helps to explain why people underuse scarce resources because owners can block each other. Patent pools may me seen as me mechanism that addresses problems that are created by such a tragedy of the anticommons, caused by overlapping property right. More specifically, in our context, patent pools may serve as a mechanism to (1) reduce the transaction costs (a one-stop shopping system involves considerable less costs than numerous bilateral licenses, (2) to control the total (cumulative) license fee (even if all IPR holders demand a fee that they consider reasonable, the cumulative fee may be prohibitive) and (3) improve access to patents.

[5] Department of Justice antitrust division and Federal Trade Commission, hearings on: competition and intellectual property law and policy in the knowledge based economy, Cross-Licensing and Patent Pools, Wednesday, April 17, 2002, Great Hall of the U.S. Department of Justice, 333 Pennsylvania Avenue, N.W., Washington, D.C.

Given the nature of the problems and the phenomena we are interested in, this study has an explorative character.[6] In order to collect empirical data to support our analysis, we use a case study approach is used, focussing on three cases. IPR problems and patent pools are most likely to occur in sectors where compatibility standards are at stake: many parties may hold essential standards for one single technology. Moreover, for a patent pool to be legally allowed, it almost by principle needs to be linked to a well-defined technical standard or definition. Building upon earlier research results, we have identified three cases in which many overlapping property rights can be observed: the case of DVD technology (field of Consumer Electronics - CE), the case of second- and third generation mobile telecommunications standards (field of telecommunications), and open document standards (field of computer technology). In the first two cases, patent pools have in fact been established, while in the third case, an interesting alternative was proposed. We also contrast patent pools to another alternative coordination mechanism, the so-called non-assertion covenants.

Research methodology

We employ a combination of a literature survey, desk research on existing patent pool organisations, and a number of field interviews, where we have placed emphases on high-level representatives from firms that are potential licensors and/or licensees for pools. Since IPRs and patent pools are, to many firms, a very sensitive subject not every firm we approached would agree to have their comments and views written down in way which would allow readers to identify them. To keep this study as valuable as possible, we decided to make the interview results totally anonymous and worked them into the overall analysis. Most often, however, we were able to refer to public sources of information.

On the basis of our study, we aim to draw conclusions on (1) how patent pools may or may not contribute to the creation and diffusion of standards; (2) in what situations patent pools are appropriate, (3) what the main trends in patent pools are, (4) what the main challenges and trade-offs are, particularly from the perspective of their potential members. The paper rounds up with recommendations addressing legislators (the EU in particular) whether and how they could facilitate the establishments of paten pools in order to increase the success of technical standards.

Structure of this paper

Below, in Section 2, we will first discuss the relation between standards and patenting, and introduces patent pools, including their basics and some examples. As competition law respectively antitrust law is very important in this field (and actually determines whether patent pools are allowed to be established), we pay attention to regulatory issues in Section 3. In Section 4, the three selected cases are presented. Finally, we close with drawing conclusions and discussing policy implications (Section 5).

[6] A first European study dealt already with the interrelationship between IPR and standardisation (Blind et al. 2002), which covered besides a company survey (see Blind and Thumm 2004) also a case study on the MP3 patent pool (Blind 2003).

2 Standards, patenting and patent pools

The relation between standards and patenting can be a troubling one. Standardisation has a public (or quasi public)[7] nature and strives for equal access for all, whereas property rights are more in the private sphere and are meant to give exclusive rights to one party, for a pre-defined period. This section aims to provide a better understanding of the difficult relation between standards and patents, and introduces the phenomenon of patent pools

2.1 Patents in standards: essential and non-essential patents

That the implementation of technical standards in products implies the use of patented knowledge is rather usual these days. It is also not a totally new phenomenon. Philips and Sony license their compact disc patent to hundreds of manufacturers. The widely used IEEE[8] Ethernet standard for local area networks are based on patents of Xerox.[9] In addition, the MPEG[10] audio and video coding standards cover several patents too (see below). In some cases, patents even apply to standards that are referred to in regulatory measures. The use of the patented modular telephone jack, which can be found on virtually any device that can be connected to the telephone network, is obligatory in many situations in the US.[11]

In fact, some modern products based on standards, such as a GSM or UMTS telephone, may be covered by thousands of patents, even if we do not take into consideration that patents on the similar invention are often taken in many different countries. A specific category of these patents, however, is what is usually referred to as 'essential patents'. In short, a patent is considered essential to a standard when implementation of that standard is only possible using the patented knowledge. In other words: there are no workarounds; anyone that wishes to produce a product compliant to the standard needs a license from that patent owner. It should be noted that determining essentiality is not without problems. Can we really be sure that such workarounds do not exist? What if there are alternatives, but the cost of implementing them (both in terms of money or in technical terms) are prohibitive to be used in this context?[12]

It should also be noted that non-essential patents can be very valuable. An example: a substantial part of the buyers of mobile phones seems to attribute great value to so-called predictive text input feature on GSM phones. This feature allows them to compose short text messages more easily. In order to market a successful phone, a manufacturer may feel that it

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[7] This is called *quasi public* in this study, because in practice not all parties have equal access to the standard and to the standardisation process.

[8] IEEE: Institute of Electrical and Electronics Engineers.

[9] Hanrahan, 1995, p. 496.

[10] MPEG: Motion Picture Experts Group.

[11] This telephone connector is incorporated in the Federal Communications Commission (FCC) Part 68 Rules and also is the basis of an IEC standard (Hanrahan, 1995, p. 496).

[12] Let's give an hypothetical example: assume a firm has patent a way of calculating a certain parameter, that is continuously to be computed in mobile phone in its stand-by mode. Suppose that there is also another way of doing that calculation, but that alternative requires 100 times as much computing. Given the power needs for computing power and given the available battery technologies, that would result in a reduction of the maximum stand-by time from a full week to a few hours. Does this imply that the patented technology is essential, or not? Where is the threshold?

needs to license that patent, even though the standard does not include this feature and the patent in question is therefore has to be considered non-essential.[13]

Nevertheless, despite the observation that non-essential patents can be indeed very valuable, essential patents are a special category on their own. When a firm fails to secure a license to an essential patent, it cannot make and sell any product complying to the standard, and thus is completely barred from competing on the market of the standardized product.

2.2 A tragedy of the anticommons

A situation with overlapping patent rights, as we observance in several standardisation environments, can be characterised with what has been called the 'tragedy of the anticommons'. To explain this metaphor, we first turn to the so-called 'tragedy of the commons', where this analogy is taken from.

The **tragedy of the commons** refers to a situation where many actors have unrestricted access to a collective good (such as farmland or fishing pools), resulting in a tendency for over-exploitation and exhaustion on the longer term, damaging everyone's interests.[14] As such, it concerns the conflict for resources between individual interests and the common good. In economics, this reasoning has often been used to argue in favour of privatisation and/or regulation; for instance by introducing property rights. Such an ownership would create an incentive to consider the value of the property in the future.,

Analogous, the **tragedy of the anticommons** occurs when rational individuals (acting separately) collectively waste a given resource by under-utilizing it. This happens when too many individuals have rights of exclusion in a scarce resource.[15] As such, this metaphor helps to explain why people underuse scarce resources because owners can block each other. The term "tragedy of the anticommons" was introduced by Harvard Law professor Frank Michelman and popularized in the late 1990s by prof. Michael Heller. In one article, he uses the classic example of why many storefronts in Moscow are empty while street kiosks in front are full of goods. His explanation is that many agencies and private parties had rights over use of store space and that it was difficult or even impossible for a start-up retailer to successfully negotiate for the use of store space. Even though all the persons with ownership rights were losing money with the empty stores, and stores were in great demand, their competing interests got in the way of the effective utilisation of space.[16]

Overlapping rights of exclusion may occur, in particular, when intellectual property rights such as patents and copyrights are at stake.[17] It is a common misunderstanding that patents would give the right to produce something; they merely provide the right from preventing others to do so. But if the production (or implementation) of something that incorporates your own patent but also patents held by others; you still need permission by these others (licenses) to be allowed to

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[13] This example refers to the popular T9 predictive text input developed and patented by Tegic (an America Online subsidiary) and licensed to may of the world's largest mobile phone manufacturers.

[14] The term is originally from a parable published by William Forster Lloyd in 1833, and was popularized and extended by Garrett Hardin in his 1968 Science essay "The Tragedy of the Commons". (Source: Wikipedia).

[15] Source: Wikipedia.

[16] Heller, M.A. (1998). The Tragedy of the Anticommons: Property in the Transition from Marx to Markets. Harvard Law Review 112 (3), pp. 622

[17] DePoorter & Paris (2003) used this metaphor in relation to copyright and fair use.

produce. A practical example is that of a cumulative invention. Firm A patents the basics of a entirely new process, and after that firm B invents (and patents) a way to practically implement this process. Firm A can only use this implementation if it obtains a license from B; where B can only commercialise its implementation when it gets a license from A. In modern times, such cumulative inventions are increasingly common.

The risks of the tragedy of the anticommons (underuse) grows with the number of overlapping property rights. Apparently, standards are prone to such situations. As explained in the preceding paragraph, any organisation that wants to implement a standard into a product, must ensure access to all essential patents (by obtaining licenses from all the holders of these patents). As a result, a standard that has many essential patents may suffer from underuse (lack of diffusion). It should be stressed that this type of underusage is different than the 'normal' type of underuse that is associated with the patent system (ie. the build-in trade-off in the balance between creation and usage).

Not only the areas that use technical standards but also other sectors have been mentioned as being prone to cumulative rights problems such as the tragedy of the anticommons. One of these is the field of biomedical research by (which has a lot of patented procedures), discussed by Heller & Eisenberg.[18]

2.3 Coordination mechanisms to deal with patent access problems in standardisation

Obviously, standards bodies would like that licenses of essential patents are available to all potential implementers, at reasonable terms and condition. If not, the diffusion of the standard is at risk. To that end, there are several policies that have been adopted by standard bodies.

In the **royalty free (RC) licensing** policy, standard bodies (or other organisations) impose that all licenses for essential patents are made available free of charge. If one of the patent holders chooses not to comply, the standard is withdrawn, or a workaround is developed so the standard in question is no more essential (i.e. the standard is changed). Patent holders may be sensitive to this thread: if their IPR is no longer essential to the patent, it may well raise less money, unless there are other good markets for the patent (possible other, competing standards). An additional enforcement is possible if governments require royalty-free patents as part of their procurement rules. Royalty free policies draw heavily on the ideas of the open source community, where developers of software voluntary waive their rights, and developed a license that all other contributors and adopters of their software do the same (e.g. the GNU license). In the field of telecommunications, there have been some attempts to have standards bodies imposing an RC policy, however, to no avail.[19]

The so-called **RAND** or **FRAND** licensing policy establishes that all holders of essential IPR must use (fair,) reasonable and non-discriminatory terms when licensing those IPRs. Usually, members of the standard body in question took the obligation on them to notify the body of any essential patents they are aware of. This obligation is usually part of the in the membership rules (established in the Statutes or the Rules of Procedure). Any holder of an essential IPR (member or not) is urgently requested to issue a statement that it will indeed meet the RAND conditions for its patents that are essential to a specific standard. If this part refuses, the standard body must

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[18] Heller & Eisenberg (1998).

[19] For details, see section 4.2, at 'Patents in GSM, the European second-generation mobile technology'.

halt the development of the standard or must find a way to change the standard ion a way that the patent is question is no longer essential.

Both coordination mechanisms have been introduced by standard bodies (and by governments, when procuring). Experience shows that both have their limitations and drawbacks.

Royalty-free conditions has been made part of the procurement conditions in the Dutch Programme for open Standards and Open Source Software in government Ossos[20] and is now taken over for the European Community in their European Interoperability Framework (EIF). This bold move, however, is heavily disputed as it conflicts strongly with the interests of existing market players, which often invested heavily in research under the assumption that these costs could be recovered by licensing income.[21] A royalty-free licensing policy has also been adopted by W3C, among others.[22] The W3C's policy seeks to W3C seeks to its Recommendations that can be implemented on a Royalty-Free (RF) basis; this standards body will not approve a Recommendation if it is aware that Essential Claims exist which are not available on Royalty-Free terms. Although the W3C policy is not without any discussion, it seems as if the large majority of players can accept it. This might have to do with the nature of the standards in question, and the norms, values and history of the internet development. It is rather unthinkable that such a policy would be accepted in the field of radiocommunications standards, for instance.

(F)RAND licensing policies have been pioneered by ETSI (see Section 4.2) and are now quite widely adopted among standards bodies. Also these policies are not without problems, however. Some of the most serious limitations are:

- The terms reasonable and fair are open to different interpretation. What is reasonable? In some sectors (e.g. pharmacy), it would not be unusual for a patent holders to demand a licensing fee of several dozens of percents of the wholesale price of a drug. At the same time, many in the telecommunications sector might find such a fee unreasonable. But what is the definition of that criterion? There is little or no jurisdiction that can help us how fair and reasonable should be interpreted in this context.

- Licensing contracts between parties are, almost by definition, confidential documents. So, for any given licensee, it is very hard to determine whether the non-discriminative clause is met or not.

- The only read threat that standard bodies can make against IPR holders to get them make the desired declaration is that they halt the development of the standard. This is not a very strong menace; the holder of the IPR knows that the consequences of such a move are so sever for the standard body that they will only do this as a very last resort.

- Even if each of the individual IPRs is licensed in a fair and reasonable manner (however we define that), it could be very well that all licenses together would result in an

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[20] See http://www.ossos.nl/index.jsp?alias=english.

[21] A good examples of such critics can be found in CompTIA (2004). White Paper "European Interoperability Framework" ICT Industry Recommendations. Brussels, op te vragen via http://www.comptia.org/sections/publicpolicy/docs/interopwhitepaper0204.pdf. Ook in een recent rapport van EICTA worden dergelijke kritieken geuit. (EICTA (n.d.). Interoperability white paper., op te vragen op www.eicta.org/files/WhitePaper-103753A.pdf).

[22] See "W3C patent policy", version of 5 February 2005, available at http://www.w3.org/Consortium/Patent-Policy-20040205/.

unreasonable high amount. Obviously, the more essential IPRs, the bigger this problem gets.

- Parties that are no member of the standards body obviously cannot be compelled to notify the body of any essential patent they hold. As a result, there is always a risk that a firm stands up and claims an essential patent. Like members, such a firm has the right not to license on RAND conditions, however, this situation is even the more hazardous that this happens a late stage in which changes to the standard (workarounds) have become almost impossible.

In practice, we have seen several conflicts involving these RAND policies. Below, some illustrations are given:

- In late 1998, Qualcomm demands that ETSI meets a number of its demands before it is willing to declare that it essential patents for UMTS can be licensed on RAND terms and conditions. Some felt they were taken into hostage; others insisted that Qualcomm was acting fully within its rights. This is one move in a long-term conflict, which had severe consequences for the development of UMTS (see the case study in section 4.2).

- In late 2003, the European Commission ordered ETSI to remove a patent declaration by Sun Microsystems from its online intellectual property database. The justification for this was the commission's own investigation concluding that Sun did not, in fact, have an essential patent, and that the presence of the declaration could distort competition in violation of the EU equivalent of antitrust law.[23]

- Late 2005, a number of large telecommunications players formally complained at the European Commission that Qualcomm had unfairly used its patents on third-generation technologies to squeeze excessive royalties and licensing deals out of the industry.[24] The licensing fees of Qualcomm were said to be "excessive and disproportionate to the role Qualcomm had played in developing the technology".[25] Other complains are that Qualcomm is 'offering preferential terms on royalties on technology patents to manufacturers which also bought their chipsets'.

2.4 Patent pools essentials

Patent pools may help to solve, to some degree, the problems that were observed with the RC and RAND licensing policies discussed above. Following the USPTO, we define patent pools as "[…] an agreement between two or more patent owners to license one or more of their patents to one another or third parties."[26] A patent pool allows interested parties to gather all the necessary tools to practice a certain technology in one place, e.g, "one- stop shopping," rather than

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[23] See SCTE Standards Bulletin, Fall 2003, at http://www.scte.org/documents/standards/bulletin/SB_Fall_2003.htm.

[24] Financial Times, 'Groups push for action on intellectual property', 21November 2005.

[25] Moconews.com, 'Qualcomm Unfair With 3G Licences: Rivals', 28 October 2005.

[26] USPTO (2000). The alternative definition, given in the same paper reads: "the aggregation of intellectual property rights which are the subject of cross-licensing, whether they are transferred directly by patentee to licensee or through some medium, such as a joint venture, set up specifically to administer the patent pool.". However, we feel somewhat hesitant about this definition, as it suggest that cross licensing to be a core element, while, in our view, a patent pool could theoretically also exist without cross licensing (i.e. when the pool members do not need access to each other's patents, but when they do form a pool to license it to third parties).

obtaining licenses from each patent owner individually.[27] Another useful definition is offered by Robert P. Merges (1999).: *"A patent pool is an arrangement among multiple patent holders to aggregate their patents. A typical pool makes all pooled patents available to each member of the pool. Pools also usually offer standard licensing terms to licensees who are not members of the pool. In addition, the typical patent pool allocates a portion of the licensing fees to each member according to a pre-set formula or procedure [...]"* In this context, we are most interested in what we would like to call *technology-based patent pools*: where a pool is constructed to bundle licensees for a specific technology, such as essential patents for a technical standard.

Patent pools have been used for more than 100 years, and for various reasons. The earliest patent pools were mainly established to (1) clear blocking patent positions and to cease patent hostilities (these pools were often created after government intervention), and (2) for market division among horizontal competitors, naked price fixing and other anti-competitive goals (nowadays, such behavior is considered as a hardcore violation of competition/antitrust regulation, both in the US as in Europe).

Over time, patent pools came to serve other functions. In the current context, where RC and (F)RAND policies show their limitations, patent pools may help to:

(a) bring transaction costs down[28],
(b) control the cumulative licensing costs, and
(c) clear blocking patent positions and lessen access problems caused by opportunistic behaviour.

Other goals of patent pools include the avoidance of costly infringement litigation[29] and assure the interoperability and implementation of technical systems.[30] An often-overlooked aspect is the role of patent pools in that of a mechanism of information or knowledge exchange, e.g. unpatented technical information and information on the essentiality of IPRs.

Typical features of modern patent pools are the following:

- makes all pooled patents available to each member of the pool.
- standard licensing terms to licensees who are not members of the pool; usually a simple, coherent menu of prices and other terms to licensees
- allocates a portion of the licensing fees to each member according to a pre-set formula or procedure
- Consensus to license on FRAND considerations

2.5 Past and recent patent pools

As indicated, patent pools have existed since more than 100 years, but their reason of existence has changed a lot. This sections aims to present an up-to-date overview of such pools. Roughly, we can divide them into two periods:

- Period 1: Market-based patent pools (late 19th century up to the 1990s)

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[27] US Patent and Trademark Office, "USPTO issues white paper on patent pooling", Jan. 19, 2001.

[28] Here, we refer to the reduction of transaction costs associated with one-shot agreements in an environment with a repeat-play nature. Note that cross-licensing agreements can have this feature too: they often do include provisions of future IPR held by the contract parties.

[29] See www.essentialinvventions.org.

[30] See www.mpegla.com.

- Period 2: Standard-based patent pools

As we will show below, the second period can be further divided into (a) Patent pools established by involved parties and (b) Patent pools established and/or administrated by licensing organisations ('licensing authorities') that aim to develop larger number of pools. Examples of pools within the two distinguished periods will be further discussed in the two sections below.

Market-based patent pools

The first patent pools date from halfway the 19th century, and at that time such pools were, as indicated, mainly established to:

(1) clear blocking patent positions and to cease patent hostilities; these pools were often created after government intervention (the US-government-induced pools in aircraft manufacture and automobile are good examples of this);
(2) create market division among horizontal competitors, naked price fixing and other anti-competitive goals.

Merges (1999) presents a rather complete overview of 'old' patent pools and their features. Table 1 presents an overview of these (supplemented with pools found in other sources). Note that most documented patent pools were established in the US; we have found only one case of such a pool in Europe (that of the German stereo television technology). There have also been patent pools in sanitary production and glass production (dissolved in 1912 and 1945, respectively).[31] In addition to these better-known pools (that are regularly referred to in papers), Lerner, Strojwas & Tirole (2003) provide an even much longer list of 63 patent pools, most of them established in the 1920s and 1930s.

Table 1: Overview of well-known patent pools[32]

Sewing Machine	One of the first patent pools was formed in 1856, by sewing machine manufacturers Grover, Baker, Singer, Wheeler, and Wilson, all accusing the others of patent infringement. They met in Albany, New York to pursue their suits. Orlando B. Potter, a lawyer and president of the Grover and Baker Company, proposed that, rather than sue their profits out of existence, they pool their patents.
Movie Projector	In 1908, Armat, Biograph, Edison and Vitagraph entered an agreement under which the four firms assigned "all the patents in the early-day motion picture industry." The agreement also specified the royalties that were to be paid into the pool by licensees of the pool patents such as movie exhibitors.
Bed	In 1916, the owners of various patents related to folding beds and other similar devices entered into an agreement providing exclusive license to the Seng Company to manufacture and sell under the pool patents. Of the total royalties, 33 percent was allotted to the Pullman Couch Company. The license contract was signed by the Davoplane Bed Company (7 patents), the Pullman Couch Company (13 patents) and two inventors. The Seng Company paid a fixed percentage to the pool. Pool members split the royalty according to a formula in the pooling agreement.
Aircraft	In 1917, as a result of a recommendation of a committee formed by the Assistant Secretary of the Navy (The Honorable Franklin D. Roosevelt), an aircraft patent pool was privately formed encompassing almost all aircraft manufacturers in the United States. The

[31] www.essentiainventions.org.
[32] Sources: Merges (1999), Wikipedia, and www.essentiainventions.org.

	creation of the Manufacturer's Aircraft Association was crucial to the U.S. government because the two major patent holders, the Wright Company and the Curtiss Company, had effectively blocked the building of any new airplanes, which were desperately needed as the United States was entering World War I.
Radio	In 1924, an organisation first-named the Associated Radio Manufacturers, and later the Radio Corporation of America, merged the radio interests of American Marconi, General Electric, American Telephone and Telegraph (AT&T) and Westinghouse, leading to the establishment of standardisation of radio parts, airway's frequency locations and television transmission standards.
(German) stereo television	In 1980 German manufacturers of television sets assigned the IPRs for stereo television to a body called IGR. This body 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. Salora complained to the Commission, which obliged IGR to open up its licence scheme to third parties.[33]

Standard-based patent pools

With some exceptions, no new patent pools were established since between approx. 1920 and the 1990s. The explanation for this was the more critical attitude that the US authorities developed towards patent pools: increasingly, they were seen as an example of uncompetitive behaviour, incompatible with antitrust law.

Then, in the 1990s, the first new pools appeared on the scene again. These were rather different types of pools, specifically designed to deal with technologies that were essential to one and the same technical standard. Bay bundling such patent, the access to the technologies needed to implement the standard was facilitated, and thus these patent pools could have stronger pro-competitive than anticompetitive effects. Proposals for such pools were submitted to the US Antitrust Authorities, which in a number of cases issued a comfort letter in which it indicated that, given the information provided, they saw no reason why the pool was incompatible with antitrust law. After such a 'green light', the pool could be established. Best known examples are the so-called MPEG-2 patent pool, the MP3 patent pool (Blind 2003), the DVD-3 patent pool and the DVD-6 patent pools. The comfort letters in question were made public and have been studied by many, as they provide a good indication which aspects or practices the authorities judge to be acceptable, and which not. The first few patent pools were established on the initiative of the companies involved, and were often administered by one of these companies or by a new legal entity specifically established for this purpose.

Not long after, a new organisation model seemed to come along. In this new model, pools are established by specialist pool administrators, which aim to offer a wide collection of patent pools. These administrators use their experiences to establish and run pools. Firms involved in a standard can turn to such administrators with the request to set up a pool for their standard, but apparently these administrators increasingly take the initiative for pools themselves, issuing calls for IPR that are essential for specific technical standard. Right now, there are two of such administrators: MPEG Licensing Authority (MPEG LA) and ViaLicensing. Their activities and business models seem broadly identical. The MPEGLA was originally established to administer MPEG-2 patents, whereas ViaLicensing is a subsidiary of Dolby, a firm that has a long

[33] More information is in Temple Lang (1995) and in EC (1991), paragraph 94.

experience to license out its technologies to other (think of the Dolby noise reduction systems for tape recorders, and Dolby technologies form multi-channel cinema sound).

Table 2 presents an overview of recent, standard-based patent pools, including some pool proposals.

Table 2: Standard-based patent pools[34]

Application area	**Pools patents for the following standard**	**Pool administrator**	**Number of licensors and licensees**[35]
Wireless communications	IEEE 802.11 family (including 'WiFi')	ViaLicensing	6 licensors
Video coding	AVC (ITU H.264)	ViaLicensing	5 licensors
Video coding	AVC (ITU H.264)	MPEG-LA	18 licensors 68 licensees
Video coding	MPEG-2 (the pool itself is often called MPEG-LA, although this organisation now administers other pools too)	MPEG-LA	25 licensors, 134 unique patents 1021 licensees[36]
Video coding (audio part)	MPEG-2 AAC audio	ViaLicensing	5 licensors 126 licensees
video coding (audio part)	MPEG 4 audio standard (also known as MPEG-4 Part 2 and ISO/IEC 14496-3); includes MPEG 4 AAC	ViaLicensing	14 licensors 132 licensees
Video coding	MPEG 4 visual	MPEG-LA	26 licensors 292 licensees[37]
Video coding	MPEG-4 Systems	MPEG-LA	8 licensors 67 licensees
Radio Frequency Identification (RFID)	Electronic Product Code (EPC), 2nd generation (also known as 'GEN2)	A consortium of RFID product providers[38]	Still in the establishment phase. Around 20 firms are involved in setting up the pool.[39]
Mobile communications	Third generation mobile standards, including the UMTS/3GPP standard	3Gpatents (formerly 3G3P)	7 licensors
Television broadcast	DBV, MHP and OCAP	ViaLicensing	Not available
Television broadcast	DBV-T	MPEG-LA	4 licensors 36 licensees
Interactive television directories	TV Anytime forum TVA-1 (is equal to ETSI TS 102 822)	ViaLicensing	7 licensors
DVD	DVD Video, DVD ROM (plus patents for the ' slash' recording standard, that we leave out of consideration here)[40]	DVD 6C licensing agency (see 0 for details)	8 licensors (started as six, hence the name) 377 licensees
DVD	DVD Video, DVD ROM (plus patents for the ' plus' recording standard, that we leave out of consideration here)	3C DVD patent pool, administered by Philips	4 licensors[41]
Radio broadcast	Digital Radio Mondiale (DRM)	ViaLicensing	9 licensees
Computer communications	IEEE 1394 (FireWire interface")	MPEG-LA	10 licensors 368 licensees
Video coding	Second generation Source Coding-Decoding Standard – AVS (Audio	AVS patent pool management organisation	[6 licensors]

[34] Sources: www.mpegla.com, www.vialicensing.com, www.dvd6ca.com, as well as various sources referred to in Sections 0, 0, and 4.5.

[35] As communicated by the licensing administrator (status per 10 February 2006).

[36] Among these licensees there are quite some legal entities that appear to be a part of the same organisation.

[37] Ibid.

[38] See www.rfidjournal.com/article/articleview/1786/1/1.

[39] See RFID Journal (Aug. 10, 2005). "The RFID Patent Pool: Next Steps". Available from http://www.rfidjournal.com/article/articleview/1798/1/1/, and LinuxDevices.com (Aug 12, 2005). "RFID 'patent pool' consortium forms". Available from http://www.linuxdevices.com/news/NS8390642236.html.

[40] More details are given in Section 4.1.

[41] The firm LG joined at a later stage.

	Video Coding standard working group of China)[42]		

Table 3: Standard-based patent pools (including recent proposals)

ViaLicensing is currently setting up pools for a number of new standards, including:

- the IEEE 802.16 ('WiMax') standard,
- the MPEG-7 standard (a technology for Content Description of multimedia material),
- the ISO 18092 and ISO 21481 standards for Near Field Communication (NFC),[43]
- the ISO/IEC 13818-7 standard, which specifies a Spectral Band Replication (SBR) option for the MPEG-2 standard.

Also MPEGLA has some licensing programmes in development, including:

- The OMA DRM (Digital Rights Management) standard
- VC-1 or VC-9 television standards[44]
- ATSC digital television standard (the American counterpart of DVB-T)[45]
- Blu-Ray Disc, a standard for high-capacity storage on CD/DVD like discs
- Terrestrial Digital Multimedia Broadcasting (T-DMB) and Satellite Digital Multimedia Broadcasting (S-DMB) standards (for use in Korea)

There are some notable observation when looking at these patent pools: (1) The two larger administrators (MPEG LA and ViaLicensing) sometimes bundle IPR for the same technological standards; (2) The China-based AVS patent pool was established in response to existing (US) patent pools, apparently because their licensing fees were considered to be too high for Chinese industry.[46] The new AVS pool aims is also aimed at the market of video coding but only includes IPR from Chinese firms, and includes the option to differentiate between the tariffs inside China and abroad.

Patent pools have been under fire, though. The 3C DVD patent pool, which includes Sony Corporation, Pioneer Corporation, and Philips Electronics, found itself the defendant in a national class action law suit in 2004, and of another legal suit (this time brought by two Chinese DVD manufacturers) in January of this year - even though the members of this pool had obtained a no action letter themselves.[47]

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[42] See http://www.avs.org.cn.

[43] This pools seems to be nearly there now; see Electronic News (2/1/2006), 'NFC Jumps in the Patent Pool', available from http://www.reed-electronics.com/electronicnews/article/CA6303827.html.

[44] From the MPEGLA website, it is not entirely clear for which standard (or both) this program is developed.

[45] For DVB-T, a pool initiative met considerable resistance. See EEtimes (24 November 1998), 'Digital-TV patent pool draws fire in Europe', available at http://www.eetimes.com/futureofsemis/showArticle.jhtml?articleId=18300379&kc=2511. Note that Lerner, Strojwas & Tirole (2003) do mention the establishment of a DVB-T pool, but we found no more data on this.

[46] See Wen Gao (sa), Open Standard and impact to the industry in China, Chinese Academy of Sciences availavble at www.ee.cuhk.edu.hk/ispacs2005/keynote/Gao%20Wen.ppt, and Wenwen Li (sa), The Intellectual Property Issue in the Standardisation Process - A Case Study from China's Experience, China National Institute of Standardisation (CNIS), available at http://www.thebolingroup.com/unifier_divider/powerpoint_slides/wenwenli.pdf.

[47] The following article, written from the Chinese perspective, makes for interesting reading. http://www.consortiuminfo.org/newsblog/blog.php?ID=1849

Patent pool models

Looking at the examples given in the preceding section, we can distinguish between several models for patent pools, or patent pool types (see Table 4). All fall within the definition of patent pools as we presented above, still there is a fine distinction between the three models.

Table 4: Patent pool models

Pool model 1: Joint licensing schemes. These are initiated by a group of (usually larger) licensors of a particular technology (or standard). One of them may act as an agent for the joint licensing contract. For instance, Philips is the agent for both the DVD3 and the DAB joint licensing scheme. Most of these pools are eventually open to any holder of essential IPR to the standard in question, nevertheless, they started as a activity of a small group.
Pool model 2: Patent pools with a licensing administrator. In this type of patent pools, there is an open call for essential patents for a certain standard by an independent body. Subsequently, the body has a patent evaluation carried out (usually by an independent, third party) to determine essentiality to the standard in question. A priory, the licensors that decide to join such a pool do not know who the other licensors will be that will become a member of the pool. A good example os such a pool is the MPEG-2 pool. The licensing administrator determines whether the patents are in fact essential, sets the royalty rate for the bundles (in dialogue with the licensors), and collects the royalties and redistributes them given a pre-agreed scheme.
Pool model 3: Patent platforms. In this model, an organisational approach is adopted that deals flexible with multiple technologies (standards) and multiple product groups (employing one or more patents that are essential to a certain standard). It also aims to be more flexible towards the actual agreements between licensors and licensees. In the patent platform, there is one overall umbrella organisation, as well as multiple entities called 'PlatformCo', which each develop licensing programmes for specific standards. The aim is to have a standard offer (bundle) available (that the involved licensors cannot refuse). However, within the context of the patent platform, licensors and licensees may also agree upon other arrangements, possible involving cross licensing, the licensing of non-essential patents, and so on. To date, the 3Gplatform is the only example of such an approach.[48, 49]

3 Regulatory approaches towards patent pools

As we have discussed in Section 2.5, there is a 'gap' in time between the market-based patent pools (most before the end of WW2) and the standard-based pools (starting in the 1990s). This gap can be attributed to the way regulators looked upon such pooling initiatives.

As any type of coordinated conduct between market parties, patent pools can have anti-competitive effects and therefore are critically watched by competition authorities (Europe) respectively antitrust authorities (US). At the same time, patent pools promote increase technology transfer, which is pro-competitive and benefits economic and social welfare, in much the same way that also licenses for IPR in general are considered to be pro-competitive. Pools may capture the efficiencies that may come from licensing complementary technologies

Over times, regulators have looked in different ways upon the desirability of patent pools. This section will first introduce a more elaborate overview of the various pro- and anticompetitive

[48] In Goldstein & Kearsey (2004), the 3Gplatform founders explain the organisations model in detail.

[49] Critical comments concerning patent platforms were expressed in EEtimes, (November 27, 1999), 3G intellectual property licensing strategy comes under fire, available at http://www.eetimes.com/story/OEG19991127S0003.

effects of pools (Section 3.1). As the phenomenon of patent pools received much more attention in the US than it did in Europe, we will continue by first discussing the regulatory approach in the US (Section 3.2) and then that in Europe (Section 3.3).

3.1 Pro- and anticompetitive aspects of patent pools

As indicated, patent pools have both pro- and anticompetitive effects. For a regulator, it is important to understand the various effects, their size, and which category of effects will prevail. Pro-competitive effects (depending on the exact conducts concerning of the pool) mostly have to do with the promotion of technology transfer, They include the following:

(P1)	Facilitating equal access to licenses for all potential licensees;
(P2)	Speeding up access to technology;
(P3)	Integration of complementary technologies;
(P4)	Reduction of transaction costs for both licensees and licensors;
(P5)	Possible clearing blocking positions;
(P6)	Avoidance of costly infringement litigation;
(P7)	A potential reduction of the cumulative license fee;
(P8)	Protection against certain strategies of patent holders (such as bundling essential IPRs with non-essential ones);
(P9)	Guaranteed non-discriminatory and equal access to all potential licensees. (At least, if agreed in the portfolio license conditions. See also the MFN clause below);
(P10)	A valuable source of information to would-be licensees (For example, the portfolio list must give a decisive answer to which patents of the participants are essential to a standard and which are not.)

The main possible anti-competitive effects include the following:

(A1)	Restrict competition between the licensors that participate in the pool, and serve as a price-fixing mechanism. This could especially be the case if substitute patents are in the pool, ultimately resulting in rising the price for products and services that utilise the pooled patents;
(A2)	Have anti-competitive effects for licensees, as it could force them to purchase patents that they normally would not have selected (for instance, if a pool were to include two cost-effective but not essential methods to manufacture a display for a mobile phone, a manufacturers would prefer to license only one of them, but the pool would force this firm to license both);
(A3)	Have anti-competitive effects for non-participating firms that hold patents that are substitutes to patents included in the pool. Since the licensee of the pool already has to pay for all patents in the pool, it might not select this competing patent, even if the latter is considered to be superior;
(A4)	Limit competition in downstream products incorporating the pooled patents, or in other markets that are somehow related to those (for instance, a patent pool for the DVD standard could potentially limit competition in the market for DVD players, in the market for DVD disks, or in the market for content that will be produced for that medium);
(A5)	Have anti-competitive effects towards other standards or technologies, as it might reduce the availability of patents that are technically or economically essential for those other standards;
(A6)	Remove incentives for further innovative behaviour. If a pool is already there, there is little to gain from developing an alternative (substitute) to one of the technologies in the pool, as licensees already pay for the one that is part of the pool (see A3, above).

Because of these potential anti-competitive effects, competition authorities look with great attention to patent pools and comparable constructions. If these authorities do not find sufficient safeguards that prevent undesirable effects from happening, they will not allow such agreements. Participants will look for ways to include such safeguards. Mechanisms that can be included by the patent pool participants to reduce the risk for anti-competitive effects include the following:

- Include only essential patents. By definition, essential patent rights have no substitutes and thereby it is guaranteed that there only are complementary patents in the pool. This would remove the anti-competitive risks associated with (A2) and (A3) above;
- Ensuring that all the pooled patents are valid and have not expired. If this were to be the case, then competition or antitrust authorities would without doubt initiate an enforcement action;
- Agreeing upon an independent expert as an arbiter of essentiality. This expert should also see to it that all patents are valid and have not expired;
- Include a procedure for deleting patents from the pool when this patent expires, is found invalid by a court, when its holder leaves the pool, or when this patent loses its essentiality, for instance;
- Assure that all patents that are in the pool are also licensed individually by their holder on fair, reasonable and non-discriminatory conditions, also for other purposes than the standard that the pool is intended for. In this way, the pool will not be used to block competitive standards as meant in (A5) above;
- Assure that licenses from the pool are available to any interested third party on fair, reasonable and non-discriminatory terms;
- Including a provision that resembles a MFN-clause[50] to ensure than all licensees pay an identical license fee;
- Assure that licensees are free to make products that do not comply with the standard for which the patent pool has been established;
- Including a so-called grantback obligation. Licensees that hold essential licenses themselves (but do not participate in the pool) are then obliged to license these on reasonable and non-discriminatory conditions to all licensors and licensees in the pool. This further reduces risks for patent blocking.

Also Beeney (2002) has developed a similar list of design issues that maximise the pro-competitiveness of patent pools. Many of the items on his list are similar to those listed above.

3.2 Antitrust regulation in the US

Over time, the US authorities have looked upon patent pools in quite different ways. Up to the end of World War 2, the government itself had been involved in establishing patent pools, mostly to solve patent access issues for applications with a high societal importance (such as the aircraft pool in the war). After the second world war, also in a generally more critical attitude towards monopolies and anticompetitive behaviour, paten pools were more or less banned. This was formalised in the 1970s, when DoJ published a rather rigid approach towards licensing, the so-called ‘nine no-no’s’. This was a list of per se violations of antitrust law, in other words: hardcore restrictions.[51]

[50] The Most Favoured Nation (MFN) is used in the WTO, among other organisations, and basically determines that if a country grants favourable terms and conditions for one country, all other countries have the right for that same terms and conditions.

[51] See Gordon, 2002.

In the mid-1990s, we can observe an interesting change in US policy. IN the so-called Antitrust Guidelines for the Licensing of Intellectual Property[52], the U.S. Department of Justice (DoJ) and the Federal Trade Commission (FTC) for the first time acknowledged significant pro-competitive effects. By doing so, they followed suggestions by antitrust scholars like Teece and Jorde for a more liberal approach for inter-firm cooperation, also in the field of IPR.[53] Although the new guidelines also confirmed that the DOJ wanted to maintain its vigil over anticompetitive behaviour, it invited firms to think of more innovative approaches. The nine non-no's were formally abandoned in 1986.[54]

Indeed, on the late 1990s, several firms informed DoJ of their plans to establish patent pools. In a so-called Business Review Procedure, DoJ commented on the expected effects of the proposed plans, and indicated whether they believed such plans to be compatible or incompatible with antitrust law. If the first is the case, the resulting letter is referred to as a 'comfort letter' or a 'green light'. Although such a letter does not make a firm immune for any future legal action (for sure, any other firm retains the right to challenge their conduct), it does usually give a firm enough certainty if they know that DoJ, as it is, does not see reasons to take actions against their plans. So basically, it is a commitment of 'no action' by competition authorities. The protection this gives is not perfect (it does not bind private parties), but substantial.

In the late 1990s, three widely circulated business review letters were published: two of them for plans for a DVD patent pool, one for a MPEG-2 patent pool (for details and references to these letters, see Section 4.1). These rather detailed letters are very interesting as they discuss, in detail, which aspects the regulator takes into account when judging upon these pools. In 2002, a similar clearance was given to a patent pool initiative for third generation mobile standards (for details and references to these letters, see Section 4.2). In the US, there is also one interesting example of a case where a business review letter in fact concluded that a certain pool would be anti-competitive, and thus did now allow its establishment. This is the so-called VISX case. One of the main reasons why this pool proposal was found incompatible with antitrust law was that some of the patents in the proposed pools were substitutes, not complements.

After the above-mentioned cases, however, no similar business review letters seem to have been published afterwards for patent pools.[55] In fact, interviewees suggested that recent pool initiatives have designs that are rather similar to those already tested, making a new assessment unnecessary.

In 2002, the Federal Trade Commission and the Department of Justice organised a set of hearings concerning 'Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy'.[56] Its goal was to revisit the question of a proper balance of competition and patent law and policy. Many interesting contributions were made by scholars, both economists and lawyers.[57] Also patent pools were discussed in detail. In the opening session, it was said that: 'In these hearings, we will encourage exploration of a number of broad questions about

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[52] U.S. Department of Justice and the Federal Trade Commission (1995).
[53] See Merges, 1999.
[54] See Beeney, 2002.
[55] See the overview of such letters at http://www.usdoj.gov/atr/public/busreview/letters.htm#06.
[56] Department of Justice antitrust division and Federal Trade Commission, hearings on: competition and intellectual property law and policy in the knowledge based economy, Cross-Licensing and Patent Pools, Wednesday, April 17, 2002, Great Hall of the U.S. Department of Justice, 333 Pennsylvania Avenue, N.W., Washington, D.C.
[57] For an overview, see http://www.ftc.gov/opp/intellect.

patents pools, such as whether pools actually result in the competitive problems they are hypothesized to cause and whether the antitrust authorities have focused on the right criteria when evaluating patent pools.'[58] Unfortunately, in the final report on the hearings[59], patent pools do not even make it into the concluding chapter, and the report does not go much further than stating that 'Panelists also observed that various patent licensing arrangements – cross-licensing, patent pools, and the licensing requirements of standard setting organisations – have helped to mitigate the potential harm to innovation caused by patent thickets.'.[60]

3.3 Competition policy in the EU

Compared to the US, the discussion on IPRs and intellectual property – including phenomenon such as patent pools – is not much in the public domain. In fact, there does not seem to be much literature on the European policy in that field. Until 2004, the European Commission did perform procedures that are similar to the Business Review Procedure in the US.[61] There were two types of letters, so-called Negative Clearance Letters (NCL) (the agreement is totally outside Art. 81) and Exemption letters (the agreement is addressed in Art 81 but meets the exemption terms listed in Art 81.3, basically saying that the agreement is pro-competitive after all). However, none of the two types of comfort letters was made public and the receivers were not authorized to publish them (although a press release by the EC typically discussed their outcome and content). As far as we can track, comfort letters have been sent out to the DVD6C patent pool[62] and to the 3Gpatents pool.[63] As of early 2004, the EC changed its regulation and eliminated the concept of comfort letters (see below).

In the European Union, patent pools may infringe competition laws (Article 82 in particular). Up to 2004, patent pools are not covered by the 'old' group exemption for license agreements[64], in contrast to several other types of license agreements. In April 2004, a new Regulation on block exemption for technology transfer licenses came into force (EC, 2004, with additional guidelines given in EC, 2004b). Still, this new block exception does not cover patent pools, given preamble 7: *'[This Regulation] should also not deal with licensing agreements to set up technology pools, that is to say, agreements for the pooling of technologies with the purpose of licensing the created package of intellectual property rights to third parties.'* The accompanying guidelines confirm this.[65] In fact, in a press release[66], the European Commission indicates that it does not have the powers to adopt a block exemption regulation for patent pools.

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[58] James (2002).
[59] FTC (2003).
[60] Ibid, p. 44.
[61] For a comparison between US and EU law, see also Delrahim (2004).
[62] This comfort letter is announced in European Press Release concerning the DVD2 patent pool, Brussels, 9 October 2000. Although this press release also refers to the fact that the 3C DVD firms also pooled their patent, we are not aware of a EC comfort letter for this pool.
[63] EU (2002).
[64] Block exception on the transfer of technology 240/96
[65] See these guidelines (EC 2004A): 'The TTBER does not cover technology pools. The notion of technology pools covers agreements whereby two or more parties agree to pool their respective technologies and license them as a package. The notion of technology pools also covers arrangements whereby two or more undertakings agree to license a third party and authorise him to license on the package of technologies.'.

Interesting enough, however, the guidelines do give considerations what aspects of pools the EC believes to be incompatible with competition rules, and what type of arrangements are allowed. In short, the Commission indicates that:

- Pools should only include essential technologies [to a standard] (Art. 219-221)
- Pools should only include complementary technologies, never substitutes technologies (note that if all IPRs in a pool are essential, than this definition is by definition met) (Art. 219-221)
- Pools [with a strong position on the market] should be open and non-discriminatory[67] (Art. 224)
- Pools should not unduly foreclose third party technologies (Art. 224)
- With pools [with a dominant position on the market], royalties and other licensing terms should be fair and non-discriminatory and licenses should be non-exclusive. (Art. 226)
- Licensors and licensees must be free to develop competing products and standards and must also be free to grant and obtain licences outside the pool (Art. 227)
- Grant back obligations should be non-exclusive and be limited to developments that are essential or important to the use of the pooled technology (Art. 228)

In addition, the Commission sets some standards to the institutional arrangement of the pool (preferring a pool established by independent parties over a pool initialised by a limited group of technology owners, among other things), independent expert selection, and addresses the necessary resolution mechanisms.

Goldstein & Kearsey (2004, p. 214), two authors that were closely involved in setting up the 3Gpatent pool, note that the European Commission and the US DoJ do closely coordinate their positions. However, other people still call for more harmonisation. This was also expressed by interviewees. During a recent dialogue at the European Policy Centre, Hisamitsu Arai, Secretary General of the Intellectual Property Strategy Headquarters in Japan called for a more harmonisation between Europe and Japan in the context of patent pools.[68]

4 Three case studies on patent pools and associated coordination mechanisms

The relationship between IPRs and standardization is as tense now as it has been at any point since the late 1980s/early 1990s when the launch of GSM sparked a landmark controversy about incorporating such rights into emerging standards. Current events in the 3G mobile-environment (see ETSI), the Rambus ruling, concerns in the standards-world about the fate of the Eolas patent and the recent case of Research in Motion (the maker of the BlackBerry) being confronted with an patent claim are among the ingredients that are currently heightening tensions here. In this context, a widening set of different responses are being tried in order to clarify the changing role of patents in relation to standardization processes which themselves are undergoing change. Among those approaches being tried, patent pools (see cases) make up a notable supply-side

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[66] See http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/04/470&format=HTML&aged=0&language=EN&guiLanguage=en.

[67] We believe this issue should be interpreted with regards to participation.

[68] See http://www.theepc.be/en/default.asp?TYP=ER&LV=475&PG=ER/EN/detail&AI=475.

mechanism (IP holder). This mechanism, which has a long history, is enjoying something of a renaissance at the international level. It has recently been touted as a good way to coordinate IP of multiple stakeholders more efficiently in relation to standardization activities.

There are also other mechanisms that are addressing the need for coordinating multi-rights and multi-right-holder scenarios where a potential for 'hold-up' or simply for the cost of rights—cumulative or individual—to become prohibitive creates uncertainty. One mentioned in the literature (Graf & Zilberman, 2001) involves 'patent clearing houses' which have been forwarded in the field of the bio-agricultural research. The patent clearing house' approach involves a mechanism for academic researcher institutions to provide for free access to rights that might affect their research. This mechanism however does not seem to be sufficiently widespread in practice yet to affect the relationship between research and standardization.

4.1 Case DVD/MPEG technology

The first case is from the field of consumer electronics (CE). The technologies and standards in this field are among those most visible to end users: almost everyone recognizes the relevance of a compact cassette or video cassette fitting in the recorder, or the CD in the CD-player. One of the commercially most successful CE standards in the last decade has been that of the DVD. This high-density optical carrier is used for video recordings as well as computer data. The MPEG technology is pivotal for the actual video content on DVD discs; for that reason we combine both technologies into a single case.

For this case, the following structure will be used: first the development of the relevant technology and standard will be briefly discussed. Subsequently, the way patents affect the standard, and the use of coordination mechanisms for patents are treated. After we have introduced all three cases, the comparison and the analysis of the coordination mechanisms will be presented in Section 4.5.

Context: DVD/MPEG technology and standard development[69]

Optical storage in the CE sector first reached high volumes with the outstanding success of the compact disc (CD) in the early 1980s, as successor to the vinyl record.[70] Expectations were high for the high-capacity derivate called DVD, which allowed storage of a video up to the size of a feature film. Around 1998, the first DVD players and discs were introduced in the European market. The development of DVD not only involved optical storage technologies, but also data compression techniques (DVD uses one known as MPEG-2). Although the standard-setting process revealed substantial differences in interests and in technical preferences, the actor managed to agree upon one single standard in the end.[71] However, for the recordable versions, different incompatible variants emerged. Soon, DVD technology will have its successors: Blu Ray and HD DVD are two proposed systems to store high-definitions films on a disc of a similar size.

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[69] Parts of this case have been presented by INTEREST project team member Stephan Gauch at the SIIT 2005 conference in Geneva, Switzerland. See Gauch (2005). See also Gauch, S. (2006)

[70] The LaserDisc (then called DiscoVision, also known as VideoDisc) was introduced on the market in 1978 by MCA/Philips. That is several years before the CD, which was introduced in most world markets in 1983. Although the lLaserDisc already employed many of the (optical) technologies that made CD a success, the number of VideoDisc users remained limited.

[71] See, for instance, Taylor (2000).

When the question concerning a CD technology successor offering enough capacity to hold high-quality multimedia data arose in the early nineties, a technology race between two competing parties began to develop a suitable format. The two formats resulting from this were the Super Density (SD) digital video disk format stemming from the "TAZ" project supported by Matsushita, Toshiba and Time Warner and the MultiMedia Compact Disc (MMCD) format supported by the original CD technology developers Sony and Philips. Both formats differed in technical specifications and capacity. Being aware of the problems where consumers are confronted with two, mutually incompatible standard, both parties initiated a working group consisting of mayor ICT players like IBM, Microsoft, Intel and HP to mediate a solution. By the end of 1995 this group, known as the Computer Industry Technical Working Group (TWG), proposed a unification of both specifications to circumvent the possible danger resulting from two separate standards (CE, 2004). The DVD Forum, an industry consortium founded by the IPR-holders of the DVD technology, was made responsible for the approval of the official DVD Books. This is the (non-recordable) DVD standard as we know it now.

Whereas for DVD-video the stakeholders managed to agree upon a single standard, the paths started to diverge for the recordable variants of DVD. There, two different camps emerged, which we will call the 'plus' camp (including Philips and Sony) and the 'slash' camp (with Hitachi, Matsushita, Mitsubishi, JVC, and others). Interestingly enough, the membership to these camps is very close to that of the earlier camps mentioned above, with the MMCD supporters backing the "plus"-standards (DVD+R and DVD+RW) and the former SD supporters backing the "slash"-standards (DVD-RAM, DVD-R and DVD-RW).

Patent pools for DVD / MPEG

Producing a DVD player, a DVD disc or other DVD-related products involves many different patents by different owners. Two pools initiatives have been taken to bundle licenses for essential IPRs for DVD. These pools are discussed below, as well as other relevant IPR that is not in those pools.

The '3C DVD' patent pool

In December 1998, Philips, Sony and Pioneer received a comfort letter from the US Department of Justice for establishing a patent pool for DVD-ROM and DVD-Video patents.[72] (Note that all 'DVD-3' patent pool members are key members of the later DVD+RW Alliance.) At a later stage, LG joined the 3C DVD pool. In this pool, Philips acts as a licensing administrator for patents held by all three companies: 115 patents in all for the manufacture of DVD players, and 95 for the manufacture of the discs themselves. At that time, the pool only included patents with filing dates before 31 December 1996. Bundle fees are set as follows: *'Player license per-unit royalty is to be 3.5% of the net selling price for each player sold, subject to a minimum fee of $7 per unit, which drops to $5 as of January 1, 2000. The Disc License royalty is to be $.05 per disc sold. […]'*. Though this arrangement is usually referred to as a paten pool, it best first under the heading of 'joint licensing program' of our more detailed categorisation (Section 2.4). On their web page, Philips offers an overview of joint patenting programmes regarding DVD technologies (sometimes in slightly different forms constellations).[73]

The 'DVD-6C' patent pool

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[72] This comfort letter is available at http://www.usdoj.gov/atr/public/busreview/2121.htm.
[73] See http://www.licensing.philips.com/licensees/patent/dvdrw/.

In June 1999, the group calls itself the DVD-6C Licensing Agency received a similar comfort letter from the US Department of Justice for setting up and patent pool.[74] At that time, its members were Hitachi, Matsushita, Mitsubishi, Time Warner, Toshiba, and JVC. Again this pool was for the DVD-ROM and DVD-Video formats. IN this case, Toshiba was acting as the licensing administrator, sublicensing the essential patents of others as a bundle. Bundle fees are set as follows: *'The underlying Authorisation Agreement requires Toshiba to charge royalties of $.075 per DVD Disc and 4% of the net sales price of DVD players and DVD decoders, with a minimum royalty of $4.00 per player or decoder.'.*

At a later date, essential patents for newer standards (most notable DVD-R and DVD-RW, i.e. the 'slash' or 'minus' formats) were also added to the pool (in separate bundles). IBM joined as a licensor, but left again when its DVD-related patents were bought by Mitsubishi. In 2005 also Sanyo and Sharp followed this example, raising the number of licensees to eight. By now, there are no less than 377 licensees. Nowadays, Hitachi and Panasonic now act as regional agents for certain world regions, while Toshiba is the licensing administrator ion other regions. In 2003, the pool substantially reduced its fees.[75]

Though this arrangement is usually referred to as a paten pool, it best first under the heading of 'joint licensing program' of our more detailed categorisation (Section 2.4). An interesting overview of similarities but also differences between the two DVD patent pools is given in Kelly, 2002. It is remarkable that the same firms that are in different patent pools for DVD, are all happily together in the MPEG-2 pool (see below).

The MPEG LA pool

The DVD standards, as discussed in this case, essentially describe the way data is stored on the disc. It does not specify, however, how that data is coded, the DVD standards merely refer to other existing coding standards. The most important one in this context is MPEG-2. In fact, every DVD video player will need to implement MPEG-2 to be able to play regular DVD videos.[76]

For MPEG-2 (which in fact has wider use than DVD discs only), a patent pool has been established as well. In contrast to the joint licensing programmes of DVD-6C and 3C DVD, this is a Patent pools with a licensing administrator (subbed pool model 2 in Section 2.4). It was an independent, external organisation, known as the MPEG Licensing Authority, that set itself the aim to develop a patent pool for this standard. This organisation published a open call, inviting any party that believed to own patents essential to MPEG-2 (in fact, the video coding part only) to join the program.

In June 1997, the MPEG LA received a comfort letter from the US DoJ, to establish a patent pool for the MPEG video standard.77 Take-up was quick, and now the pool includes 25 licensors, 134 unique patents and 1021 licensees.[78] After establishing the MPEG-2 pool, the same licensing authority started calls for other (sometimes related) standards too, and currently administers pools for six different standards, and has pools for another five standards in the making (see Section 2.5 for more details). As such, it seems to have developed a repeatable and sustainable

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[74] This comfort letter is available at http://www.usdoj.gov/atr/public/busreview/2485.htm.

[75] The reader is referred to http://www.dvd6cla.com/news.html for details.

[76] Theoretically, the MPEG coding functionality could be left out if it concerns a DVD-ROM drive only and the user does not wish to be able to play standard DVD videos from it.

[77] The review is available at http://www.usdoj.gov/atr/public/busreview/1170.htm.

[78] Among these licensees there are quite some legal entities that appear to be a part of the same organisation.

model of establishing pools, which as been followed by ViaLicensing, that has developed into a similar of licensing authority now.

Other relevant patents for DVD

Apart from the pools mentioned above, there are a other patents relevant for producer of DVD-related products. Dolby offers licenses for those that wish to implement Dolby Digital in their DVD players. Both Thomson and DiscoVision own patents involving optical disc technology, and each is looking to collect separate royalties. There is also a licensing fee for a copy protection system used within a DVD player[79], and the DVD Format/Logo Licensing Corp collects licenses for those using the DVD logo's.[80]

Nevertheless, if we look at the pool and take their focus into consideration – essential patents for the DVD standards (excluding possible audio/video coding systems), then we have to conclude that by far, the large majority of relevant patents is inside one of the two pools.

[79] http://www.nerd-out.com/forum/viewtopic.php?p=76179&sid=b83eed6530c14555980d6d1e36a78b58.
[80] http://www.dvdfllc.co.jp.

Pressure on the DVD pools

But even when designed with care, and having received a comfort letter, patent pools can still be attractive targets for litigation. The 3C DVD patent pool found itself the defendant in a national class action law suit in 2004, and of another suit (this time brought by two Chinese DVD manufacturers) in January 2005.[81]Underlying reason is that manufacturers in countries like China find the current total license fee of approx. 20 US$ for a DVD play er too high.[82, 83] There are also concerns from DVD replicators, as articulated in 2002.[84] DVD-6C seemed to have responded to such urges to lower prices more than 3C DVD. In March 2006, The International Optical Disc Replicators Association (iODRA) has lodged a formal complaint with the European Commission over the royalty rates charged by DVD patent holders. In its submission to the Competition Directorate-General, the trade association cites three patent pools: the DVD6C, DVD3C and MPEG-LA licensing agencies.[85] Such pressure is not unique. The MPEG-4 pool also was criticized (See also Note 144, below) and the company 2on legally challenged the MPEG-4 pool.[86]

4.2 Case Second- and third generation mobile telecommunications (2G/3G)

Telecommunications can be seen as a prime example of a market where interoperability is at stake. As we will see, there is nowadays an intensive patent activity in this sector, possibly making it an interesting sector to implement patent pools. As telecommunications is a broad sector in itself, and most patent-related academic studies are about mobile telecommunications, we will also focus on that sub-field. In fact, the field of mobile telecommunications is perhaps the field in which problems with patents in standards have been the most visible. Given the European perspective of this study, and the fact that Europe has shown to particularly successful in that market, we will also focus on the European standards for mobile telecommunications, GSM and UMTS.

Below, we will first discuss the development of the GSM technology and standard. Second, we treat the way patents affect the standard, and the use of coordination mechanisms for patents are treated. Subsequently, we will do the same for UMTS.

Context: GSM technology and standard development

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[81] See Sony Corporation, Pioneer Corporation, Philips Electronics and the 3C DVD Patent Pool (22 June 2004), available at https://www.lawyersandsettlements.com/case/sony2; Lawsuit Filed on DVD Patent Pool, (China Daily January 20, 2005); http://64.233.179.104/search?q=cache:Tbqd14-_xdUJ:www.china.org.cn/english/BAT/118335.htm+%22patent+pool%22+dvd&hl=nl&gl=nl&ct=clnk&cd=9; The Register. 'Chinese manufacturers sue DVD patent pool' (25th January 2005). http://www.theregister.co.uk/2005/01/25/chinese_dvd_maker_lawsuit/; and Appliance magazine (29 December 2004), Complaint Filed Against DVD Patent Pool, available at http://www.appliancemagazine.com/news.php?article=7901&zone=0&first=1.

[82] Note that this fee can also involve non-essential IPR, or essential IPR that is not included in the patent pools.

[83] http://www.china.org.cn/english/BAT/118335.htm.

[84] See International Optical Disc Replicators Association (2002), 'Royalties Payments Concern Replicators', available at http://www.iodra.com/news_stories.php?news_id=4.

[85] http://www.cdrinfo.com/Sections/News/Details.aspx?NewsId=14929

[86] http://www.on2.com/pressreleases.php3?qs1=on2_chalenges_existence_of_mpeg4. A position paper of the challenging company is at http://www.on2.com/news_position_paper.php3.

The development of GSM started in the early 1980s. At that time, the PTT's in most European countries started to roll out substantial mobile networks. These networks employed analogue technology, and most countries employed a self-designed, mutually incompatible technology. Though this would result in lack of scale and lack of roaming services, PTTs wanted to wait for the second generation of mobile technology and use that opportunity to harmonise their networks. Initially, manufacturers did not warmly welcome such a harmonised activity (that was to become GSM), as it would create a market with considerable more uncertainties and risk than before. However, over time, they changed position: the enormous costs associated with developing such technologies and products and the faster and faster growing market (both in number of subscribers as in number of operators) made support for GSM increasingly attractive. In 1986/1987, the difficult process of selecting the basis technology took place. In an attempt to create a head start for their national industries, Germany, France and Italy started an cooperation and created a strong lobby to have their technology chosen as the basis for GSM. However, actors from other countries presented technically less challenging designs that better suited networks in areas with medium traffic densities, whereas the German-French proposals were designed with high traffic densities in mind. After laborious technical discussion, comparing various proposals, the operators finally rejected the German-French proposals, and decided upon a system that was largely based on a proposal that had been submitted by Ericsson. After that, the standard was finalised between 1987 and 1990, and first implementations started around 1991. In little time, GSM was an enormous success. The technology has been successfully exported to almost all world regions, accounts for approx. 75% of all the worldwide market and early 2004, the number of GSM subscribers passed the 1,000,000,000 mark.[87] It is widely recognised that a number of European manufacturers as well as network operators (notably Vodafone) have benefited greatly from the GSM standard.

Patents in GSM, the European second-generation mobile technology

Patents were very important during the earliest days of telecommunications, but they lost most of their significance in the period between approx. the second world war and the 1990s. The re-introduction of patents in this field is linked to the advent of GSM Europe's second-generation standard for mobile communications.

It was the development of GSM that totally changed the role of patenting in the telecommunications sector. That is the main reason why we will focus on this technology here. While we do not want to deny that patent-issues were relevant for other second-generation mobile standards too (e.g. D-AMPS, PDC, cdmaOne), the GSM story learns us most of the issues at stake, and is also the best documented development in that context. In this section, we will briefly discuss the issue of IPRs in GSM. We assume that the reader is already acquainted with the main phases in the development of the GSM standard; those that are not, are referred to Hildebrand (2002) and Bekkers (2001/2001a). When considering IPR in GSM, we can broadly define five different phases:

- Early concerns about IPRs in GSM (1980 – 1987)
- Attempts by operators so secure access to IPRs by procurement contracts (around 1988)
- The bilateral licensing progress and the exclusive club of GSM manufacturers (1990-1992)
- Adoption and revision of ETSI's IPR policy (1993 - 1994)

[87] Data from the GSM Association (www.gsmworld.com), consulted 9 December 2005.

- Broadening access to patents, as well as surfacing new patent claims (1995 and later)

We use these phases to structure our discussion below. After that, we conclude with an analysis.

Early concerns about IPRs in GSM (1980 – 1987)[88]

The initiative for GSM was taken in the so-called Conférence Européenne des Administrations des Postes et des Télécommunications (CEPT), an organisation that comprised all European incumbent telephone operators. Manufacturers initially regarded this development with fear. They dreaded the risks associated with the high development costs, and feared Japanese competition if a common standard would be defined. Network operators therefore realized that they needed to reduce the perceived uncertainties of the suppliers. Fourteen network operators then signed the so-called GSM Memorandum of Understanding (MoU), committing themselves to procure GSM networks. As a result, the reluctance of manufacturers changed into enthusiasm when the potential market size of this standard became apparent.

Research indicated that digital technology would best fulfil the capacity and cost/performance demands of the operators, although the final decision for a digital system was repeatedly postponed. Germany and France strongly subsidized the development of suitable technology, hoping to ensure a leading position for their national industry. In an attempt to create a head start for their national industries, Germany, France and Italy signed an agreement for the adoption of an identical, digital standard. This way, they were forcing the CEPT to adopt a digital standard, and they expected that such a standard would be based on one of the technologies developed by German and French suppliers.

However, actors from other countries presented technically less challenging designs that better suited networks in areas with medium traffic densities, whereas the German-French proposals were designed with high traffic densities in mind. After laborious technical discussion, comparing various proposals, the operators finally rejected the German-French proposals, and decided upon a system that was largely based on a proposal that had been submitted by Ericsson. However, this choice was difficult to accept for the governments of Germany and France, and political talks on the highest level were held to prevent those two countries from stepping out from the GSM project altogether. These talks, and diplomatic arrangements between suppliers that secured that certain German and French suppliers could also play an important role in the selected technology eventually made the technology choice acceptable for these two countries.

During the period of the development of the various technical proposals, actors became increasingly aware of the imminent danger of IPRs. One of the reasons for the rejection of the German-French proposal was indeed that it was considered to be 'too proprietary'.[89] In 1988, under great pressure from the EC, the GSM project was transferred from the CEPT to the newly established European Telecommunications Standards Institute (ETSI).[90] ETSI aimed for a general policy concerning IPRs, but this came too late to serve the GSM project.

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[88] Parts of the following text are drawn from Bekkers, 2001.

[89] Cattaneo (1994, p. 63). It is not clear whether she refers to property rights owned by members of the SEL/Alcatel consortium, or more generally to the head start that consortium members would have if this technology was selected. Nevertheless, both situations were undesirable for other actors (see also Iversen, 1999, p.93).

[90] The European Community recognized that the GSM standard would greatly facilitate the strongly wished harmonisation in this sector, but regarded the CEPT not as the most appropriate body to set such a

Attempts by operators so secure access to IPRs by procurement contracts (around 1988)

Aware of the risks that IPRs could constitute for them, the main European operators issued an invitation to equipment suppliers in 1988 to tender for network equipment. These operators, acting together in the GSM MoU, produced a draft procurement procedure in which manufacturers were essentially forced to give up all their IPRs and to provide for free world-wide licenses for essential patents (Garrard, 1998, p. 139, Cattaneo, 1994, p. 64, Good, 1991, p. 402, and Wilkinson, 1991, p. 97). This arrangement was found to be unacceptable by many manufacturers and resulted in a dispute that threatened the entire GSM program. Especially Motorola from the US, which was heavily involved in the development of GSM, stood up against the attempted imposition (Garrard, 1998, p. 140, Wilkinson, 1991, p. 197). Under pressure of the manufacturers, the intended provisions of the operators were dropped. However, in a Musketeer's Oath approach, a number of operators required the suppliers of their network to sign a declaration in which they agreed to serve the whole GSM community, both suppliers and operators, on fair, reasonable and non-discriminatory conditions. Companies that decided not to accept this condition, as Motorola did, were not entitled to supply equipment to those operators, but thereby prevented a restriction of their rights.

The bilateral licensing progress and the exclusive club of GSM manufacturers (1990-1992)

In the early 1990s, however, when the first networks were being supplied to the operators, the IPRs problem peaked when Motorola refused to grant non-discriminatory licenses for its sizeable portfolio of essential patents that turned out to be essential for GSM. Motorola was only prepared to enter into a limited number of cross-licenses with selected parties, and also limited the geographic scope of such licenses to Europe. For the companies involved in these agreements, this cross-licensing reduced market risks. However, for those not involved, it created barriers to enter the market. Several companies, including Matra from France and Dancall from Denmark, made unsuccessful attempts to secure licenses. Of the many Japanese companies that showed very promising prototypes of GSM terminals around 1992, almost none succeeded to get all the necessary licenses within the first few years of commercial success of the GSM standard.

The behaviour of Motorola strongly influenced the supply market structure in the sector, but could not obstruct the success of the standard. European regulations resulted in two or more GSM operators in each EC member state, and GSM subscribers grew tremendously in all countries, especially from 1994 onwards. On the supply side, virtually all equipment was supplied by the companies that took part in the cross-licensing scheme: Ericsson, Nokia, Siemens, Alcatel, and Motorola. Many countries world-wide expressed their preference for GSM, and this forced Motorola to lift the regional restrictions in its licenses. With the use of IPRs, Motorola succeeded in having an interesting revenue stream even though it could not offer switching subsystems and even though it knew that its market prospects were restricted. With the internationalisation of GSM, non-European suppliers such as Lucent (former AT&T) and Nortel started to play a more active role, but never surpassed the success of the five champions. In the late 1990s, a number of non-European firms (especially from Japan) finally managed to obtain all the necessary licenses to build GSM terminals, but it will be difficult for them to catch up. For suppliers, the participation in cross-licenses turns out to be essential to obtain a strong market position. First of

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standard. One reason was that the CEPT was only open for network operators, not for other actors involved in GSM such as manufacturers and candidate privately owned operators. The CEPT and its member states reacted by transferring the standardisation to the ETSI: a newly established standards body that meets all the requirements of the EC. With this new body, the GSM standardisation moved to a more institutionalized and more transparent environment.

all, companies that do not succeed in securing all the necessary licenses simply cannot market products. It is generally held that this kept many potential Japanese and smaller European suppliers from the GSM handset market.[91] This is also the case for many smaller European suppliers.[92] Secondly, those firms that do succeed in getting all the necessary licenses, could be forced to pay a premium price for them. Sometimes, IPR holders are only prepared to sell a full bundle of patents that in fact only contain a few essential ones. Our own research has indicated that the cumulative fee paid for GSM handset licenses is very high, and this was recently confirmed by the actor director of the ETNO[93], who revealed that royalty fees make up to 29% of the costs of GSM handset.[94] Such prices make competing very difficult for those companies that are not participating in the cross-license fees.

Adoption and revision of ETSI's IPR policy (1993 - 1994)

The GSM experience made painfully clear that is was not obvious anymore that any party holding IPRs for telecommunications standards, drawn up by official bodies, would be prepared to license these IPRs to all interested parties, under terms and conditions that are undisputed. Knowing this, ETSI members started to exert pressure on this standards body to develop an IPR policy that would prevent what they considered to be abuse of patents. Although the development of this policy is, strictly regarded, not specifically linked to the GSM standard, it was clearly induced by problems that had surrounded GSM, and designed to prevent such problems to repeat themselves. However, looking back, the development of this policy is still typical for the period of 2G communications systems, and therefore included in this section of this report.

ETSI started working on the a patent policy around 1990, and very early drafts of what is known as the ETSI IPR Policy and Undertaking were rather extreme, including compulsory licensing, among other things. They were drawn up in the direct aftermath of the GSM dispute, and may therefore be regarded as an overreaction to this experience. The Commission of the EC, stressing that such practices could be incompatible with both the Paris Convention of 1883 and with WTO rules, exerted pressure on ETSI to come to a more acceptable policy.

In March 1993, ETSI brought its IPR Policy and Undertaking to vote on the General Assembly of its members. The policy in question is best characterized as 'licensing-by-default': unless specific actions are taken, an IPR holder automatically agrees to license on fair, reasonable and non-exclusive conditions. This is in strong contrast with the practices from other standards bodies, where a firm must explicitly agree to license its IPR.[95] The policy was approved by a large majority. It should be noted, however, that the voting structure in ETSI was such that the voting national delegations were often dominated by national operators (usually not owning IPRs

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[91] Cattaneo G. (1994). The making of a Pan-European network as a path-dependency process: The case of GSM versus IBC (Integrated Broadband Communications) network. In G. Pogorel (ed.). Global Telecommunications Strategies. Amsterdam: Elsevier Science, p. 68, Garrard, G.A. (1998). Cellular communications: Worldwide market development. Norwood, MA: Artech House, p. 140, and Donegan, p. (1995). A priority for the EU review (editorial). In Mobile Communications International, September/October 1995, p. 3.

[92] For example, one of the first companies to develop a GSM handheld phone, Dancall from Denmark, is reported to have filed a complaint with the Commission of the EC, in a desperate attempt to eliminate its competitive disadvantages. Pelkmans, J. (1999). The GSM standard: Explaining a success story. Manuscript submitted for publication.

[93] ETNO: European public Telecommunications Network Operators' association.

[94] 3G patent initiative devised to avoid 'Qualcomm-type' disputes. (19 June 2000). TotalTele. Retrieved 4 july 2000 from the World Wide Web: www.totaltele.com.

[95] For the main provisions of this policy, see Bekkers, 2001.

themselves). The European manufacturers present in ETSI did not want to antagonize these operators, because they were heavy dependent of sales to these operators.

The approved policy, however, met a lot of resistance worldwide. Many actors pointed to weaknesses and undesired effects on the short and of the longer term. The US government started an intensive lobby to have the ETSI IPR-policy annulled, and the policy became the subject of trade negotiations. The European Commission was hesitant to provide the requested clearance to ETSI that the policy was not incompatible with European competition law. A powerful US trade body, CBEMA, filed a formal complaint with the EC Commission Competition Authorities, and more than a dozen ETSI members informed ETSI that they would terminate their membership if the policy were to be implemented. Given the growing pressure, the General Assembly of ETSI decided not await the verdict of the Commission and abandoned its original policy. It adopted a less far-reaching policy, known as the 1994 IPR Policy, which is still the basis for the current policy. This new policy requires members to notify IPRs they are aware of, but does not oblige members to license their IPR under RAND conditions. If a members refuses to license, even after several requests of ETSI to do so, ETSI has halt the development of standard, and look for ways to circumvent the use of that particular IPR.

Broadening access to patents, as well as surfacing new patent claims (1995 and later)

In the second half of the 1990s, GSM turned out to be increasingly successful outside Europe. In the US it competed with two other 2G standards (D-AMPS and IS-95 CDMA), but its market share vis-à-vis these competitors kept growing. GSM was also adopted in numerous other countries across the globe. This made it relevant for more and more telecommunications systems suppliers to include GSM products in their portfolio. As revenue generating opportunities increased, GSM license holders became more relaxed to license other firms. Over time, more and more manufacturers managed to license the necessary IPR, including American, Japanese and Korean firms in particular. Although some of these firms have managed to win considerable shares of the market (think of Samsung in the GSM handset market), it did not annul the head start that the firms had that managed to secure access to all necessary IPRs right from the beginning.

Incidents with GSM-related IPR do show, however, that the situation is still delicate. For instance, years after the first GSM products entered the market, InterDigital Technology Corporation (IDC) from the US claimed to own patents that were infringed by GSM products. In April 1995, the US Federal Court, however, ruled the claims invalid, making mobile telephone manufacturers around the world breathe a sigh of relief. By that time, InterDigital had already collected seventy million dollars from royalties. One year later, however, German Federal Patent Court upheld one of the InterDigital patents that was found invalid in the US. A more recent clash occurred more recently, when a firm challenged that certain Sun patents would be essential to specific ETSI standards. The firm claimed that it developed technology that was able to meet the standard but did not infringe on the Sun IPR. Sun, nevertheless, refused to withdraw its claim of essentiality in the ETSI IPR database. The European Commission urged ETSI to remove the Sun claim from the patent database, while ETSI quite understandably said that this was not within her power, and that Sun should withdraw its statement itself.

Analysis: what we learned from IPRs in GSM

The development of GSM was accompanied by the first large-scale patent disputes in telecommunications standards. The GSM case shows us that:

- Changed circumstances, both in general as in the telecommunications market in general, have lead to the more aggressive use of IPRs and to more pronounced IPR strategies.

- It is not obvious anymore that IPRs relevant to formal standards are available to everyone and at terms and conditions that are acceptable by everyone.
- Access to patents does, to a large degree, determine the ability of firms to compete on the market, especially in the earlier, most profitable period.
- Standard bodies are, for a variety of reasons, not in a position that allows them to adopt effective IPR strategies.

Context: UMTS technology and standard development

The success of GSM, that in may ways by far exceeded the expectations at the various early stages during its development, set high expectations for UMTS. This does not mean, however, that during all stages all involved parties were very involved, and that the development proceeded without glitches. Again, IPR issues turned up high on the agenda of those involved.

Whereas the way GSM developed is widely known and often recorded, such information on UMTS did not (yet) reach a larger public. Table 5 summarises that account by presenting a brief timeline of the UMTS development.

Table 5: UMTS timeline

Time	*Event*
Between 1990 to early 1995	Explorative R&D is conduced. The EU-funded RACE research programme output shows outline of UMTS technology (though no specific choices yet made)
1995 - 1996	EU is disappointed by the relatively low interest in UMTS by most commercial actors; the EU induces establishment of UMTS Task Force and UMTS Forum
1996 - 1997	Japan takes over the lead by a swift development and procurement of an experimental 3G network
1997	Renewal European interest as a response to the Japanese move; now also operators welcome a more energetic UMTS development
Dec 1997, January 1998	After fierce competition between several proposals, ETSI members manage to agree on the technological basis for UMTS. ETSI teams up with ARIB, TTC and other regional bodies and establishes 3GPP in order to make their regional efforts mutually compatible. A similar setting called 3GPP2, however, is developed for the competing MC-CDMA ('cdma2000') standard.
Early 1999	The ITU attempts to decide upon a single, worldwide 3G standard but fails to do so.
1999	The Operators Harmonisation Group manages to get the diverged 3G standards much closer, facilitating roll-out and interworking. They also solve some industry disputes, clearing the way for the roll-out of networks
Late 1999	Release of first full, stable version of UMTS: Release 99
2000-2001	Auctions or beauty contests are held for UMTS licenses in most European countries
2000 - now	Improving and refining the UMTS standard, new releases
2000 – now	Commercial product development and network procurement

Patents in UMTS, the European third-generation mobile technology

When considering IPR in UMTS, we can broadly define three different phases:

- Phase 1: Choosing the main technology basis for UMTS;
- Phase 2: Attempts to define IMT-2000 - a harmonised global 3G standard;
- Phase 3: Afterplay.

As with GSM, we use these phases to structure our discussion below. After that, we conclude with an analysis.

Phase 1: Choosing the main technology basis for UMTS

Having the IPR conflict with GSM in mind, all actors were very much aware that UMTS had a large potential for IPR problems too. Property right issues were widely cited as the most contentious problem that was foreseen with third-generation standards. European actors already are very much aware of the strong patent position of the US firm Qualcomm for CDMA technology, and expect this company to demand high license fees.[96] Some actors feared fees in excess of 10%.[97] Another interesting observation is that already before the decisions upon UMTS technology, the firms Ericsson and Qualcomm are already involved in a lawsuit concerning CDMA patents in the United States District Court for the Eastern District of Texas.

In late 1997 and early 1998, ETSI made the fundamental decision concerning the technological basis for UMTS. After preparatory work, five proposals had been developed, based on different technologies. The two most promising proposals were the so-called Alpha proposal, a DS W-CDMA technology backed by Ericsson, Nokia, Lucent and Motorola, among others, and Delta, a TD/CDMA system backed by Siemens, Alcatel and Nortel, among others. Both had their basis in earlier (pre)competitive European research projects, and the support for the two standards was, not surprisingly, strongly related to involvement in that research. Also, the Alpha proposal was very close to the technology already selected by Japan, and Ericsson and Nokia were involved in those Japanese activities as a supplier. Siemens and Alcatel were not, and would not benefit from such a head start if Alpha were chosen.

At the time of the technology selection, much attention was paid to the fact that a number of companies failed to provide ETSI with the requested IPR declarations and the possible consequences of this. In fact, industry experts warned that *'If forced to pay stiff royalties, Ericsson and Nokia may be unable to afford the cost of developing and manufacturing third-generation W-CDMA systems'*.[98] At its SMG #24 meeting in Madrid, ETSI refrains from deciding upon the technology for UMTS, among other things because of unsolved IPR issues with the various proposals, and with the *alpha* proposal in particular. At the pivotical ETSI SMG 24*bis* in Paris on 28 and 29 January 1998, Qualcomm stated it believes to have a strong IPR position in both the Alpha and the Delta concept of UMTS. Siemens states that its investigations did *not* identify any Qualcomm IPRs for the *delta* concept. The final technology selection was finally made on that same ETSI SMG 24*bis* meeting. The day right after the technology selection, 29 companies from around the world issue an IPR declaration in accordance with Clause 6.1 of ETSI's IPR policy, thereby stating that they are prepared to grant irrevocable licenses on fair,

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[96] A representative of Alcatel said at the ETSI SMG24*bis* meeting '*[...] in the case of one certain company outside the IPR pools [of alpha and delta] asking for 6% [license fee], a pool license agreement of other companies to keep license fees at 1%, would result in 7% license fees of total'* (ETSI, 1998f, p. 3). Without any doubt, this 'one certain company' here is Qualcomm.

[97] Sometimes called 'double-digit' fees.

[98] Quote given in *Mobile rivals prepare for Paris take-off. (19 January 1998). CommunicationsWeek International.*

reasonable and non-discriminatory terms and conditions. However, Qualcomm did not sign such a declaration.[99]

Quite soon after, it became rather clear that there were going to be serious problems: in a letter to ETSI in April 1998, Qualcomm states it was not prepared to sign ETSI's IPR statement concerning the IPRs it holds for the development of UMTS. The letter is a response to ETSI's request for clarification of Qualcomm's licensing position. At around the same time, thee were signals that backers of the competing cdma2000 technology (developed by Qualcomm) want the chip-rate of W-CDMA (set at 4.096 Mchips/s) to be identical to that of cdmaOne and cdma2000, i.e. 3.6864 Mchip/s.[100] This chip rate is a technical parameter that is quite at the hard of the system, and is the ' master clock' that times all operations in the system. The relevance of Qualcomm's desire is that when two systems have an identical chip rate, it would be much easier to develop chipsets and components that could support both technologies. Qualcomm could be interested in becoming a supplier of such chip sets (both for its own cdma2000 standard as for possibly for UMTS).

Now one of the firms holding an essential patent (and apparently even a lot of them) refuses to licenses on RAND conditions, the ETSI *ETSI's Rules of Procedure* determine that work on UMTS based on the selected W-CDMA (Alpha) technology had to be ceased,[101] [102] and ETSI would have to opt for a TDMA-based third-generation standard.[103] Nevertheless, in the months that followed there were no indications that ETSI actually did work towards a TDMA solution.

All, in all, by the summer of 1999, there is a clear deadlock: UMTS is strongly based on CDMA technology, while one of the biggest holder of IPRs for this technology is not prepared to license its patents to UMTS manufacturers.

Phase 2: Attempts to define IMT-2000 - a harmonised global 3G standard

In the summer of 1999, the ITU attempted to converge the different 3G developing techniques (partly also linked to different world regions) and to set a single, harmonised world standard. To that end, they formally invited actors to submit candidate (radio) technologies. The invitation of the ITU for proposals was taken very seriously by all actors involved. All standards bodies that were developing third-generation standards took care they could timely submit a proposal. The ITU process also attracted wide attention from the public. ITU also made it clear that for any

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[99] *Qualcomm hold out on 3G could stymie key ETSI agreement*. (30 January 1998). Total Telecom.

[100] *US locks swords over GSM successor*. (5 May 1998). Total Telecom.

[101] The ETSI Rules of procedure state that *'Where a member notifies ETSI that it is not prepared to license an IPR in respect of a standard, the General Assembly shall review the requirement for that standard and satisfy itself that a viable alternative technology is available for the standard which: (1) is not blocked by that IPR; and (2) satisfies ETSI's requirements. (Clause 8.1.1).* Where*, in the opinion of the General Assembly,* no such viable alternative technology exists, work on the standard shall cease*, and the Director-General of ETSI shall request that member to reconsider its position. If the member decides not to withdraw its refusal to license the IPR, it shall inform the Director-General of ETSI of its decision and provide a written explanation of its reasons for refusing to license that IPR, within three months of its receipt of the Director-General's request*.' (ETSI, 1998b (Rules of procedure), Clauses 8.1.1 and 8.1.2. Emphasis added.). Besides that, it is widely believed that Qualcomm holds essential IPRs for *any* implementation of CDMA technology.

[102] This is also confirmed by ETSI in a letter responding to US criticism that ETSI favoured European manufacturers: Open letter to Chairman Philip M. Crane, Retrieved 2 October 1999 from the World Wide Web: www.etsi.org/ press/ETSIOpenletter180898.htm.

[103] This conclusion was also taken by other observers; see, for instance, *ETSI responds to US criticism in adopting wireless standard*. (26 August 1998). Telecom A.M.

proposal to be accepted, it needed to be clear that licenses would be unconditionally available for RAND terms and conditions.

But what was supposed to be a masterpiece came out as a big disappointment, mainly due to IPR issues. At the end of the day, the ITU was not able to decide. When in March 1999, the deadline was reached, two important firms, Ericsson and Qualcomm had still failed to declare that their licenses would meet those conditions. Unfortunately, despite insistence from the ITU, the ETSI and from mobile network operators all around the world, Qualcomm and Ericsson did not reach an agreement before this important ITU meeting. Despite enormous pressure from the ITU, the ETSI and from mobile network operators all around the world, Qualcomm and Ericsson did not reach an agreement before this important ITU meeting. As a result, the ITU was not able to make any real decision, and had to drop its ambition for a single world-wide standard, and also had to drop its less far-reaching ambition to harmonise the various standards as far as possible.

However, if fact only a few days after that deadline and the ITU giving up, the two firms did reach an agreement. [104] In sum, the companies agreed that Ericsson would purchase Qualcomm's infrastructure unit, enter into a series of cross-licenses agreements, settle existing litigation, and that they both would issue the requested IPR statement to the ITU, declaring that licenses would be available under fair, reasonable and non-discriminatory terms and conditions. As a part of the arrangement, both parties agreed to withdraw their patent blockings for third-generation standards. After this agreement was made public, Qualcomm stated that it would focus on its core business, developing CDMA terminals and designing chipsets. Although Qualcomm's infrastructure division was sold to Ericsson for an unspecified sum, it was generally known this division was unprofitable, and many observers believe that gaining access to Qualcomm's IPR was very costly for Ericsson.[105]

This move, however, cam too late for the ITU to realise its ambition of a single global standard. In the following years, still considerable work was necessary to have the different world standards growing closer to each other, to prevent unnecessary and high costs at the implementation stage. The Operators Harmonisation Group, in particular, was instrumental in convincing all parties to adopt a single chip rate in the end.

Phase 3: Afterplay (1999-2006)

Whereas it seemed as patent problems were largely solved by mid-1999 (with Ericsson and Qualcomm both agreeing to license their IPR at RAND conditions), these problems kept the mobile business society busy for the years to follow. This expressed itself by various proposals how to deal with 3G patents including patent pools (more on that below), as well as reports about patent conflicts.

These reports reached their (tentative) peak in late 2005. In October of that year, a number of leading 3G players including Ericsson, Nokia and Panasonic each filed a complain at the European Commission, asking it to investigate what they call the anti-competitive conduct of

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[104] The deal was reached even before the ITU issued its press release. This resulted in a rather strange press release, which for the largest part seems to have been written without the knowledge that there would be a deal after all. See International Telecommunications Union. (25 March 1999). *ITU approves key characteristics for the radio interfaces of third generation mobile systems* [press release]. Ericsson later confirmed that behind the scenes it had already been negotiating a peace with Qualcomm, starting in Spring 1998. (Source: Westmand, 1999, p. 28.).

[105] See, for instance *Ericsson & Qualcomm settle differences and back single 3G standard*. (25 March 1999). Total Telecom.

Qualcomm.[106] These firms refer to the RAND statement that Quamcomm has issued to ETSI, among other bodies, and state that Qualcomm is breaching these by (1) refusing to license some firms, especially potential chip set manufacturers, and (2) charging excessive and disproportionate fees for its essential UMTS patents, when compared to its fee for cdma2000 patents.

At about the same time, a number of operators publicly criticized ETSI's IPR policy, claiming that it leaves companies exposed to unattainable and excessive demands for royalties.[107] A few months earlier, in June 2005, the EU already announced that is was investigating ETSI to determine whether firms can exploit this body's rules to pull off a so-called 'patent ambush'.[108], [109] In response to this, ETSI established an IPR committee to study possible changes in the IPR policy.

In March 2006, ETSI announced that it is working on a radical revision of its IPR policy, under pressure of operators.[110] The new plan is designed to get all relevant patent-holders to sign up to a pre-agreed cumulative cap of approximately 5% for royalties on the cost of all equipment based on certain new standards.

The consequences of the planned changes to the ETSI IPR policy are difficult to predict but are likely to be far-reaching. Eventually, they may introduce the certain end of ETSI as a relevant telecommunications standardisation body. On the short term, some parties (especially those that pressed for these changes) may benefit from affordable license fees for future extensions to UMTS/3GPP. Manufacturers that have already vested interests in these standards will be forced to stick with that standard and accept the new terms and conditions. However, on the longer term, given the high number of essential IPRs in telecom standards and the very diverse stakes and business models of their owners, it seems very unlikely that ETSI will succeed in getting all (or even most) parties to agree to contribute their IPR under the new condition, eventually forcing ETSI to halt the development of new standard or losing its most relevant contributors/members. Obviously, there is no way of forcing unwilling members – let alone outsiders – to agree to such conditions, and ETSI might also find it very difficult to design a mechanism how to distribute the price cap among IPR contributors – then one has to get into some type of valuation of IPRs. ETSI might eventually find itself in a very, very undesirable role which in the end limits its abilities to operate as a successful standards maker.

IPR in UMTS

In total, some 73 firms claim to own patents essential to UMTS. Table 6 shows these firms, as well as where they notified that they believed to own such patents. The ETSI IPR notification database currently seems one of the most reliable sources of actual patents for UMTS. A recent

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[106] "Leading mobile wireless technology companies call on European Commission to investigate Qualcomm's anti-competitive conduct". Press release of Broadcom, Ericsson, NEC, Nokia, Panasonicv and Texas Instruments, dated October 28, 2005.

[107] Financial Times, 'Groups push for action on intellectual property', 21November 2005.

[108] Financial Times, 14 June 2005, " EU watchdog to investigate telecom patents regulations".

[109] A patent ambush, also called submarine patenting, is a strategy where the IPR holder does not notify its essential patent and at a relatively late stage of the development suddenly confronts all other with its patent claims.

[110] Informa (1 March 2006), 'ETSI acts on unfair, unreasonable and discriminatory IPRs'. Available at http://www.informatm.com/itmgcontent/icoms/whats-new/20017339277.html;jsessionid=635AF81F5BE0812FE0361EFE6656449B.

version of that database, ETSI special report SR 314 of April 2005, 13,106 essential UMTS patents are notified. Many of these are however the same patent in different legislations. A recent analysis of this database by Bekkers & West (2006) identified approx. 1,227 unique essential patents. In this sense, UMTS could be regarded upon as a special case: both the number of right holders and the total number of essential patents are much higher than for any other single standard known to us.

Table 6: Essential IPR claimed for UMTS according various sources

Notifications at:	**ETSI online IPR database (1)**	**ETSI SR314 (2)**	**ARIB(3)**	**ARIB(4)**	**ATIS**	**Current 3G patents pool members (5)**	**ETSI online IPR database (1)**
Concerning: (6)	**UMTS**	**UMTS**	**UMTS**	**UMTS**	**UMTS**	**UMTS**	**GSM**
Aepona	x	x					
Alcatel	x	x					x
ASUSTeK	x	x					
Axalto	x						
Bijitec	x	x					
Broadcom	x						x
BT							x
Bull CP8							x
Canon	x	x	x				
Casio			x	x			
CCETT	x						
CCL/ITRI	x	x					
Cellnet							x
Cisco Systems	x	x					
Coding Technologies	x	x					
DDI				x			
De Te Mobil							x
Ericsson	x	x	x				x
ETRI (Korea Telecom)	x	x				x	
EVOLIUM	x	x					x
France Telecom	x	x					x
Fujitsu Limited	x		x	x		x	
Gemplus							x
Golden Bridge Technology	x		x	x			
Hitachi	x						
Huawei Technologies	x						
Hughes Network Systems	x						
Innovatron							x
Intel	x						
InterDigital	x	x					x
IPR Licensing	x	x					
Italtel Spa	x	x					
KDD			x				
Kineto wireless					x		
Kokusai			x				
KPN	x					x	x
Lucent/AT&T	x	x			x		x
Lupa Finances							x
Matra							x
Matsushita/Panasonic	x		x	x			
Media Farm	x	x					
Mitsubishi	x	x	x	x		x	x
Motorola	x	x	x	x			x
NEC Corporation	x	x	x	x		x	x

Notifications at:	ETSI online IPR database (1)	ETSI SR314 (2)	ARIB(3)	ARIB(4)	ATIS	Current 3G patents pool members (5)	ETSI online IPR database (1)
Concerning: (6)	UMTS	UMTS	UMTS	UMTS	UMTS	UMTS	GSM
Nokia	x	x	x	x			x
Nortel Networks	x	x					x
NTT	x		x	x		x	x
NTT DoCoMo							
OKI Electric Industry	x	x	x	x			
Omnipoint	x	x					x
Orange	x						x
Philips	x	x					x
Qualcomm	x	x	x	x			x
Robert Bosch	x	x					x
Rockwell							x
Salbu Research & Development	x	x					
Samsung	x	x	x	x			x
Schlumberger Systèmes							x
Sharp			x				
Siemens	x	x	x	x		x	x
Sony			x	x			
Sun Microsystems	x	x					x
Tantivy Communications	x	x					
Télédiffusion de France	x						
Telia	x	x					x
Telia Sonera							
Texas Instruments	x	x		x			x
Toshiba	x	x	x	x			x
University de Sherbrooke			x				
Vodafone/ Libertel/ Airtouch	x						x
VoiceAge	x	x					
Voicecraft			x				
Wi-Lan	x	x					
Total number of firms notifying	52	37	22	17	2	7	36

Notes:

(1) IPR in ETSI deliverables, as available from www.etsi.org, as of September 28th, 2005.

(2) ETSI SR 000 314 V1.14.1 (2005-04) Special Report, Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards.

(3) Notifications in document ARIB STD-T63 Ver 1.00 "List of Essential Property Rights (IPRs) for ARIB STD-T63 " IMT-2000 DS-CDMA system" (probably from October 2000)

(4) Notifications in "Japan's Proposal for Candidate Radio Transmission Technology on IMT-2000: W-CDMA", ARIB, June 1998

(5) Firms that agreed to license via W-CDMA Patent Licensing Programme

(6) GSM refers to any GSM, GPRS or DCS-1800 patents; UMTS refers to any UMTS/3GPP patents

Patent pools in mobile telecommunications

As shown above, patent issues were very problematic for UMTS. Already during early stages, people thought of ways of dealing with these. Working groups were established, and also the idea of creating a patent pool for UMTS was considered more and more seriously.

In January 1998, the proponents of the *alpha* proposal in ETSI, including Ericsson, Nokia, NTT DoCoMo, NEC, Fujitsu, Matsushita (Panasonic) and Mitsubishi, announce activities concerning a patent pool. Representatives of the *delta* group report similar activities too.[111] Qualcomm says that it is interested in discussing a pooling concept which might simplify IPR handling, but that it wanted time to study the matter further.[112] In the summer of 1998, the UMTS IPR working group, an independent grouping of forty companies involved in UMTS (operators, equipment manufacturers and chip vendors) publishes its first report, studying various ways to deal with UMTS IPR issues including, in particular, patent pools.[113] In January 1999, the same group publishes a report based on extensive consulting of involved parties.[114] The report pays attention to various license models and recommends an arrangement called a 'patent platform' that has features in common with both a patent pool and a patent forum. However, it is remarkable that this group consulted virtually every player that is involved in third-generation patents, except Qualcomm.

When the final decision was taken on the UMTS technology, ETSI's press release also indicated activities that could be interpreted as ideas to set up a patent pool or something similar: "[the 31 companies that made the proposal leading to this new solution] will work together to provide agreed guidelines for the handling of IPRs essential to the UTRA specification which result in reasonable cost for the manufacturers.".[115, 116]

Now the pivotal technology decision was taken, the UMTS IPR group took the responsibility to establish what was to become known as the 3G patent platform (also called 3G3P for a while).[117] The UMTS IPR WG worked within a legal entity called the UMTS Intellectual Property Association (UIPA). The 3G Patent Platform specification was first approved and published in June 1999 by the UIPA General Assembly. After its establishment, the 3G patent platform has adapted itself to "ensure compliance with antitrust regulations and […] better understanding of industry requirements.".[118]

When looking at the main drivers for this patent pool initiative, we can find the usual motives such as improving access/availability of licenses, and a timely arrangement for the cost effective management and administration of all the concerned essential patents. More interesting, however, is that price control was one of the basic aims of the initiative. In fact, the UMTS IPR working group has described a patent pool as '[...] a one-stop clearing house with a cap on the maximum royalties.'.[119] This explicit aim makes the 3G pool different from many other pools, including those in the CE market. This goal is also reflected by the title of 3Gpatent's press release of 9 January 2002: 'Commercial launch of the 3G Patent Platform services to limit maximum royalties for 3G systems'.

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[111] ETSI: European Telecommunications Standards Institute. (1998f). *Consensus decision on the UTRA concept to be redefined by ETSI SMG2* (ETSI SMG (98)1 Annex 6). Sofia Antipolis, France: Author.

[112] Ibid.

[113] UMTS IPR Working Group (1998).

[114] UMTS IPR Working Group (1999).

[115] ETSI press release, 29 January 1999, "Agreement reached on radio interface for third generation mobile system, UMTS (Universal Mobile Telecommunications System)".

[116] Although the work ' pool" is not mentioned here, one may argue that the general guidelines on IPR are already decided upon by the standard body as such, and thus such an initiative by firms is likely to be a further-reaching agreement on IPR, not unlikely in the form of a patent pools.

[117] See "Background History of the 3G Patent Platform" at www.3gpatents.com.

[118] Ibid.

[119] UMTS IPR Working Group (1998).

There are also other design differences that set this pool apart from other pool. Witnessing various critics that were expressed in journal articles in 1999, the 3G pool was lacked the clout of a full patent pool or licensing agency.[120] In particular, according to these sources, the licensees will pay royalties *directly to the companies holding the corresponding licenses*. Patent holders and licensees are free to negotiate deals to meet their business requirements. Also, by the same time, observers note that 'Qualcomm has dug its heels in opposition to any of the proposed 3G patent arrangements'.[121]

In November 2002, a positive business review letter from the US DoJ was received for the 3G patent platform.[122] Similar clearances were received from the Japanese Fair Trade Commission (Positive view on the Consultation Pursuant to Prior Consultation System relating to Patent and Know-How issued, 28 June 2002) and the European Commission (a positive "comfort letter" published 11 November, 2002). These regulators studied a patent pool design as laid out in (3G3P, 2002). The reviews of regulators to prepare their comfort letter took rather long: it is noted that the EC review took two years (which is quite long given the developments in the mobile telecommunications market).[123]

Despite the overall aim to develop a platform for multiple technologies, having so-called Platform Companies developing licensing schemes for each of these (UMTS, CDMA2000, EDGE), only one came to see the light of day. In 2004, a 'W-CDMA Patent Licensing Programme' was established for UMTS FDD patents.[124] A total of 7 licensors offered their patents as a bundle to prospective licensers.

Over the years, the number of participating firms in the 3G Patents initiative dropped rather steeply over time. Table 7, below, shows the number of parties involved at four key moments in the history of the patent pool.

At this moment, it looks like the 3Gpatent pool is not very successful. Despite the broad aims, a license programme for only one single standard was developed, and this licensing program only covers a small fraction of the total IPR for that standard.[125] It may be too early, however, to judge on the possible success of 3Gpatents; some interviewees noted that it can take a rather long time. Also, the patent platform model does seem to be rather flexible and promising. Possible, in another sector, and without the explicit price control aim, such a platform would work very well. Interesting enough, two people that have been very closely involved in establishing this pool, Larry Goldstein and Brian Kearsey, have shared their ideas and experiences in a book.[126]

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[120] See EE Times (21 May 1999), "Possible 'showstoppers' shadow 3G patent pool" (http://www.eet.com/story/OEG19990521S0014) and EE Times (November 27, 1999), "3G intellectual property licensing strategy comes under fire".

[121] EE Times (November 27, 1999), "3G intellectual property licensing strategy comes under fire".

[122] This letter is available from http://www.usdoj.gov/atr/public/busreview/200455.htm.

[123] Goldstein & Kearsey (2004, p. 210).

[124] Note that the 'platform specification' published by 3Gpatents includes the following text: 'The scope of the services cover the 3G systems standardized family of technologies defined in the ITU within the framework of IMT 2000, plus any regional adaptation defined by 3GPP and 3GPP2, approved and published by the recognised standards bodies (e.g. ARIB, ETSI, TIA, TTA, TTC, CCSA, etc.).'.

[125] At the time of writing (14 March 2006), their website www.3gpatents.com also went dead.

[126] Goldstein & Kearsey (2004).

Table 7: 3Gpatents membership or associations over time

	European	*Asian*	*North American*	*Total*
Entities that participated in some or all of the definition activities of UIPA (June 1999 - April 2002	24	14	11	49
Companies associated with the 3G Patent Platform Partnership (3G3P) during the period September 1999 to December 2002	10	15	0	25
Notifying partners for EU antitrust clearance	8	10	0	18
PlatformWCDMA initial members, as of summer 2004	2	5	0	7

If we now look what share of the total number of essential patents for UMTS is (currently) covered by the pool, this is rather limited. Table 8 shows an overview of all essential UMTS patents, on the basis of a recent study by Bekkers & West (2006). The total number of patents in that data set amounts to 1227. From the table, it shows that the pool covers no more than approx. 5% of all patents.

Table 8: ETSI notified essential patents by firm

Firm	*Claimed number of unique essential patents*
Nokia	248
Ericsson	244
Qualcomm	228
InterDigital	168
Samsung	86
Motorola	54
Philips	45
Siemens(*)	38
Asustek	23
Alcatel	20
Mitsubishi (*)	18
Nortel	15
Toshiba, ETRI (*), Voiceage, France Telecom, Evolium, Sun Microsystems, OKI, Tantivy communications, IPR licensing, Salbu research & development, Cisco systems, Robert Bosch, Canon, CCL/ITRI, Media farm, Aepona, Bijitec, Wi-lan, Telia	Each claiming 5 or less patents
Coding technologies, Italtel, Lucent, NEC, Omnipoint, Texas Instruments	Blanket claim

Source: Bekkers & West (2006). Note: *Firms market with an (*) agreed to license via W-CDMA Patent Licensing Programme*

4.3 Case OpenDocument and XML Reference Schemas

In the final case, we turn our focus to another mechanism to coordinate the involvement of IPR into standards. This case focuses on 'non-assertion covenants' (NAC) which make up another approach that has recently emerged to reduce uncertainty about IPRs in the standards environment. We explore the use of NAC as demonstrated in the case of open-document format, an arena where there are two competing standards supported by two dominant players. Here we draw out some of the central aspects of the NAC case as recently exhibited in the area of open-document file standards. We point to some ways in which this mechanism focuses on some

fundamental questions related to the rationale of IPRs in the standards environment, and we highlight the affinity of this case to other initiatives that address the IPR concerns.

First of all, we introduce what non-assertion covenants are. In brief, 'Non-assertion covenants' are familiar bilateral agreements which accompany licensing agreements. (see Philips). When used as a unilateral agreements initiated by dominant players with large IPR holdings, they can significantly affect the licensing dynamics of a technology. In this case, they are used to signal to potential adopters of the standard (and to regulatory authorities who might be interested in the 'openness' of a given standard) of their intention not to assert such rights in as far as they overlap the area of an emerging standard. The covenant is based on the principle of reciprocity, meaning that it provides the strong incentive for other rights-holders to follow suit (see below). The successful NAC can thus defuse the IPR question altogether, both for parties to the standards activities as well as for third-parties. At the same time, the NAC can also serve to promote the adoption of the standard since it signals strong backing while it reduces uncertainty about what the terms of licensing are likely to be.

Non-assertion covenants

The case we look at here involves the multilateral use of 'non-assertion covenants' (NAC) in the area of open document standards. This is an area in which two standards have emerged— or are emerging— and have come into conflict. Here, the focus is on the recently ratified OASIS standard called Open Document Format for Office Applications (OpenDocument). Oasis is a consortium which includes IBM, Adobe and Sun Microsystems, and this standard bills itself as, "offer(ing) users and providers true freedom-of-choice with a royalty-free, XML-based file format for text, spreadsheets, presentations, formulas, and business charts."[127] Here it is noteworthy that Sun had earlier initiated an unsuccessful attempt to standardize document formats to head off Microsoft's dominance in the area.

OpenDocument Format is now being actively promoted especially among public administration around the world. The recently formed ODF Alliance has for example grown out of the standards activity in order to promote and advance the use the standard:

> *As documents and services are increasingly transformed from paper to electronic form, there is a growing problem that governments and their constituents may not be able to access, retrieve and use critical records, information and documents in the future. To enable the public sector to have greater control over and direct management of their own records, information and documents, the ODF Alliance seeks to promote and advance the use of OpenDocument Format (ODF).*[128]

The standard primarily targets governments and can also be seen as a response to the call of governments (such as in France) to promote a migration of public-administration documentation away from proprietary office formats (read Microsoft) to 'open', non-proprietary platforms. Public administration represents a large and influential market for office applications. The list of public-administrations that have linked their procurement strategy to platforms that reference 'open standards' processes has grown, representing a direct challenge to Microsoft's dominant position in this area. This dominance has been built on a de-facto standards process.

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[127] http://www.oasis-open.org/committees/office, 2006

[128] The ODF Alliance's webpage. The ODF Alliance was recently launched (March 2006) and includes diverse industry partners, associations,
NGOs and academic/research institutions. http://www.odfalliance.org/about.html

In addition to French ministries, the standard has been endorsed in Singapore, Brazil, and by the European Commission. The OpenDocument standard therefore represents a move into the territory held by Microsoft. This tendency among large document users is one factor that has helped Microsoft to change its policy of not contributing to standards processes. In this important area, Microsoft has taken its technology to a standards consortium, the European Computer Makers Association (ECMA), to roll its XML Reference Schemas into an international standard, which then can be migrated to the recognized ISO system.

This step seems to satisfy the requirement mandated by public legislation that file systems should be the result of an open standards process and should themselves be open. However, observers have questioned the degree to which the ECMA channel represents an open process in the sense called for by the relevant public guidelines. Andrew Updegrove, publisher of Consortiuminfo, laid out the basic concerns in an interview with SearchOpenSource.com, when he said: "At Ecma, the XML Reference Schema working group is tightly constrained by a charter that commands it to produce a specification that is tightly locked on Microsoft Office in its current and upcoming versions." [129]

In late 2005 the confrontation between ODF and Microsoft office applications as referenced in the emerging ECMA work was taken to the US, in Massachusetts home of MIT, Harvard, and the W3C. The confrontation has centred on the procurement by the State of Massachusetts of file software to store and access public records, where the decision was made to adopt ODF for all digital documentation in 2007. The decision to adopt ODF has been highly contentious both inside the state administration and in public debate. It has been accompanied by a stream of headlines, a public resignation, and statements by the governor. What role do the Non-Assertion Covenants play in this setting?

The emergence of two Non-Assertion Covenants

Non-Assertion Covenants have emerged against this background both in conjunction with the ODF and with the XML Reference Schema. The appearance of NACs on both sides has highlighted the question of how 'open' the competing standards are. Sun Microsystems issued its NAC to the OASIS consortium of which it is a member[130]. The NAC spells out Sun's intentions not to charge licensing fees, provided other parties don't enforce theirs for the standard, either for the current version of the ODF or any subsequent version which it is involved in elaborating.

The NAC represents a commitment by Sun to the standards consortium and to potential adopters of Sun's intention. This commitment can be seen to be binding since it carries the weight of Sun's member contract with the consortium.[131] Whatever its legal merits, the role of the NAC is significant in helping to lay the basis for the OpenDocument standard's outward presentation as unequivocally 'royalty-free'. This helps to dispel uncertainty about the licensing status of the standard, which after all involves major players with large patent portfolios, such as IBM, Sun, and Adobe. The signal that the NAC conveys both for this version and upcoming versions reduces the uncertainty of potential adopters on this important point.

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[129] Loftus, Jack.(2006) OASIS gives Microsoft Office another punch with ODF Adoption Committee. 08 Mar 2006 | SearchOpenSource.com. http://searchopensource.techtarget.com/originalContent/0,289142,sid39_gci1171615,00.html

[130] The chairman of OASIS is a Sun employee.

[131] See Andrew Updegrove's interpretation of this in his blog, cited extensively here at: http://www.consortiuminfo.com/newsblog/blog.php?ID=1762

The public declaration also challenges the ECMA standards process, pointing up ingrained uncertainty about how open Microsoft will address licensing of its intellectual property. As a result, Microsoft responded in kind in November 2005 with a Covenant Regarding Office 2003 XML Reference Schemas. This Covenant was published to its website, and reads similarly to the Sun Covenant but with some important differences. These differences, including the fact that it is posted to a website which Microsoft controls and which is of doubtful legal consequence, are pointed out by Updegrove, who is also a lawyer with open support for ODF.[132]

The key aspect of the NAC is the reciprocity clause which is akin to a cease-fire. This is a key feature of open-standards (see discussion below) and, according to Updegrove (op cit.), is commonly called a "defensive suspension" term. It is noted that this term only kicks in where a party requires licenses of the author of the covenant, unless otherwise stated. In the comparison between Microsoft's and Sun's covenants, Updegrove points out a major difference. Microsoft only implies the defensive suspension term where it, or one of its affiliates, is subsequently sued or otherwise required to license. In the Sun case, the defensive revocation right extends to 'any implementation of "Sun has reserved the right, if it wishes, to be a "patent policeman" that could assist any implementer of ODF."[133]

The idea of a 'patent policeman' is an interesting development and raises questions about how the regulation of the IPR question will develop in future.

4.4 Issues and observations

The relationship between intellectual property rights and standardization activities remains tense. The empirical work here and in the cases in section 1 acknowledged the need to find better ways to deal with those IPRs that may be deemed 'essential' to the functioning of a standard. There are some general IPR related challenges. These include concerns about the quality of patents in general, about their applicability in software, about their potential to encumber interfaces, as well as about the way different actors use them. The emergence of Non-Assertion Covenants can be seen against this backdrop. And it can be seen in relation to other initiatives in this area as well, including the IPR policies of individual standards development organizations (SDOs) and to the open standards moment.

One of the concerns of SDOs involves the timely disclosure of essential IPR. Here the successful NAC actually moves a significant step beyond merely getting the holders of 'essential' IPRs to disclose in a timely fashion. Disclosure is a primary step to address the threat that IPR royalties pose to the development of a standard, and it has been addressed both in the courts since at least the early 1980s[134] and since then by standards bodies. It is topical here to recall the practice introduced by ETSI to get IPR holders to commit to a disclosure of any relevant IPRs in an area of a known standardization activity (see Iversen, 2000). The ETSI approach had the advantage over the previous approaches of standards bodies in that it actively encouraged IPR holders to disclose their relevant rights, a list of which ETSI then published in the interest of transparency. Though a step ahead for standards bodies and the way they addressed IPRs, the ETSI approach however could not ensure the accuracy of that list nor could it ensure that the

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[132] See blog, and links including an interview with a Schema proponent, for Updegrove's observations: http://www.consortiuminfo.com/newsblog/blog.php?ID=1762.

[133] http://www.consortiuminfo.com/newsblog/blog.php?ID=1762

[134] See the FTC vs Dell, 1996. the earliest case identified is 1981 in the US. See Iversen, Østersjøen, Thue Lie (2005). …

terms offered by the licensor would in fact fulfil its insistence that they should be 'reasonable and non-discriminatory'. (see recent probe by the Commission).

The NAC is the initiative of one IP holder who unilaterally acknowledges that it has rights which might be viewed as essential for the standard at hand; and it, as a matter of public record, states its intention not to claim royalties for those rights provided reciprocity from other right-holders. Of course this action by a single actor does not mean that all rights will be disclosed by all other rights-holders or that they will follow suit in licensing terms. But it does force the hand of recalcitrant rights-holders and it ideally can set a standard for the way other all rights holders behave for purposes of the given standard. Failing that, playing the NAC card may be advantageous since it would tend to flush out any royalty-bearing rights at a relatively early stage.

IPR policy at standards body

One reason that the ETSI approach is topical here is that the NAC holds an affinity to an approach—the IPR Undertaking—that ETSI was forced to jettison when it elaborated its current IPR policy in 1993-4. That likeness is only superficial, since the form (contractual guidelines established by standards body versus a declaration by a single rights holder), the immediate objective (to create rules for standards body members versus to make known the licensing intentions of that rights holder), the level (multilateral versus unilateral), and the setting (a newly hived-off body whose membership then had little in the way of IPRs versus the position of a single recognized rights holders) are all very different. But there remains an affinity in that the intended outcome of the two is similar: both initiatives aim to dissuade supporters of a standard under normal circumstances from leveraging their rights on the back of the standard and thereby to reduce adoption risks of the standard. This promotes the take-up of the standard.

This general approach to encourage licensing on free and non-discriminatory basis except under special circumstances (in the ETSI case this was the 'crown-jewel' exception; in the NAC, special claims for royalties then would become part of a normal cross-licensing procedure) is also in keeping with the current focus on 'open standards' where there are some direct links as well.

Open standards

Sun Microsystems is here a direct link, being the author of the NAC, a proponent of the standard, as well as a proponent of 'Open Standards'.[135] In line with its long term commitment to interoperability, Sun has increasingly stressed open standards as a way to counteract the drift in the standards ecosystem away from some perceived fundamentals. This drift includes the tendency for standardization to move closer to implementations (as opposed to interfaces), for standards processes to move from earlier ideals of 'due process', for the quality particularly of software patents to be wanting[136] and for patents and other IPRs to be used more opportunistically in standards processes (cf. FTC versus Rambus).

Open Standards is a term with many definitions. In terms of its position statement on "Common Criteria for IT Interoperability"[137], Sun follows Kretchmer's presentation of the ingredients of a standard that might accurately be called 'open'. In particular, Section 7 and 8 of this declaration set out the conditions that required licenses should follow in a so-called open standard. Sun here emphasizes the importance of open standards to, "provide a level of protection against economic and legal uncertainty, as the process by which they are developed is clear about intellectual

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[135] See also Sun case in Part 1.
[136] See Lee Patch's statement before the USPTO, 1994
[137] See http://www.sun.com/software/standards/overview.xml

property rights."[138] What is emphasized here is reciprocity, timely disclosure, uniformity in licensing terms according to an established understanding of 'reasonable royalties' and their terms.

Interviews with Sun (see Part 1, the Sun Case) emphasized that in the software area a defensive approach to 'essential patents' is in most cases the one defensible approach for the standardization environment. Here the rationale for standards should be to find solutions that address collective problems in the best manner and not to leverage standards by maximizing royalty rates on IPRs. Cases such as the 'crown jewel' one, in which IP is central to the business model of the (in particular, small) firm participating in the elaboration of a standard, require that provisions are included to allow the IPR holder to secure reasonable royalties while also allowing the standards committees to look for alternatives that circumvent the technology in question.

The problem emerges when such exceptional cases become the rule. When multiple stakeholders, holding multiple rights, use the standard as a vehicle to cross-license their technologies among themselves, it becomes difficult to distinguish between what rights are really essential to the standard, what fair and non-discriminatory licenses are, and what the cumulative royalty burden will eventually be for all implementers, etc. Patent pools, showcased in the following two cases, represent an approach to manage these sorts of questions. But, there is still a deeper question about what is required to get the best technology into the standard specifications. To keep balance between the interests of the rights holders and the collective rights of the standard as a whole requires clear guidelines about the time disclosure of rights and clarity about the licensing process. A standard that is over-encumbered by a bandwagon of license claims is not likely to be successful among adopters. In Sun's words, "successful Open Standards define a common technology baseline that encourages the industry to compete on innovations, not the basics….Open Standards provide the assurance to both vendors (large and small) and consumers that innovation and value will continue." (ibid; p 2).

4.5 Comparison and analysis of the cases

In the preceding sections, we have looked in detail at a number of product markets, and attempts to deal with IPR issues by introducing patent pools. First, we need to recognise that the appropriateness of any solution or coordination mechanism is strongly related to the exact context. Nevertheless, in this section we attempt to draw more general conclusions regarding the success and appropriateness of patent pools in different situations.

In short, we observe that the studied patent pools in the DVD case are successful, whereas the pool in the mobile telecommunications case is not. This is not to say that the DVD pools are without any problems (as we discussed, some are under fire of allegedly high pricing). Also, this is not to say that the 3G platform pool for mobile telecommunications is without any success: it is there, it operates, but failed to attract the IPR holders that own the lion's share of IPR for the standard in question.

In Table 9, we conclude by summarising a number of key issues concerning the patent pools in this case study, and the most important environmental factors. From our DVD/MPEG technology, treat the two DVD pools as a couple (as they differ not that much in this context), as well as the MPEG-2 pool. As such, we now compare four coordination examples.

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[138] http://www.sun.com/software/standards/overview.xml, p. 2. (2006)

Table 9: Comparison of the studied patent pool and other coordination mechanisms

Case	**DVD/MPEG technology**		**Second- and third generation mobile telecommunications (2G/3G)**	**Open document standards**
IPR coordination initiative	3C DVD patent pool and DVD-6C patent pool[139]	MPEG 2 patent pool (MPEG-LA)	UMTS pool (3Gpatents)	Competing Non Assertion Covenants
Coordination mechanism (subtype)	Patent pool (joint licensing program)	Patent pool (Patent pool with a licensing administrator)	Patent pool (patent platform). Particularity: original ideas was that all licensees and licensors would still get into bilateral license agreements	Non assertion covenants with a 'patent policeman'
Administrator	One of the licensors	Independent licensing agency	Independent licensing agency	Dominant IPR holder
Main drivers for setting up mechanism	Promotion of the standard and the technology	Combination of promotion and reducing transaction cost	Price control, ensuring access	Ensure royalty free licensing. Signal to adopters Response to regulatory concerns
Interests of actors	Single worldwide standard agreed (at least for DVD)	Mixed, though still possible to align	Difficult to align, worldwide/regional issues	Promote the adoption of the standard
Competition	Within standard	Between standards	Between standards, between technologies	Between standards and approaches
Business models issues	Mainly production-driven business models (though this might change)	Mixed. Also issue of licensing base calculation	IPR-driven business models as well as production-driven business models	Market with a dominant player; regulator issues involved
Standardisation mode	Forum/consortia type standardisation, with no pre-agreed IPR procedures in place	(Semi-)formal	Formal bodies, IPR procedures in place	Consortia
Pool initiator	A grouping of the large licensors themselves	Independent licensing agency	Independent body (though initiative is from standardisation scope)	A set of computer and computer program companies
Setting up procedure	Closed start, later allowing other licensors to join	Open call	Open call	Unilateral
Outcome	Two pools for the same standard	For some standards: two competing licensing agencies, together offering a rather comprehensive coverage	Single pool proposal, but limited coverage (no more than approx. 5% of all essential patents)	Two standards with two NACs vying for recognition by regulators and the market. Currently in play
Relation to standardisation	Weak	Weak. Acting only after the standard is all set	Strong. It was from the standardisation sphere that the idea for a pool started	Strong. The standard forms the basis for the NAC
Number of patents	Low (few dozens)	Low to medium (few to several dozens)	Very high (>1000)	High

As indicated, this is an explorative study and on the basis of three cases. Two of these look at patent pooling approaches while the third looks at innovative uses of Non Assertion Covenants to

[139] For this comparison, we only take the pool into account as far as it relates to DVD-essential patents. The patents on other standards, such as the 'dash' and ' plus' standards for recordable CD's are not taken into account

resolve potential conflicts with essential patents. Thus, the cases do not provide the basis to draw rigid conclusions. Nevertheless, the following observations can be drawn particularly from on patent pool cases, as well as the input from interviews:

- The RAND model of licensing shows severe limitations (see Section 2.3). Some recent formal complaints at the European Commission (including that of a number of key 3G players against Qualcomm, see Section 4.2) will be the proof of the pudding; but even if the defendant is found guilty of breaching some competition rule (e.g. discriminating amongst licensees) this still does not solve the many problems.

- The NAC case attempts to circumvent this tangle of issues by using the IPR position of a dominant player to ensure the standard will remain Royalty-Free.

- Patent pools do indeed save on transaction costs, by creating a single point of access. They increase transparency, reduce uncertainty, and lower search costs. They may also lead, as an effect, to lower (total) fees. However, some interviewees stressed that such a price control should not be a goal as such for a pool; as it seriously reduces its chances for success by pushing parties out (see below).

- Patent pools that are established in order to promote a standard or a technology, and that might lead to a substantially larger market, have good chances to succeed. The higher penetration (larger market) may offset the typically lower income per license of pools compared to bilateral licensing. When such a promotion of a technology is the key objective of the parties involved, this trade-off is acceptable and a patent pool makes sense.

- Patent pools whose main driver is price control, not promotion and larger market size, are not very likely to be successful. There will be too many IPR owners who will conclude that joining a pool will not satisfy their expectation for licensing income. In addition, they some control over their IPR, limiting their ability to use it as 'bargaining chips'.

- As for now, the 3Gpatents pool seems to enjoy a very limited success. Many firms have already signed bilateral contracts.[140] Some of the interviewees attributed this failure to the price cap, which kept out many players – by joining the pool, they would not meet their commercial targets for their IPR. As such, this price control had a negative effect on the pools success. Still, it is too early to decide whether the 3G3P pool is successful. For comparison, for some other pools it also took a rather long time to become a success (for instance in the CE market)

- The growing number of 'technology-only' firms (firms with a business model to exploit IPR rather than produce) is a challenge to pools. We have already seen examples in the telecommunications market, but also firms in the CE market expect to see more of such firms in their sector too.

- The third-generation mobile telecommunications case is a special case, in the sense that the total number of essential patents for this single standard is apparently much higher than for any other single compatibility standard, and that there are more different IPR holders than with other standards.[141] This increases potential problems with a too high cumulative license fee. Also,

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[140] Although there apparently there are still many instances where no agreements have been made yet (even tough products have already been sold).

[141] As a comparison: the patent pool for DVB-T (proposed in 1998) covers 12 essential patents (that apparently are all essential patents) and four IPR holders and seems to cover all. (see http://www.eetimes.com/futureofsemis/showArticle.jhtml?articleId=18300379&kc=2511). Many other pools (as discussed in Table 3) have much lower number of IPR holders than in 3G too.

patenting is (even) more strategic than in other areas: many patents seems to be technically very, very close, suggesting that their holder deliberately tries to get multiple patents on what could be considered as one single invention. The unique example of the NAC effectively attempts to cut this Gordian knot.

- Standards bodies do not seem well positioned to get involved in patent pools or in related activities (such as access or price control). They do not have the skills or the competences, and the risk of a conflict of interest (especially given their standardisation tasks) is large. There are several examples of pools whose initiative was closely related to the standardisation process and that failed.[142] Some interviewees stressed that they even should not promote pools: if there is a rational for a pool, the market will establish one itself. But what standard bodies could do, is provide information about the standards and the (known) IPR positions.

-The NAC case is one in which the Standards body and the strategic use of the NAC are strongly aligned. Here the legal bond of the member company to the standards body provides some of the credibility of its commitment not to enforce its IPR. At the same time, the existence of this NAC helps the standards body to bill the standard as 'royalty free'.

- There is a trend of including more and more rather different functionalities in one single device: 'the device formerly known as the mobile phone' now has an electronic agenda, a portable MP3 music player, a photo camera, a web browser and video playing capabilities. Another example is the set top box for digital television, which may cover DVB-T receiver technology, MPEG video coding technology, and MHP[143] or any other type of comparable interactive platform in order select material and interact. Such an accumulation of different technological areas drives up the (relative) costs of IPR even more. One important question is then whether it is reasonable of producers to demand that the fees *for all these technologies* stay below a certain limit.

- There is also a trend of having more than one pool for one single standard. On the one hand, there is a good thing about this. It offers a certain freedom for licensors to choose, and might also be a good solution if the expectations of two groups of IPR holders are too difficult to me met in one single pool (two pools could each have their own way of establishing a bundle fee and their own way of distributing that among the right holders). On the other hand, having more than one pool obviously decreases the benefit of the phenomenon of pooling. It seems undesirable that there are two or more pools for each standard, but in specific cases it may be appropriate.

- Especially in the last two years, litigation of patent pools is rising. Some interviewees comment, however, that that is a natural thing and does not threaten patent pools as such. Like any tool, patent pools must make sure that they develop according to the changing needs, if necessary. And it is inevitable that some companies will want to test the limit of any (licensing) agreement, including patent pools.

- Regulators can, for example through procurement practices, affect the resolution of IPR considerations (as in the NAC case).

- It is not unusual that a pool gets the blame when a standard does not spread. For instance, the MPEG-4 pool was in some ways controversial when it was set up, because it introduced service

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[142] The 3G pool came out of the IPR Working Group, which was closely related to UMTS standardisation activities. The original proposal for an DVB-T pool came from the so-called 'IPR module', that was closely related to the standardisation activities of DVB. The first pool is not very successful, and for the second pool, it was eventually decided to have a pool for DVB-T in MPEG-LA.

[143] MHP: Multimedia Home Platform.

provisioning fees.[144] MPEG-4 took up rather slow, and the pool was blamed for that – but that is a sheer overestimation of the effects of a pool. There are definitely other factors at stake that have influenced the take-up of MPEG-4.

- There is an interesting development of independent licensing administrators that have developed patent pools processes, including open calls and external assessment of essentiality of the patents in the pools. Using a similar pool design for each time, they do not need to go through the business review process over and over again, saving time and costs. Although this process increases the risk of having several pools for a single standard (see above), they do seem to benefit both licensors and licensees and thus also society as a whole. In fact, some pools that were initially reported to be established by one of the licensees (the joint licensing programme model as discussed in Section 2.4) were instead brought to one of these independent license administrators.[145]

5 Conclusions and policy implications

Given the explorative character of these case studies, it is not possible to draw generally applicable conclusions from it. The results however do help to clarify the possible role different approaches to pooling can have, their success factors, and their relation to standards. Moreover the case studies introduces the important question of how such coordination mechanisms might be shaped to improve the interaction between standards and research.

The work here supports the proposition that more attention is necessary on to IPR issues for modern compatibility standards. As IPRs develop into one of the largest single cost factor for many new technologies, and access problems to IPRs may have far-reaching consequences for adoption of standards, the work thus far on this front indicates that one cannot study adoption and implementation of standards without considering the IPR dimension.

This works also suggests that patent pooling mechanisms offer a promising approach to overcome a number of contemporary problems effecting standards adoption. These problems particularly include the sheer number of patents (Shapiro's patent thicket) and the transaction costs that invokes. Pooling mechanism can also increase transparency, lower uncertainty, lower search costs and speed up access. Since some of recent problems are worsening, there may be good reasons to support certain pooling approaches. But this will continue to depend on the individual pooling approach in its individual context.

The use of Non Accession Covenant unilaterally illustrates the fact that new mechanisms are being tried in order to resolve the sorts of problems that can arise when a standard involves the IP of an unknown number of patent holders. That approach attempts to return the relationship between standards and patents to a time when patents were employed defensively. This approach appeals to users in the public sector, and emphasizes the importance of support In this case, the advantages of a standard that is widely adopted outweigh the added prospect of royalty

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[144] See Technolgy and Business (6 March 2002). 'Stop. Pay toll. Download.', available at http://www.salon.com/tech/feature/2002/03/06/mpeg/index.html?x. Another critical article is: MPEG-4 License Fee Under Attack http://www.hive4media.com/news/html/breaking_article.cfm?sec_id=2&article_ID=2757.

[145] For instance the DVB-T pool, see http://www.eetimes.com/futureofsemis/showArticle.jhtml?articleId=18300379&kc=2511.

income. But this is a special case, as are all three cases, and one where the markets structure, the legislative climate, and the type of technology all influence the equation.

In general the case work suggests that patent pools can aid the diffusion of standards. As such, indirectly, they can also improve the interface between standards and research, as the more likely standards are going to be, the higher the incentive to bring research results into them. Also, with the outlook of a pool (and thus better accessibility of the IPR of others), it makes it easier for a firm to bring patent research results into a standard.

However, patent pools do not eliminate all problems. The two patent pool cases indicates that especially the most crucial problem, that of conflicts of interest,[146] is not likely to be addressed successfully by pools. Also the problem of controlling the cumulative license fee is not likely to be solved by establishing pools. Although pools may have the effect of bring down these fees, this is only to the degree that the pools at the same time increase the total market size (by the promoting function of the pool). Pools that are established with the main goal of bring down the cumulative fee (e.g. using price caps) are likely to fail, as long as one may not expect the total market to grow substantially as a result of the creating of the pool. Finally, pools also do not seem suit to cope with the question of unwilling IPR holders, patent ambushing / submarine patenting strategies, patent trolls, etc.

The situation is somewhat different in the Non Assertion Covenant case as presented. Here a major IPR holder in effect seems to take on the role of a 'patent policeman' to make sure that all parties, both those involved in the standards activities and 3rd parties, will not enforce their patents for the purposes of the standard..

On the basis of this limited study we, however, may conclude that the patent pools are not very successful as a coordination mechanism to control cumulative costs (e.g. with t price cap), The pools that seem to be established primary for those reasons, failed.

In Europe, patent pools have not been a matter of much public discussion. In the US they were, and a consensus seems to have developed that, if well designed, the pro-competitive effect of pools outweighs the anti-competitive ones. Although we think that the market will benefit more from an (even more) harmonised international regulatory approach towards pools than from divergent regulatory approaches, more attention to pools is needed.

Patent pools are increasingly attracting attention from economic scholars and policy makers. At the same time, there are many gaps in our knowledge and further study should be made, not least from a standards (or network economy) policy point of view. In particular, it would be extremely valuable to initiate a larger, more in-depth study into the various successful (and not successful) standards pools, involving representatives from both these pools as well as other stakeholders (licensors, licensees, standards bodies).

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[146] Especially those between (1) business models that are dominantly based on market shares vs. business models dominantly based on licensing income and (2) conflicts resulting from stakes in different, competing technologies.

Literature

3G3P (2002), 3G patent platform for third generation mobile communication systems: Definition, function, structure, operation, governance. 28 May 2002, Version 7.2, Approved public version (issue 1 published November 22, 2002)

Andersson, C. & Phillips, M. (2005). Patent Pooling: A multiparty licensing mechanism as a response to a world of ever-increasing number of nestled patents. Master thesis at the Chalmers University (confidential).

Baltes, C. (2000). Patent Pools: An Effective Instrument for the HighTechnology Co-operation? Master thesis at the Lund University, Faculty of Law.

Bekkers, R. & Liotard, I. (1999). 'The tense relation between mobile telecommunications standards and IPR.' In: European intellectual property review, Vol. 21, Issue 3, pp. 110-126.

Bekkers, R., Duysters, G. & Verspagen, B. (2002). 'Intellectual property rights, strategic technology agreements and market structure: The case of GSM.' In: Research Policy Vol. 31 Issue 7, pp. 1141-1161.

Bekkers, R., Verspagen, B. & Smits, J. (2002). 'Intellectual property rights and standardization: The case of GSM.' In: Telecommunications Policy 26 (2002), p. 171-188. Also in: The Standards Edge. Bolin/Sun, San Anselmo (CA).

Bekkers, R. (2001). The development of European mobile telecommunications standards: An assessment of the success of GSM, TETRA, ERMES and UMTS (doctoral dissertation). Eindhoven University of Technology, The Netherlands.

Bekkers, R.N.A. (2001a). Mobile Telecommunications Standards: GSM, UMTS, TETRA and ERMES. Boston, MA: Artech House.

Bekkers, R.N.A. & West, J. (2006). Strategic Patenting in UMTS Standardisation. working paper for the DIME conference, 23-24 March 2006.

Beeney, G.R. (2002). Pro-competitive aspects of intellectual property pools: a proposal for safe harbor provisions (A submission to the United States Department of Justice Antitrust Division and the Federal Trade Commission Joint Hearings on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy).

Blind, K., Bierhals, R., Iversen E., Hossain, K., Rixius, B., Thumm, N. & van Reekum, R. (2002). Study on the Interaction between Standardisation and Intellectual Property Rights, Final Report for DG Research of the European Commission, Karlsruhe..

Blind, K. (2003). Patent Pools – A Solution to Patent Conflicts in Standardisation and an Instrument of Technology Transfer, Proceedings of the 3rd IEEE Conference on Standardisation and Innovation in Information Technology edited by T. Egyedi, K. Krechmer, and K. Jakobs, Delft 2003, pp. 27-35.

Blind, K. & N. Thumm, (2004). Interdependencies between Intellectual Property Protection and Standardisation Strategies, in: Research Policy 33, 2004, pp.. 1583-1598.

Brooks, J. (1975). Telephone: The first hundred years. New York: Harper & Row.

Cargill, C.F. (1989), Information technology standardisation: theory, process, and organisations, Digital Press, Newton, MA.

Computer Business Online (s.a.). "Sun Microsystems - Back to its Best?" http://www.cbronline.com/content/COMP/magazine/Articles/Servers_Mainframes/SunMicrosystems-Backtoits.asp.

Delrahim, M. (Deputy Assistant Attorney General Antitrust Division, U.S. Department of Justice) (2004). US and EU Approaches to the Antitrust Analysis of Intellectual Property Licensing: Observations from the Enforcement Perspective. Presented at American Bar Association, Section of Antitrust Law.

Drinkwater, D. (2004). Patent Pools: A Solution For The Telecommunications Industry. Les Nouvelles : Journal of the Licensing executives society, Vol. 39 (2004), Issue 4, pp. 183-185.

EC (2004), Commission Regulation (EC) No 772/2004 of 27 April 2004 on the application of Article 81(3) of the Treaty to categories of technology transfer agreements.

EC (2004b) Commission Notice, Guidelines on the application of Article 81 of the EC Treaty to technology transfer agreements, (2004/C 101/02)

European Commission (1991), Eleventh Report on Competition Policy.

European Community (2004), COMMISSION REGULATION (EC) No 772/2004 of 27 April 2004 on the application of Article 81(3) of the Treaty to categories of technology transfer agreements.

European Community (2004a), COMMISSION NOTICE Guidelines on the application of Article 81 of the EC Treaty to technology transfer agreements (2004/C 101/02).

European Union (2002). Antitrust clearance for licensing of patents for third generation mobile services. Letter to 3Gpatents, dated 12 November 2002.

Fair Trade Commission (1999). Guidelines for patent and know-how licensing agreements under the antimonopoly act. Japan.

Federal Trade Commission (FTC) (2003). To promote innovation: the proper balance of competition and patent law and policy.

Gartner Symposium (2001). IT expo, 2001. Mastermind Interview: Sun Microsystems' Scott McNealy. http://symposium.gartner.com/story.php.id.1167.s.5.html.

Gauch, S. (2006). '+ vs. - : Impacts and Dynamics of Competing Standards of Recordable DVD-Media'. In Coenen et al (eds), EURAS proceedings of the Workshop on Standardization on 8-9 June, Hamburg. Aachen, Germany: Wissenschaftsverlag Mainz.

Gilbert, R. (2001). Economics, Law, and History of Patent Pools and Cross- Licensing Agreements. Presentation.

Gilbert, R. J. (2002), "Antitrust for Patent Pools: A Century of Policy Evolution", October 2002.

Gilbert, R.J. (2002a) Patent Pools: 100 Years of Law and Economic Solitude. (preliminary draft).

Goldstein, L.M & Kearsey, B.N. [2004?]. Technology Patent Licensing: An International Reference on 21st Century Patent Licensing, Patent Pools and Patent Platforms. S.l.: Aspatore.

Gordon, G.G. (2002). Analyzing IP License Restrictions Under the Antitrust Laws: A General Outline of Issues. (A submission to the United States Department of Justice Antitrust Division and

the Federal Trade Commission Joint Hearings on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy).

Heller, M.A. and Eisenberg, R.S. (1998). Can Patents Deter Innovation? The Anticommons in Biomedical Research. Science, Vol. 280, May 1998.

Hewitt Pate, R. (Assistant Attorney General, Antitrust Division, U.S. Department of Justice) (July 1, 2004). Promoting economic growth through competition and innovation. Address presented at Chinese Academy of Social Sciences, Institute of Law, Beijing, China.

Hewitt Pate, R. (Acting Assistant Attorney General Antitrust Division U.S. Department of Justice). (January 24, 2003). Antitrust and intellectual property. Address before the American Intellectual Property Law Association, 2003 Mid-Winter Institute, Marco Island, Florida.

Hildebrand, F. (2002), GSM and UMTS: the creation of global mobile communication, Chichester: Wiley.

Iversen, E., E. Øversjøen and H. Thue Lie (2004). Standardisation, innovation and IPR. Telektronikk, Issue 2 (2004).

James, C. (2002.) Opening Day Comments for FTC/DOJ Public Hearings on the implications of antitrust and patent law and policy for innovation and other aspects of consumer welfare.

Junghoon, KIM (2004), Technical Standard-Setting, Patent Pooling, and Competition Policy, Institute of Intellectual Property (IIP), Tokyo, Japan.

Iversen, E.J. (1996). Standardization and intellectual property rights: Conflicts between innovation and diffusion in new telecommunications systems. Paper presented at the ETIC (Economics of Technology and Industrial Change) workshop, May 1996 in Maastricht, Netherlands.

Iversen, E. (1999a). Standardisation and intellectual property rights: Conflicts between innovation and diffusion in new telecommunications systems. In K. Jakobs (Ed.), Information technology standards and standardization: A global perspective (pp. 80-101). Hershey, PA [etc.]: Idea Group.

Iversen, E.J. (1999b). Standardization and Intellectual Property Rights: ETSI's controversial search for new IPR-procedures. Paper presented at the 1st IEEE conference on standardisation and innovation in information technology, Aachen (Germany), 15 17 September 1999.

Kelly, C.J. (2002). Patent Pools and Antitrust Enforcement 1997-2001, available at http://www.ftc.gov/opp/intellect/020417christopherjkelly.pdf.

Kim, Sung-Hwan (2004). Vertical Structure and Patent Pools. Review of industrial organisation, Vol. 25, Issue 3.

Kitch, E.W. (2003). Comment on the Tragedy of the Anticommons in Biomedical Research. Advances in genetics, vol. 50 (2003), pp 271-274.

Kulbaski, J.J. (2002). Comments On Patent Pools and Standards For Federal Trade Commission Hearings Regarding Competition & Intellectual Property. (A submission to the United States Department of Justice Antitrust Division and the Federal Trade Commission Joint Hearings on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy).

Lerner, J. & Tirole, J. (2004). Efficient Patent Pools. The American economic review, Vol. 94 (2004), Issue 3, pp. 691-711.

Lerner, J. (2002). Patent Pools: Some Policy Considerations (presentation) (A submission to the United States Department of Justice Antitrust Division and the Federal Trade Commission Joint Hearings on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy).

Lerner, J., Strojwas, M. & Tirole, J. (2003). The Structure and Performance of Patent Pools: Empirical Evidence. Working paper Harvard University/NBER/ University of Toulouse/Massachusetts Institute of Technology.

Lerner, J., Strojwas, M. & Tirole, J. (2004). The Design of Patent Pools: The Determinants of Licensing Rules. (National Bureau of Economic Research Working Paper No. 9680).

Lerner, Josh et al (2003). Cooperative marketing agreements between competitors: evidence from patent pools. Cambridge, MA: National Bureau of Economic Research.

Lin, Daniel (2002). Research versus development: Patent pooling, innovation and standardisation in the software industry. 1 J. Marshall Rev. Intell. Prpo. L. 274.

Lind, R. et al. (Charles River Associates). (2003). Report on Multiparty Licensing. Commissioned by the European Commission. ('Magellan report').

Loftus, J. (2006) OASIS gives Microsoft Office another punch with ODF Adoption Committee. 08 Mar 2006, SearchOpenSource.com. http://searchopensource.techtarget.com/originalContent/0,289142,sid39_gci1171615,00.html.

Merges, R.P. (1999). Institutions For Intellectual Property Transactions: The Case for Patent Pools.

Noam, E. (1992). Telecommunications in Europe. Oxford University Press.

Patch, L. (1994) Sun-Software Patent Testimony. Hearing on Use of the Patent System to Protect Software Related Inventions. 26 January 1994 (transcript). Http://lpf.ai.mit.edu/patents/testimony/statements/sun.testimony.html.

Shapiro, C. (2001). Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting. Forthcoming Innovation Policy and the Economy, Volume I, Adam Jaffe, Joshua, Lerner, and Scott Stern, eds., MIT Press, 2001.

Sun (S.A.) Open Standards at Sun. Letter from Greg Papadopoulos, Senior Vice President and Chief Technology Officer on Value of Open Standards. http://www.sun.com/software/standards/overview.xml.

Sun Microsystems. (2005) Annual report. http://www.shareholder.com/visitors/dynamicdoc/document.cfm?documentid=1014&companyid=SUNW.

Taylor, J., (2000), *DVD Demystified* (second edition), McGraw-Hill Professional

Temple Lang, J. (1995). Defining legitimate competition: Companies' duties to supply competitors, and access to essential facilities. In B. Hawk (Ed.), *Annual proceedings of the Fordham corporate law institute: International antitrust law & policy* (pp. 245-313). New York: Juris Publishing.

UMTS IPR Working Group. (September 1998). *Third generation mobile communications: The way forward for IPR*. [s.l.]: Author.

UMTS IPR Working Group. (January 1999). *Third generation mobile communications: The way forward for IPR. Industry reflection period report of the UMTS IPR working group.* [s.l.]: Author.

U.S. Department of Justice and the Federal Trade Commission (1995). Antitrust Guidelines for the Licensing of Intellectual Property

USPTO (2000). Patent pools: A solution to the problem of access in biotechnology patents?

USPTO (2001). White Paper on Patent Pooling.

Verhoest, P., Vercruysse, J.P. & Punte, Y. (1991). *Telecommunicatie en beleid in België* [Telecommunications and regulations in Belgium]. Amsterdam: Otto Cramwinckel.