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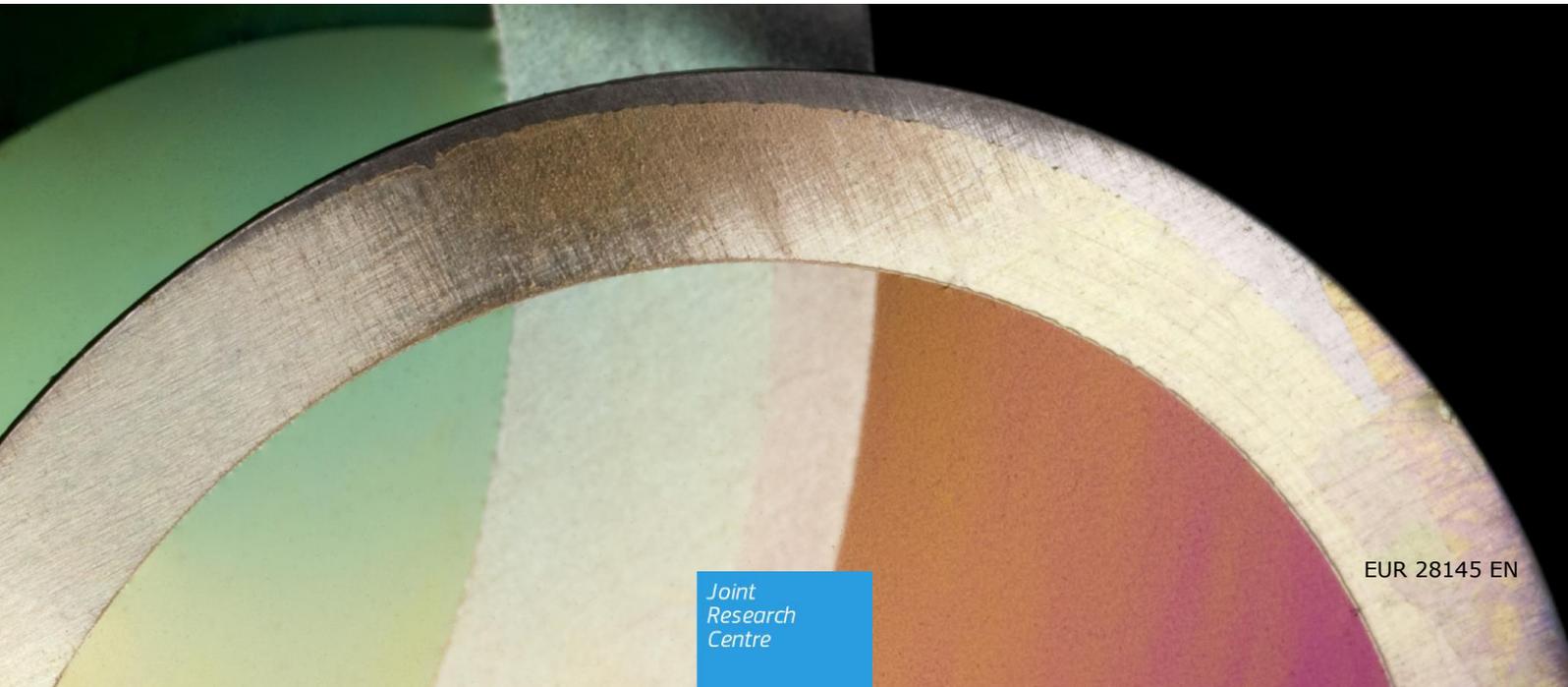
Patent Assertion Entities in Europe

*Their impact on innovation
and knowledge transfer in
ICT markets*

Europe Economics

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Title

Patent Assertion Entities in Europe

Abstract

Patent assertion has become a common practice in shaping the balance between technology creation and technology dissemination in the Information and Communication Industry (ICT). The importance of this practice for the functioning of ICT markets has given rise to new entities that enforce patents but do not utilise the patented technology, commonly referred to as patent assertion entities (PAEs). This study provides an overview of patent assertion practices and of PAEs in Europe, taking into consideration their impact on innovation and technology transfer in European ICT markets.

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Abstract

Patent assertion has become a common practice in shaping the balance between technology creation and technology dissemination in the Information and Communication Industry (ICT). The importance of this practice for the functioning of ICT markets has given rise to new entities that enforce patents but do not utilise the patented technology, commonly referred to as patent assertion entities (PAEs). Overall, views on the role of PAEs in ICT markets and their impact on innovation and knowledge transfer in ICT are polarized.

On the one hand, patent assertion may foster innovation by providing innovators with effective patent monetisation options and by increasing the liquidity of patent markets. On the other hand, additional litigation, the threat of litigation and arbitration efforts may impose additional cost on the innovation ecosystem and obstruct innovative initiatives.

This study provides an overview of patent assertion practices and of PAEs in Europe, taking into consideration their impact on innovation and technology transfer in European ICT markets. Currently, little research on PAEs in Europe is available, in sharp contrast to the wealth of analysis that has been conducted in the United States. This study aims to fill this gap by investigating the specific features of patent assertion in Europe.

Preface

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

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

EURIPIDIS aims to:

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

Within EURIPIDIS, the present report concentrates on points 1 and 3 above. The report offers:

1. a description of the different business practices of a newly emerged type of actor (i.e. patent assertion entities-PAEs) within the European ICT sphere
2. an assessment of how PAEs affect innovation performance and technology transfer in ICT in Europe.
3. a set of policy conclusions (at national or EU levels) related to how innovation in ICT in Europe can be enhanced.

Acknowledgements

This report has been developed in close collaboration with Patent Assertion Entities (PAEs), companies affected by PAEs, companies that are clients of PAEs, and experts in the field. Most of the insights and the added value we provide derive from the fruitful exchange with the stakeholders involved. The authors and editors would like to express special thanks to Roberto Dini, Sir Robin Jacob, Thomas Kramler, Ruud Peters and Heinz Polsterer for their very helpful suggestions and contributions in the process of drafting this report.

Executive summary

Objectives of this study

Patent assertion has become a common practice in shaping the balance between technology creation and technology dissemination in the Information and Communication Technology Industry (ICT). The importance of this practice for the functioning of ICT markets has given rise to new entities that enforce patents but do not utilise the patented technology, commonly referred to as patent assertion entities (PAEs). Overall, views on the role of PAEs in ICT markets and their impact on innovation and knowledge transfer in ICT are polarized.

On the one hand, patent assertion may foster innovation by providing innovators with effective patent monetisation options and by increasing the liquidity of patent markets. On the other hand, additional litigation, the threat of litigation and arbitration efforts may impose additional cost on the innovation ecosystem and obstruct innovative initiatives.

This study provides an overview of patent assertion practices and of PAEs in Europe, taking into consideration their impact on innovation and technology transfer in European ICT markets. Currently, little research on PAEs in Europe is available, in sharp contrast to the wealth of analysis that has been conducted in the United States. This study aims to fill this gap by pointing at the specific features of patent assertion in Europe.

Methodology

We began this study with a literature review to understand PAE dynamics, gather Europe-specific information, and to compare them with US evidence. We also conducted five high-level interviews with a selected group of academic and industry experts in the European IP field, followed by twelve detailed interviews with representatives from PAEs, companies that have been approached by PAEs and companies that have used the services of PAEs. This information has been used to create case studies.

We are aware of the limitations of the study's methodology. PAEs, wary of the negative publicity that their operations attract, have an incentive to present information in a more positive light by highlighting positive aspects of their behaviour while concealing other less acceptable aspects. On the other hand, critics of PAEs have similar incentives to concentrate on the more negative aspects of their operations and to downplay any positive impacts they may have. By listening to both sides, we have tried to mitigate the risk of coming up with extreme views. We will not be able to provide statistically reliable evidence based on our analysis. However, we are confident that the way we selected our interviewees and case studies has allowed us to provide a fairly comprehensive picture of patent assertion activities in the European ICT market.

Patent Assertion Entities business models

There is a lack of consensus on how to define PAEs and describe their business models. The term PAE has been used to describe a wide range of entities and the boundaries between different PAE business models are not clear:

- PAE business models are fast evolving.
- PAEs adhering to a specific business model can occasionally, and depending on the situation, adopt a different assertion strategy. For instance, there are entities that can be involved in assertion and also pool licensing activities.
- The boundary between strategic assertion, traditionally adopted by practicing firms, and assertion activities carried out by PAEs is blurry.

Notwithstanding the above, we have observed some recurring patterns across PAEs' business models in Europe:

- Sources of funding: PAEs receive funds from hedge funds, venture capital firms, banks, universities and research institutes, governments, and private or publicly listed companies. The source of funding seems to influence the business model and the assertion strategy. For example, PAEs funded by hedge funds and venture capital firms tend to rely more on litigation to monetise their patents.
- Extent and nature of R&D investments: if PAEs conduct any R&D, these R&D activities are likely to be aimed at increasing the litigation and monetisation value of patents (e.g. developing a good prosecution practice, or making effective use of continuation and divisional applications) rather than enhancing their technological applicability.
- Revenue-generating strategies: licensing fees collected from alleged infringers represent the primary source of revenue for PAEs. Even though the specific strategy used by a PAE in its interactions with targeted firms is heterogeneous and evolving, we have identified the following common features:
 - Assertion claims tend to refer to alleged infringements of standards. Infringement of Standard Essential Patents (SEPs) can be demonstrated by referring to the standard specification, which is far less complicated than demonstrating infringement by reverse engineering a product or doing extensive tests on products. The latter would imply significant costs, which would not be in line with the business model of most PAEs.
 - Assertions are primarily targeted at the more vulnerable (and often lower) segment of the supply chain, e.g. Telecoms operators.
 - The majority of assertions in Europe have been initiated in Germany. This can be explained by the large size of the German market, the quality of the judges, the costs of litigation, the comparative availability of injunctions and by PAEs' deliberate attempts to exploit the inherent bifurcated legal system.
 - Findings from the literature claim that litigated patents are generally of relatively low quality. However, views across stakeholders concerning the quality of patents asserted by PAEs are polarised. Data that would allow us to test the validity of these claims is lacking (i.e. from tests on whether – ceteris paribus – PAEs tend to assert lower quality patents than practicing firms, and whether this claim can be made for all patents asserted by PAEs and not solely those reaching litigation).
 - With these caveats in mind, evidence from our interviews suggests that, when challenged in European courts, many of the patents asserted by PAEs are invalidated. However, stakeholders have suggested that PAEs have also asserted high quality patents in Europe. Further research in this area would be beneficial, particularly in making comparisons between PAEs and non-PAEs, assertions in different sectors and even across different types of PAEs.

In addition to the PAEs described above, there are others that engage in several ancillary activities that complement patent assertion. Even though the specific business models of these latter PAEs can vary greatly, they share a number of distinct features:

- They are more likely to have established some form of cooperation with universities, research organisations, and some are even funded by the State.
- They provide IP consulting services to third parties and engage in research activities which aim to exploit the full potential of existing technologies.
- They tend to conduct very strong prior art research and stringent validity tests.

We do not have sufficient evidence to determine whether these ancillary types of activities constitute a substantial part of PAEs' business models as a revenue generating

stream or whether they are undertaken merely as a form of Public Relations to improve the acceptance of PAEs.

Origin of asserted patents.

The majority of patents asserted in Europe originated from large practicing firms operating in the Telecoms sector. This was largely due to a number of European handset manufacturers having failed in the market. Changing market dynamics in the mid-2000s resulted in the entry of new non-European players into the handset market and the rapid erosion of market shares (and subsequent market exit) of some of the established players. The original manufacturers had portfolios of patents, which, after failing in their original business lines, they sought to monetise by, for example, selling them to PAEs. Lack of transparency with regards to both the ownership status and the precise origin of these patents has become an issue because:

- PAEs are affiliated with practicing entities, yet these links are difficult to identify.
- True owners are not easily identifiable during the discovery process due to the practice of establishing shell PAE companies in different jurisdictions.

There are various motives behind PAEs' patents being primarily sourced from large practicing firms:

- Reputational costs. Some practicing firms may wish to maximise the monetisation potential of their IP assets without the reputational costs associated with being perceived as litigious.
- Actions for strategic purposes, such as patent assertion against competitors, can be concealed via the establishment of shell companies ("patent privateers").

Notwithstanding the above case, it must be recognized that PAE assertions in Europe involve — though to a much lesser extent — patents owned by SMEs and universities. However, in these situations the original patent owners tend to retain full ownership rights of their assets. Moreover, patent portfolios may be managed by PAEs in a non-exclusive way so as to allow the original patent owner to seek alternative means of monetisation. The inability of European SMEs and universities to challenge infringements and the opportunistic behaviour of large firms has been mentioned as a major reason why SMEs and universities seek the services of PAEs, which possess significant IP monetisation expertise.

Telecoms: the most affected sector.

In Europe, patents in the fields of computer and telecommunication technologies attract most PAE activity. The following reasons have been identified:

- There are many patents in this field, which is comprised of complex technologies and combinatory innovations.
- European firms have played a key role in the development of Telecoms standards in the past and a large number of European patents were granted in this field.
- European firms operating in the Telecoms sector that used the technology and are no longer able to compete in the product market may be incentivised to rely on PAEs in order to secure an alternative source of revenue. Some of the patents monetised were Standard Essential Patents (SEPs).
- Large portions of the Telecoms portfolios that have been passed to PAEs comprise SEPs which can be asserted against a wide range of products.
- Telecoms patents, especially SEPs, are more likely to be used — and therefore infringed — by many, usually large, firms. As standards related to Telecoms are used in high-volume markets (e.g. the handsets market), the associated SEPs are attractive assets for licencing purposes.

As regards the specific Telecoms technologies involved, assertion claims have been focused on standards for core radio technology. More recently, however, a wider range of technological areas has been targeted: software, services, core network, and handsets. This shift in the areas targeted is also due to increasing interoperability in ICT sectors, resulting in patents that were originally intended to cover a specific technological field ultimately being applied to a broader technological spectrum. The automotive and the white goods sectors are particularly likely to see increased PAE activity in the future as a result of the increased scope for electronic communications within and between cars or appliances that recent technological developments have enabled (e.g. the Internet of things).

Telecom operators appear to be the favourite target in the supply chain for a number of reasons:

- Convenience — bringing an action against a Telecom operator as the distributor of infringing products is more feasible than targeting multiple manufacturers.
- Increased bargaining power — suing the Telecom operator because it practices patented technology. The high risk to which operators are exposed in cases of injunction places PAEs in an advantageous bargaining position. In the context of SEPs in Europe, however, it must be said that under FRAND terms one cannot obtain an injunction for SEPs unless the alleged infringer is unwilling to take out a license.
- Increased uncertainty — when facing assertion claims, operators must contact their supplier to evaluate the merits of the claims, who may not be in a position to provide an accurate assessment. In most cases, the manufacturer is in a better position to assess the claims, because they provide the technologies used.

The impact of PAEs' activity on ICT innovation and technology transfer in Europe

Patent quality is the most decisive factor in the potential impact of patent assertion.

Asserting low quality patents may have negative welfare implications:

- Licensing based on low quality patents encourages rent seeking behaviour.
- Since invalidation procedures are costly, only a few firms (mainly large ones) are likely to have the financial resources and expertise to counter assertions.
- Companies must reserve funds either to litigate or to settle and, therefore, PAE assertions are reducing resources that could be used for R&D.

Asserting high quality patents can have positive welfare implications.

- Patent assertion has a positive impact insofar as it helps address opportunistic infringement behaviours and rebalances bargaining power asymmetries.
- Patent assertion facilitates the enforcement side of the patent system on which both innovation incentive and the technology transfer effects are based.

Low patent quality is the source of the detrimental effects of patent assertion mentioned above. The European Patent System has a long standing tradition of comparatively high quality patents. This is one reason why excessive large-scale aggregation of questionable patents has not been observed in Europe so far. Assuming that the quality of European patents will stay high or might even increase under the new unitary patent regime, there is less risk that excessive patent aggregation will happen in Europe in the future.

At present, European SMEs have not been PAEs' main targets. The extent to which using the services of PAEs constitutes a beneficial option for SMEs is unclear given the lack of data over the fees charged for enforcement services. For example, it may be that the high fees charged by PAEs leave SMEs with only modest proceeds. There may be an indirect cost associated as the legal uncertainty introduced into the patenting system by the presence of PAEs may impede SMEs' attempts to raise funding at the early stages of technology development.

In order to assess the overall benefits of patent assertion, it is important to remember that most PAE assertions concern technologies that have been commercialised already. The fact that the technology has been commercialised raises the number of potential infringers, thus increasing the litigation value of the patents asserted. In this respect, the activities of PAEs are not likely to benefit technology transfer where it is most needed, i.e. with un-commercialised patented technologies from SMEs and Universities.

Differences between the US and Europe

Traditionally, the US market has been considered a more attractive environment for PAE activity than the European one due to a range of factors, namely:

- The US legal system, which incentivises a "sue-first, negotiate later" strategy, thus preventing the alleged infringer from filing an invalidity claim in a court of choice.
- The European Patent System has a long-standing tradition of patents of comparatively higher quality. Patent granting procedures in Europe are perceived as stricter than those in the US, which decreases legal uncertainties about patent validity.
- Litigation costs and availability of funds are significantly higher in the US than they are in Europe.
- Jurisdictional fragmentation and market size — the legal fragmentation of patent protection under the existing European patent system disincentivises PAEs from carrying out assertion activity on a pan-European scale.
- Size of jury awards and the possibility of forum shopping — jury awards granted by US courts tend to be on average larger than those granted in Europe. Moreover, some US federal courts have been known to adopt a particularly IP owner-friendly stance.
- Injunctions in Europe, typically with SEPs under a FRAND regime, are limited to cases of a allegedly-unwilling infringer (Huawei vs ZTE).

The factors listed above provide a rationale for why the US patent system has traditionally been more conducive for PAEs than the European one. However, recent developments in the US and the imminent introduction of the Unitary Patent (UP) and Unified Patent Court (UPC) in Europe have both been described as game-changing events that could increase assertion activity in Europe over the coming years. More specifically:

- The America Invents Act made it more difficult for PAEs to sue multiple alleged infringers together, a common PAE approach.
- A number of recent US court decisions have set legal precedents that are likely to limit the activities of PAEs.
- US states have attempted to use consumer protection rules to address misleading activities by PAEs.
- The Unified Patent Court will make it possible to take out injunctions with unitary effect for a European market which might attract more assertion activity in Europe.

- There is a risk that, once the UPC has been established, PAEs may engage in forum shopping and select the most favourable national or regional division.

Notwithstanding the above, a number of factors will probably limit the possibility of large-scale PAE activity in Europe in the near future. More specifically:

- The possibility of patent invalidation with unitary effect is likely to deter assertion attempts in Europe. The effectiveness of this is likely to be amplified by the strictness of validity criteria in Europe, and the presence of a “loser pays system”.
- Injunction hearings and the separation between injunction and validity procedures will be considered on a case-by-case basis by qualified professional judges, who will bear in mind the principle of balance and proportion.
- Forum-shopping does occur in Europe as well. However, it is likely to be generally restrained by the composition of the UPC’s regional/local courts and the special training received by the judges. The presence of a central court of appeal and the implementation of uniform standards will also ensure consistency in judgements. In addition, the UPC includes rules under which legal cases may have to move to the central division.

Conclusions

The main areas of policy concern are: the assertion of low quality patents; increasing legal uncertainty; and potentially excessive royalty fees.

A direct way to limit large-scale assertion of low quality patents is to ensure that the standards maintained in patent granting procedures are also of the highest quality. This could be achieved in the following ways:

- by continuously promoting effective ways of conducting prior art search that fully utilises technological advancements. Prior art searches by the EPO are already considered of higher quality than those conducted by other patent offices around the world and the EPO considers that continuously improving quality of search and examination is an ongoing priority.
- by using patent fees as a market-based mechanism which acts as a screening device to “raise the quality bar”.

Policy could also be directed towards minimising legal uncertainty. Minimising uncertainty would allow companies to improve their information sets and, by extension, commit to decisions that better reflect market dynamics. At the same time, the behaviour of some PAEs that exploit this exact type of uncertainty would be reduced by:

- increasing patent ownership transparency;
- ensuring that the UPC courts strive for the highest quality, supported by highly technical, specialised judges who have substantial experience in the subject matter; and
- Increasing the clarity of FRAND licensing commitment for SEPs.

The institutional and legal framework in Europe has not allowed the more negative consequences associated with PAEs to materialise to the same extent that it has, according to some economic literature, in the US. Moreover, some of the negative consequences that we have identified are currently hypothetical and are based on stakeholder evidence which could be susceptible to bias.

It is expected that significant changes will take place over the coming years in the European patent system, which could fundamentally alter the dynamics of the market. The introduction of the Unitary Patent and the Unified Patent Court, as well as the

ongoing debate on FRAND licencing and any subsequent changes, are going to have significant impact on PAEs.

Further research could improve our understanding of the issues of materiality. More specifically, it would be useful to conduct a quantitative empirical analysis to test whether, all else being equal, PAEs tend to assert lower or higher quality patents than practicing entities, or if there are particular types of PAEs that focus on asserting lower or higher quality patents. Moreover, a comparison is required of companies that enforce their patents with the help of PAEs with those that that engage in independent enforcement.

1. Introduction

The ICT sector represents 4.3% of the European economy comprising 16.6% of aggregate business expenditure on research and development (R&D), while ICT investment accounts for around half of the European growth in productivity¹. Moreover, the strong influence of ICT on innovation is reflected by the relative share of ICT-related patents in comparison to the aggregate number of patents. In the period from 2009 to 2011, ICT-related patents comprised more than one third of worldwide patents filed within the Patent Cooperation Treaty framework.

Patents are key to innovation as they serve a dual role. On the one hand, patents grant exclusivity for a specified time period to inventors who can demonstrate that they have created something novel. In doing so, they provide a strong monetary incentive to innovate. On the other hand, patents benefit innovation and subsequent innovators by disseminating technical information.

Therefore, in order to reap the full benefits of the patent system there is the necessity of striking the right balance between rewarding innovators for their inventions whilst ensuring that those interested in implementing and using patented technologies can do so at a reasonable cost. Such a balance is crucial in the ICT sector where the high R&D intensity in technologies for standards that provide interoperability may lead to 'patent thickets'² and a large and increasing number of patents that are Standard Essential Patents (SEPs)³ – i.e. patents that are deemed essential to produce products that adhere to a given standard.

By determining whether and which market participants have to pay licensing fees in order to practice a patented technology and by setting out the fee levels that need to be paid, patent assertion practices in ICT play a key role in shaping the aforementioned balance between inventors and technology dissemination. The relevance of patent assertion to the functioning of ICT markets is further emphasized by the emergence of new entities that enforce patents but do not utilise them, commonly referred to as patent assertion entities (PAEs).

On the one hand, PAEs can foster innovation by providing innovators with effective patent monetisation options and by increasing the liquidity of the patent market. On the other hand, additional litigation and practices such as forcing potential infringers to take a license under threat of litigation might impose an undesired additional cost on the innovation system.

The main objectives of the current study are:

- Providing a description of the different assertion strategies used by PAEs operating in Europe.
- Assessing how PAEs affect innovation and technology transfer in ICT in Europe.
- Drawing policy implications (at national or EU levels) of how innovation in ICT in Europe can be enhanced.

These objectives are motivated by the current lack of analysis for Europe which is in sharp contrast to the wealth of analysis that has been conducted for the United States. This study aims to fill this gap and to clarify the difficulties involved in analysing this issue from a European perspective.

¹ See PREDICT database: <https://ec.europa.eu/jrc/en/predict/2016/data> and <https://ec.europa.eu/programmes/horizon2020/en/area/ict-research-innovation>.

² The term used to describe a dense web of overlapping intellectual property rights, see e.g. European Patent Office, Workshop on Patent Thickets, (2012).

³ See Bourreau, M., Meniere, Y. and Pohlmann, T. (2015) "The market for standard essential patents" Paris School of Economics Working Paper.

The remainder of the report is organized as follows:

- Chapter 2 describes the methodology used in this study.
- Chapter 3 defines PAEs based on literary evidence and presents indicative typologies.
- Chapter 4, 5, 6, and 7 presents our analysis.
- Chapter 8 amalgamates our key findings
- The Appendices include:
 - The bibliography used for the study.
 - The questionnaires that were communicated to our interviewed stakeholders.
 - The summary notes of the interviews conducted.
 - An indicative analysis of the business models of several PAEs operating in Europe
 - A discussion of the relationship between PAEs and the secondary market for patents.
 - A general description of the patenting landscape in ICT and its evolution over time.

2. Methodology

The research methodology we have used combined a literature review, desk-based research and primary research in the form of interviews which were used as the source for several case studies. The purpose of the literature review was to shed light on the current thinking behind PAE activity and the dynamics that have led to such entities being less active in Europe compared to the US. Moreover, this section aimed to gather the limited Europe-specific information that is currently available in order to facilitate this comparison.

The review thus focuses on the following aspects:

- determination of what are PAEs;
- identification of the role of patents and innovation in ICT markets;
- the potential impacts of PAEs' activities on ICT patenting costs;
- the economic incentives implied by PAE activity in the ICT domain; and
- cross-country differences that might affect PAE activity.

The literature review was complemented by an analysis of PAEs' business models based on publically available information. The aim of the business model analysis was to provide a mapping of the PAE landscape in Europe; however, recognising that a substantial amount of information is not in the public domain and that often the information presented publicly can be guided by considerable biases⁴ we have mainly used this information to complement our case study analysis (see below).

We also conducted primary research in the form of stakeholder interviews; at the early stages of the research we conducted five high level interviews with experts and, in the more advanced stages of the project, we conducted twelve detailed interviews that were used as case studies. The sample has been carefully selected to ensure representativeness across the spectrum of stakeholders, i.e. experts, entities affected by PAEs, clients of PAEs and PAEs.

As we did not have jurisdiction to request information we relied on the voluntary participation of stakeholders and as many stakeholders required anonymity, we have opted for a fully anonymized presentation. Moreover, we have maintained confidentiality when required and this has helped motivate participation and enhance our understanding of the subject matter. Given these conditions, we presented interviewees with a homogenous structured interview template that served as the basis for our discussion. This was based on the following thematic areas:

- A description of PAE business models.
- Information on the patent portfolio.
- The overall assertion strategy.
- Potential future developments.
- Impact on innovation and technology transfer.

The information collected from this process was included in our analysis through the exploration of the most significant aspects explored covered the interviews; the content of the interviews has been agreed and finalized with the interviewees and is presented in the appendices. Below is a list of topics covered in the case studies:

- source of funding;
- characteristics of the patent portfolios;

⁴ Due to the controversial nature of the PAE business model, publicly available information describing the activities of such entities is likely not to be objective.

- engagement in research and development (R&D) activity;
- the origin of patents asserted;
- patent assertion strategy; and
- the revenue structure.

In total, five interviews involving experts in the European IP field were conducted:

- [Expert interview 1](#) — Head of Standardisation and IPR Management in EU-based international telecommunications company.
- [Expert Interview 2](#) — IP Consultant.
- [Expert Interview 3](#) — Former senior patent judge.
- [Expert Interview 4](#) — Former CEO of Intellectual Property & Standards division of EU-based technology company.
- [Expert Interview 5](#) — Competition expert.

Additionally, twelve interviews with companies and associations were conducted. These involved the following entities:

- [Case Study 1](#) — EU-based patent licensing company.
- [Case Study 2](#) — US-based patent licensing company.
- [Case Study 3](#) — EU-based patent licensing and monetisation company.
- [Case Study 4](#) — EU-based IPR management and promotion company.
- [Case Study 5](#) — Government space agency.
- [Case Study 6](#) — EU-based international technology company.
- [Case Study 7](#) — France-based software development company.
- [Case Study 8](#) — Trade association.
- [Case Study 9](#) — US-based international patent brokerage company.
- [Case Study 10](#) — EU-based international telecommunications company.
- [Case Study 11](#) — EU-based data networking and telecommunications equipment company.
- [Case Study 12](#) — German semiconductor manufacturer.
- [Case Study 13](#) — US-based commercial research and engineering organization.

The findings from the above research tasks were synthesised in a comprehensive manner and have been presented in a format that highlights the key thematic areas in which meaningful conclusions have been drawn. For each thematic area the evidence used to draw the relevant conclusions is presented, highlighting whether it has sourced from the literature review, the desk research or the primary research.

3. What are PAEs?

As companies continue to explore new ways to make their innovation processes more open, patents are perceived as one catalyst that enables knowledge to be shared (EPO, 2007). In the era of open innovation patents serve as legal instruments that enable firms to trade technologies (Scotchmer, 2006; Arora and Gambardella, 2010b). From the perspective of a company that tries to include external ideas and technologies in its business, it must carefully examine whether their use may infringe on the legal rights of other companies. This is due to the fact that most external ideas and technologies are generally protected by patent rights.

As a result, in recent years patent management has received growing attention, leading to the transformation of the use of patents from a primarily defensive and internal application⁵ to an active part of companies' strategies (Ruther, 2013).⁶

In the following section we present an overview the attempts made by previous research to provide a definition of a PAE.

Despite a common understanding and a wide use of the term, the literature does not provide a consensus on how PAEs should be defined. PAEs were negatively referred as "patent extortionists."⁷ By the late 1990s and early 2000s, terms such as patent trolls (Mc Donough, 2007), patent sharks (Reitzig et al., 2007) or more neutral terms such as patent elves (Geradin et al., 2008) and, eventually, PAEs emerged to describe entities whose business model revolve around patent exploitation.

The term "patent troll" was first used in the late 1990's by Peter Detkin — former assistant general counsel for Intel — who defined "a patent troll [as] somebody who tries to make a lot of money off a patent that they are not practicing and have no intention of practicing and in most cases never practiced".⁸ Subsequently, several authors have attempted to define and describe the business models of patent trolls in some detail.

Overall, evidence suggests that firms qualifying to be characterised as PAEs consist of:

- Non-practicing firms that solely acquire patents.
- Non-practicing firms that acquire patents but also develop them through R&D.
- Patent aggregators that may or may not develop patents by conducting R&D.
- Practicing firms that either acquire patents from third-parties or develop them by conducting R&D.
- Shell companies established by practicing firms to assert their patent rights.

The term 'non-practicing entities (NPEs)' is broad. It applies to any entity that owns patents (either through acquisition, in-house development, or both) but does not practice them (Schwartz and Kesan, 2014). NPE and PAEs are often confused because most studies identify PAEs as NPEs.

Instead, the term PAE characterises an "obtain and assert" business model with the purpose of generating revenues through licensing fees, royalties and damage

⁵ Such internal applications may include using patents to secure market shares by preventing competitors from entering the market.

⁶ Such activities may include licensing, sales of patents, enforcing patents against infringers or the use of patents for external sources of financing.

⁷ Sandburg, B. (2001) "Trolling for dollars", The Recorder available at <http://www.therecorder.com/id=900005527214/Trolling-for-Dollars>.

⁸ Pearlstein S. (2005) "Big firms caught with their patents down" Washington post available at http://www.washingtonpost.com/wp-dyn/content/article/2005/12/01/AR2005120101509.html?nav=rss_technology.

compensations (Galiakhmetvov et al. 2014). In some studies, the process of obtaining patents may result from acquisition or in-house R&D; hence, because this overlap, the two terms have been used in interchangeable ways.

Some scholars have attempted to distinguish the two. For example, Love et al. (2015) define an NPE as any entity that does not sell a technology product. NPEs include parties like universities which, although non-practicing, do not fit the traditional conception of a PAE. They define PAEs as independent companies that are exclusively in the business of enforcing patent rights—i.e., only those NPEs that assert patents acquired from third parties or assigned by third parties for monetisation purposes.

In addition, practicing firms with large patent portfolios, formulated either through R&D or acquisitions, may also be characterised as entities who engage in patent assertion based on defensive, financial or strategic objectives. Golden (2013) illustrates that practicing firms may also indirectly assert their patents by establishing PAEs as shell companies with the purpose of monetising their patent portfolios (i.e. "patent-privateering"). There are several competing explanations for patent-privateering, some examples of which are presented below:

- avoiding negative public relations image;
- avoiding retaliation by companies against whom patents are asserted; and
- the inability to get what they consider an appropriate royalty rate for a large SEP portfolio – this would lead them to carve-out their portfolio and allow multiple parties to part-licence it.

A factor that may have further impeded attempts to accurately define the nature and main features of PAEs is likely to be the recent emergence in the patent marketplace of firms known as patent aggregators. Patent aggregators comprise companies that predominantly do not produce goods (i.e. NPEs) but accumulate large patent portfolios encompassing a significant amount of patents on the rights of which they often assert.

In general, patent aggregators appear to differ substantially in their basic strategies, thus confounding attempts to define and categorise them. This also imposes obstacles in attempts to define PAEs as their characteristics are similar to those of patent aggregators (i.e. large patent holdings, acquisition of patents, assertion). Specifically, in their study on the emerging patent marketplace for the Organization for Economic Co-operation and Development (OECD), Yanagisawa and Guellec (2009) identify the presence of IP portfolio building and licensing companies who are seeking patents not for production purposes, but for:

- generating revenue from licensing activities; or
- defensive purposes acting as a shield to protect freedom to operate.

Specifically, within the revenue-oriented category of patent-aggregating entities Yanagisawa and Guellec (2009) identify three types of companies. These consist of:

- Patent pools. Patent pools are often set up to promote the use of a standard by offering licenses for a portfolio of SEPs of multiple patent holders who contributed to a certain standard against a discounted rate. Most frequently, patents are licensed through some medium set up especially to administer the patent pool and generate revenue (Clark et al., 2000; JPO, 2008a).
- IP/technology and licensing firms. These consist of companies with significant R&D expenditures, aiming at developing patents and subsequently monetising them, primarily through licensing (Millien and Laurie, 2008).
- IP aggregation and licensing firms. These companies develop strategic patent portfolios by purchasing other parties' patents that fit with their

IP monetisation strategy (Millien and Laurie, 2008). Such strategies may also involve acquiring patents to assert them against alleged infringers. IP aggregation and licensing firms may thus be perceived as abiding to the general PAE business model, yet at a larger scale.

Within the defence-oriented category (i.e. defensive patent aggregators), Yanagisawa and Guellec (2009) define firms that seek to acquire patents (i.e. patents that are already litigated or patents that are for sale and may fall into the hands of PAEs) in order to remove them from the market and license them to their member so that they can avoid exposure to potential costly and damaging litigation (Monk, 2009). By doing so, defensive patent aggregators provide their clients with the portfolio to defend against assertion. These aggregators do not litigate; instead, they resale the patents they acquire after licensing them to their own clients. This practice is known as a "catch and release."

Ruther (2013) defines patent aggregators as firms that focus on amassing patents, see R&D not as a core competency and do not produce or manufacture own physical goods. In some cases, (high-tech sector patent aggregators) these entities may have large R&D expenditures and acquire patents as well.

Laurie (2006) defines these types of companies as IP factories. Instead of having their own production, IP factories license, or may assert, their patents to operating companies that manufacture products and employ the technology. Practicing companies with large patent portfolios, gained through R&D or acquisitions, may also be characterised as patent aggregators who engage in patent assertion based on defensive, financial or strategic objectives (European Patent Office, 2014).

An intrinsic characteristic of patent aggregator classifications across studies is that all distinct types exhibit some level of assertion intensity, thus further frustrating attempts to define PAEs. More specifically, such firms can theoretically engage in assertion-related activities should an infringement case arise and patent rights need to be enforced or, as seen in practice, when changes in business objectives through time result in the occasional adoption of more hostile practices as a means of getting quick returns on investments (Galiakhmetov et al., 2014).

Given the above dynamics of the IP licensing landscape, our analysis focuses on the activity of PAEs that consistently engage in the assertion of patents as their key *modus operandi*. In this respect defensive patent aggregators and patent pools, despite their occasional operational resemblance to PAEs, are not considered in the analysis.

4. Key dimensions of PAEs

4.1 Sources of funding

Existing literature on the activities and impacts of PAEs illustrates their sources of funding as an important analytical dimension. Fusco (2014) points to the presence of venture capital (VC) firms specifically as their primary interest in short-term profits is likely to be linked to aggressive assertion methods. Another important funding aspect relates to whether practicing firms support PAE activity by setting and funding PAE shell companies (Golden, 2013). Such 'privateering' activities may also be associated with aggressive assertions against competitors.

Funding impacts how PAEs behave. Our interviews confirmed that PAEs received funds from:

- Venture capital firms⁹
- Hedge funds¹⁰
- Banks¹¹
- State-funding¹²
- University endowments¹³
- Private and publicly listed companies (i.e. patent-privateering).¹⁴

The funding source and the typology of assertion carried out by PAEs appear to be correlated.

Funding from venture capital (VC) firms has impacted how PAEs behave. Since VCs are interested in short-term profits, these PAEs are likely to assert patents through methods that yield quick returns (Fusco, 2014). Hedge funds also appear to focus on short-term returns.¹⁵

"PAEs funded by venture capital firms and hedge funds. Such firms are primarily focused on short-term, relatively high returns through aggressive enforcement methods." (Expert Interview 4)

PAEs increasingly appeal to these investors because PAEs prioritize patent litigation value rather than its technological application (an analytical discussion over the determinants of a patent's litigation value, including how these apply to SEPs, is presented in the Appendix).¹⁶ This valuation bears quicker fruits than developing and commercializing innovations. VC financing helps PAEs during litigation (e.g. involving invalidity claims, which can be expensive).¹⁷

Patent privateering type PAEs receive funding or are formed by practicing firms. They may also be assigned patents by the practicing company that set it up. Beside their revenue raising mission, they can strategically assert patents against competitors (Golden, 2013) – to the benefit of its funding practicing firm.¹⁸

⁹ See Expert Interview 4, Case Study 8

¹⁰ See Expert interview 4.

¹¹ See Case Study 8, Case Study 12.

¹² See Case Study 1.

¹³ See Case Study 2.

¹⁴ See Case Study 2, Case Study 8.

¹⁵ See Expert Interview 4, Case Study 8.

¹⁶ See Case Study 9.

¹⁷ See Case Study 10.

¹⁸ See Case Study 8.

Some PAEs are funded by governments, universities, or research organisations. Such PAEs tend to depict themselves as more likely to engage in ancillary activities¹⁹ and to litigate only as a last resort.²⁰ Some stakeholders disagree and believe that, to sustain a viable source of revenue, these PAEs will likely rely on litigation more than they claim. Another stakeholder claims that these PAEs also overstate their ancillary activities.

4.2 Characteristics of patent portfolios

With regards to the characteristics of the patent portfolios asserted by PAEs, these can be related to the following dimensions:

- Origin of patents
- The patents' age
- The presence of SEPs.
- Patent quality.
- The main technological sector of application.

Origin of patents

Empirical work on the origins of PAEs' patents suggests that these entities obtain patents primarily through acquisitive methods from:

- small firms (Galiakhmetov et al., 2014);
- firms that have decided to liquidate some or all of their patent portfolios, which in principle may be both small and large (Fusco, 2014); and
- distressed or bankrupt firms, which in principle may also be small and large (Chien, 2009).

In few instances, some PAEs develop patents in-house through R&D for monetisation purposes (Millien and Laurie, 2008).

The consensus among our interviewed stakeholders was that in Europe, patents asserted by PAEs are acquired from third parties and, primarily, large practicing firms.²¹ In contrast to the US, innovation in Europe is sourced mostly from large practicing firms. They account for the vast majority of patent filings as compared to start-ups and other highly innovative SMEs.²²

Furthermore, patents that are already commercialised by practicing companies make a preferable target for PAEs compared to patents from start-ups, which might require a longer time frame and more investments to be monetised.

"[...] roughly 80 % of patents asserted by PAEs were in fact initially purchased from practicing firms" (Expert Interview 4).

Moreover, telecom-practicing firms, which are the primary suppliers of patents to PAEs in Europe, are likely to supply PAEs because they no longer practice the technology in the same way that they used to practice it in the past. Such a finding is consistent with evidence from literature as Chuang (2006) argues that PAEs tend to acquire old patents from third parties, which may still apply, however, to modern ICT technologies. Technology standards, in particular, reinforce this situation as there is backwards

¹⁹ Examples of ancillary services include e.g. assisting clients in the development of patent portfolios, conducting R&D as an incubation mechanism to increase the value of clients' IP assets, and providing consulting and other patent-related services.

²⁰ See Case Study 1.

²¹ Evidence is based on a diverse set of opinions from an expert, an association and a broker. See Expert Interview 4, Case Study 8, Case Study 9

²² See Case Study 9.

compatibility between the latest technologies and their predecessors (e.g. 4G smartphones need to be compatible with 2G and 3G technology).

However, although a minority, there exist PAEs that do not solely focus on obtaining patents from large practicing firms. In fact, some PAEs in Europe appear to focus solely on small sellers of patents, such as start-ups, universities, think tanks, individual inventors and SMEs. In such cases, monetisation is viewed from a longer-term perspective. According to a PAE, the tendency to acquire patents from such sellers, which is more pronounced in the US than in Europe, is attributed to the fact that big companies have the necessary resources to scan the patent landscape and identify potential buyers themselves.²³ Thus, there is little merit from the PAEs' perspective to approach large companies in order to acquire patents. Lastly, some PAEs appear to acquire patents from a wide range of entities, irrespectively of their size.²⁴

As a general observation, however, there is a lack of transparency with regards to both the ownership status (i.e. whether PAEs own the patents asserted as opposed to monetise them on behalf of third parties) and the precise origin of such patents. This lack of transparency can arise due to the following reasons.

- A patent broker highlighted the notion that PAEs with no affiliations to any large corporations, or investor backing, do not possess the financial resources to engage in an open bidding competition with large corporations.²⁵
- PAEs may be affiliated to other practicing entities who assign patents to PAEs (i.e. patent-privateering), yet such links are often difficult to identify. In some cases, the patent producing company may still retain a share in the patent revenue after disposal of the patents to PAEs. Because PAEs may be instructed to target competitors of the producing companies, patent privateering may be perceived a "tool" to decrease competition according to one industry association.²⁶
- One patent broker²⁷ suggested that multi-layer shell companies and their revenue sharing schemes may effectively hide the patent's true owner.

The age of patents asserted

Evidence from literature suggests that PAEs tend to assert older or even unexploited patents which may still play a role in modern technology (Chuang, 2006). Some patents are believed to have the greatest litigation value because they strike the right balance between contributing to already commercialized technology and being exploitable in the future.²⁸ These patents should therefore appeal more to PAEs. However, our case studies suggest that older patents are most likely to be asserted. Our stakeholder revealed a number of reasons that might explain the prevalence of older patents asserted by PAEs:

- First, older patents have a higher litigation value insofar as they rely on a mature and widespread commercialised technology, older patents are more likely to increase the chance of infringement due to the considerable amount of time it takes in order for a market to grow and potential infringement cases to become apparent.²⁹
- Second, given the increasing interoperability present in ICT sectors, patents that were originally intended within a specific technological field may, as technology develops, have more application and thus more

²³ See Case Study 2.

²⁴ See Case Study 3.

²⁵ See Case Study 9.

²⁶ See Case Study 8.

²⁷ See Case Study 9.

²⁸ See Case Study 9.

²⁹ See Case Study 3, Case Study 8.

potential infringers. For example, the automotive (NACE code 2910) and the white goods (NACE code 2751) sectors are using more ICT technologies (e.g. Bluetooth enabled cars, Internet of Things, etc.) and are likely to see more PAE activity in the future.³⁰

- Third, practicing firms are more likely to sell patents to PAEs when the expected revenues from renewing the lifetime of a patent (and hence from the continuation of the practice of the associated technology) are lower, relative to the costs of renewing the patent.

The stakeholder engagement revealed that some PAEs may also have an interest for younger patents as they engage in more 'forward-looking' behaviour. For instance, when dealing with universities or research institutes PAEs focus primarily on a long-term basis as the associated technologies are at an early stage of development. As a result, such patents are relatively younger.³¹ However, based on the opinion of one expert, the acquisition of young patents is not likely to be at the core of PAEs' business models as PAEs tend to obtain patents that read on commercialised technologies due to their increased monetary potential (i.e. large number and possibly size of infringers).

The presence of Standard Essential Patents (SEPs)

PAEs own SEPs. Contreras (2015) describes statistics regarding assertions of SEPs by PAEs pertaining to seven broadly-adopted standards in the telecommunications and networking sectors over a 16-year period. The results suggest that PAEs have initiated 64 % of all SEP litigation cases.

Our interviews confirmed that PAEs enforce SEPs. To different degrees, SEPs are present in the portfolios asserted by PAEs.³² However, recent developments linked to FRAND licensing terms and injunctive relief over an SEP have limited the bargaining power of patent holders relative to infringers.³³ Such developments lower the litigation value of SEPs and make SEPs a less attractive asset for PAEs. Without the risk of injunction, the incentives to innovate are diminished because potential implements can infringe and holdout because there are limited incentives to seek and reach a licensing agreement.³⁴

Patent quality

The quality of patents in a PAE's portfolio and its influence on assertion strategy are key considerations. Patent quality refers to the quality of the process through which the patent was granted. A high quality patent has been granted strictly according to the grant rules (prior art) and as a consequence it has a higher chance to resist a legal challenge in court.

Reitzig et al. (2007) indicate that PAEs tend to assert primarily low quality patents. Helmers and McDonough (2012) verify the quality of the patents asserted by PAEs in Europe and find a high revocation rate of patents – compared to those sustaining infringement cases – held by PAEs in UK courts. 73% cases where PAEs enforced their patent in court and where validity was challenged were invalidity. This invalidation rate is significantly greater than the 28% for non-PAE patents. Moreover, the prevalence of judgments indicating infringement is substantially lower for PAEs (13%), relative to non-PAEs (45%).

Love et al. (2015) present a similar finding concerning PAE litigations in Germany. The authors separate PAE from NPE litigations. The revocation rate associated with PAEs is

³⁰ See Expert Interview 2: IP consultant.

³¹ See Case Study 4.

³² See Case Study 1, Case Study 3 and Expert Interview 5.

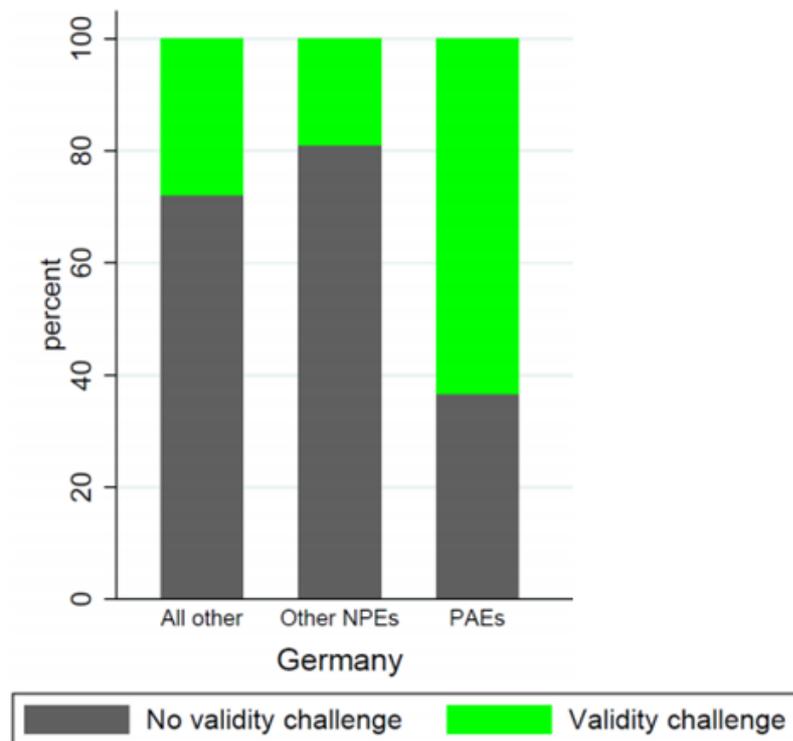
³³ Such developments have been in part motivated by prominent legal cases in the US whereby PAEs, not being bound by FRAND obligations at the time, asserted SEPs against practicing firms (See e.g. Rembrandt v. Samsung)

³⁴ See Case Study 1.

significantly greater than that associated with the remaining NPEs (55% for PAEs as compared to 4% for NPEs). The infringement rates are considerably higher for NPEs relative to PAEs (92% for NPEs as compared to 42% for PAEs). The authors investigate the likelihood of invalidity counter-claims in PAE assertions (Figure 5.2). Since PAEs do not practice the relevant technologies, invalidity counter-claims are one of the only available defences for practicing firms: PAEs cannot cross-license or be counter-sued for infringement.

However, while the above studies provide evidence of the PAE activity in European courts, they do not capture several important dynamics of their general activities. First, they provide no information about PAE assertions in Europe that does not result in litigation. Second, they compare invalidity rates for PAE and non-PAE patents of enforced patent through courts. They do not provide information about invalidity rates for PAE and non-PAE for an entire International Patents Classifications (IPCs) class. Such information would allow us to compare and analyse PAEs’ patents’ quality across similar technological fields. Thus, more research is needed on PAE litigation in Europe as the information currently remains limited.

Figure 1: Validity challenge in PAE assertions in Germany



Source: Love, B., Helmers, C., Gaessler, F. and Ernicke, M. (2015) "Patent assertion entities in Europe" forthcoming in Patent Assertion Entities and Competition Policy, Cambridge University Press.

The general view expressed by PAE targets during our interviews was of a similar nature to evidence from literature as the asserted patents were suggested to be low quality, on average.³⁵ The commercial viability of this approach lies in the opportunity costs that a defendant must bear in order to challenge even low quality patents. Given the average

³⁵ The evidence relies on material from interviews with PAE targets and an expert who has worked for a PAE target in the past: See Case Study 10, Case Study 12, Expert Interview 4.

cost of litigation, patent infringement cases are settled before trial partly to avoid extensive litigation costs and partly, according to some sources, to avoid causing any upset in investors' and customers' confidence as a result of the media exposure of the case. However, when litigation does occur, PAEs seem to win a mere 10 to 20 % of cases, while in the remaining cases PAEs' patents are eventually invalidated. These findings substantiate the statement that PAEs hold low quality patents but should be approached with some caution as they are based on the opinions of PAE targets.³⁶

"Overall, a high percentage of patents held by PAEs can be invalidated. Although speculative, one can expect higher invalidity rates for patents held by PAEs" (Case Study 12: German semiconductor manufacturer).

Apart from the implied litigation costs, an additional reason for the quality of many of the patents asserted by PAEs relates to limitations and/or issues at the patent granting phase. Although ameliorated at present, prior art research by patent granting offices, including the EPO, has historically not been as efficient, resulting in missing prior art.³⁷ In the past, prior art research was more challenging and time-consuming. In contrast, currently, widely-used, search engines have improved the capacity to find prior art compared to the systems in place several years ago.³⁸

Notwithstanding the above, a significant finding emerging from our interviews, including entities targeted by PAEs, is the recognition that PAEs also possess high quality patents.³⁹ During the assertion of high quality patents litigation is usually considered as a final option. Such a finding is in line with evidence from literature as Shrestha (2010) argues that PAEs may also assert high quality patents, including SEPs, which are likely to be of increased value, against few large and possibly entrenched firms in a technological field. Moreover, given the size of the alleged infringers and, therefore, their increased capability to finance a legal dispute, such assertion attempts would not be profitable if involving low quality patents or if they were aggressive in nature. As a result, the author argues that assertions of high quality, and hence high value, patents spur innovation by rewarding independent inventors; it should be noted, however, that as far as SEPs are concerned, they most likely originate from commercial companies as opposed to independent inventors.

PAEs have high quality patents in their portfolios because some PAEs conduct high quality prior art research and stringent validity tests in order to enhance the chances of successful assertions. As PAEs are companies that invest in patents and their enforcement in order to generate a high return, they should, in principle, have a greater interest in high quality patents. This is due to the fact that, in case of invalidation, the PAE would make a loss on their investment.

The importance of prior art research and validity testing carried out in order to ensure the relative quality of the assets has also been emphasised by some PAEs.⁴⁰ More specifically:

"[...] one of the initial and resource-intensive tasks the company needs to accomplish prior to assertion relates to the examination of the extent to which an invalidity claim by a potential infringer may be successful. This is primarily achieved through a thorough investigation of prior art. This due diligence process does not vary significantly across jurisdictions as proving the validity of a patent is an intensive task irrespective of judicial idiosyncrasies. As a result, when the company asserts a patent that is infringed, there is a strong

³⁶ See Case Study 10, Case Study 12, Expert Interview 4.

³⁷ See Expert Interview 3.

³⁸ See Case Study 10.

³⁹ See Case Study 10.

⁴⁰ See Case Study 3.

internal conviction that this is indeed the case” (Case Study 3: EU-based patent licensing and monetisation company).

4.3 R&D activity

Overall, evidence from literature on the extent of R&D activity by PAEs is mixed. While some studies point to the absence of such activities as a distinct characteristic of PAEs (Mello, 2006; Chuang 2006; Bisthoven 2013), others suggest that R&D activity is present, and in some cases substantial (Millien and Laurie, 2008; Ruther, 2013).

Our analysis aimed at shedding more light on this issue. As an overarching observation, it should be mentioned that the term R&D is often used in a different context by PAEs. Therefore, it is important to distinguish between the following four types of R&D focus:

Traditional R&D: this would refer to the type of research required to produce patent filings related to new technologies or to improvements in current technologies. Overall, PAEs are not likely to engage in this type of R&D. Based on the view of an IP expert, PAEs claiming to actually conduct traditional R&D are likely to do so as a means of enhancing their public image, rather than describing a distinctive operational feature.

Patent incubation: PAEs often conduct this type of R&D which focuses on enhancing the scope of technological applications that might apply to a patent. This type of activity is primarily observed among PAEs that, as part of their business, manage patents on behalf of third parties (often SMEs), assist clients in the development of patent portfolios, and provide other patent-related services aimed at ensuring that clients take advantage of their IP assets. This view has been shared both by a PAE and the client of a PAE.⁴¹

Research into prior art and validity testing: this activity is motivated by the need to identify high quality patents. As already explained above there is a general perception that some of the portfolios asserted are low quality and therefore it is likely that PAEs engage in this type of research to varying degrees. This view is shared by a PAE target and a PAE client.⁴²

Litigation value R&D: According to a PAE target, PAEs often dedicate resources in order to increase a patent’s litigation value. This includes any type of activity that aims primarily at increasing the monetisation value of the patents asserted (e.g. developing a good prosecution practice, or making effective use of continuation applications and divisional applications).⁴³

Notwithstanding the above, it has to be mentioned that PAEs with internal R&D departments for the aforementioned purposes may also choose to outsource R&D activities to third parties

4.4 Assertion strategies

The general lack of information over assertion strategies adopted by PAEs in the European ICT sphere prompts us to examine evidence from literature on the assertion strategies adopted primarily by US-based PAEs. Overall, these studies have highlighted the tendency of PAEs to:

- Build portfolios composed of weak patents acquired opportunistically at the lowest possible cost and assert these patents against both small and large firms, and even an entire industry (i.e. “blanket suits”). PAEs may also target end-users (i.e. “customer suits” or “end-user suits”) as a

⁴¹ See Case Study 4, Case Study 7.

⁴² See Case Study 7, Case Study 10.

means of applying pressure to the potential infringers (Mello, 2006; Reitzig, 2007, Chuang, 2006; Chien, 2009; Fusco, 2014).

- Assert strong patents against few firms within a given technological field (Chuang, 2006; Shrestha, 2010). This strategy may aim at securing a big jury award against one or more entrenched players in the industry.
- Acquire important patents, yet not necessarily SEPs, within a given technological field, thus blocking practicing firms from using them in the production of innovative products, unless committing to a licensing agreement (Chuang, 2006). This strategy may include stick-licensing practices (Yanagisawa and Guellec, 2009; Ruther, 2013).⁴⁴
- Lack good faith in their negotiations with alleged infringers (Chuang, 2006; Chien, 2009; White House, 2013).
- Exploit opportunistically:
 - Information asymmetries by hiding their identity and concealing their patent holdings so as to make it difficult for defendants to counterclaim or monitor the IP landscape (White House, 2013; Orr, 2013).
 - Bargaining power asymmetries by asserting their patents against practicing firms after these have made significant and/or irreversible investments (Mello, 2006; Chuang, 2006; Reitzig, 2007; White House, 2013; Lemley and Melamed, 2013; Fusco, 2014).

As the above are primarily based on studies with a US scope, our interviews managed to shed more light on the situation in Europe. European telecom operators appear to have experienced the largest number of PAE assertions in Europe, originating primarily from US-based entities; these are currently on the rise. The PAEs' specific strategies share some common features, which are discussed below:

- **Patent asserted** — the portfolios asserted by PAEs often include SEPs. In terms of the technological areas targeted, these can vary greatly depending on the PAE. The majority of legal actions concern the commercialised technologies that the operators buy from suppliers and for which the operators require suppliers to have cleared the licences. Some recent cases in Europe have shown that PAEs also assert older dormant patents that read on widely adopted technologies by applying them to technological fields that these patents were not initially intended for.⁴⁵ In this respect, the activities of PAEs are not likely to significantly affect technology transfer as they are based on already commercialised technologies.
- **Forum shopping** — the majority of assertions against telecom operators in Europe has been initiated in Germany. Whilst the large size of the German market is likely a contributing factor, this choice also reflects a deliberate attempt to exploit Germany's bifurcated system.⁴⁶ Assertions in Germany are associated with a higher patent litigation value. Overall, reasons for the heightened PAE activity in Germany include:
 - The size of the market and the fact that settling a negotiation in large European markets can facilitate negotiations in other jurisdictions.
 - The threat of injunction in Germany is perceived as a non-empty threat.

⁴⁵ See Case Study 8.

⁴⁶ See Case Study 1, Case Study 8, Case Study 10, Expert Interview 1 and Expert Interview 4.

- The presence of a bifurcated system which subjects the defendant to the possibility of an “injunction gap”.⁴⁷
- The technical expertise of the court in handling patent cases.

Overall litigation strategy — the approach used by PAEs to assert patents can vary significantly not only across different PAEs but also within the same PAE. A common strategy that has been observed in Germany in relation to the assertion of SEPs against telecom operators involves PAEs presenting the standard, providing evidence of how technology infringes the standard, and then demanding the relief sought from the alleged infringements. In order to get more information on the alleged infringement, operators would, in some cases, need to sign confidentiality agreements implying that they cannot include their suppliers in this negotiation process (even though the alleged infringement concerns their products).⁴⁸

Faced with the adapting dynamics of the European legal landscape (e.g. many courts have begun requiring patent owners to substantiate their claims in more detail to enable the potential infringer to assess the case) the strategy pursued by US-PAEs in Europe is evolving and becoming increasingly sophisticated:⁴⁹ exploiting the German legal system; targeting small operators first — to create a precedent — before bringing actions against large operators.

Our analysis indicates that other aspects of PAEs’ assertion strategies can vary greatly. Such variation is not only due to the observed heterogeneity across different PAEs but, more importantly, due to the fact that these entities seem to be learning how to deploy more effective strategies.

Main technological sectors of application: Telecom operators

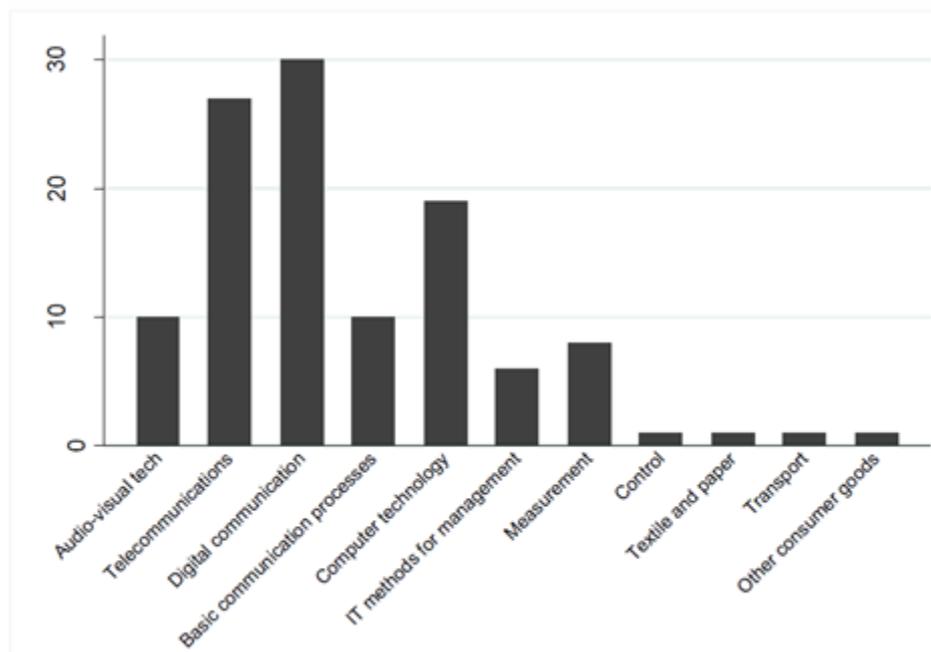
Evidence from literature suggests that the majority of patents asserted by PAEs within the European ICT sphere relate primarily to telecommunications (NACE codes 6110, 6120, 6130, 6190). For instance, Helmers and McDonough (2012) illustrate the prevalence of ICT-related patents, mainly those that apply to telecommunications (i.e. telecommunications and digital communications), in PAE litigations in the UK.

⁴⁷ Infringement proceedings tend to be less complex and quicker than validity proceedings. The presence of a bifurcation system in Germany means that, even if infringement and validity hearings are scheduled to begin on the same date, injunctions may be granted before the completion of the validity proceedings (this is known as the injunction gap).

⁴⁸ See Case Study 10.

⁴⁹ See Case Study 8.

Figure 2: Technological applications of patents in PAE litigations in the UK



Source: Helmers, C. and McDonagh, L. (2012) "Trolls at the High Court", LSE Legal Studies Working Paper No. 13/2012.

This finding is also verified in a recent study by Love et al. (2015). The authors find that PAEs are overwhelmingly involved in the litigation of German and UK patents with IPCs related to computer and telecommunications technology. By contrast, product-producing patentees most often litigate German and UK patents related to manufacturing technology and pharmaceuticals, respectively. These findings are consistent with existing evidence on the activity of US PAEs, which also tend to enforce high-tech patents at a disproportionately high frequency, especially software patents.

The authors then decompose all NPE cases in those related solely to PAEs and those related to other NPEs (e.g. universities and research labs). They find that the prevalence of telecoms patents litigated by NPEs is in fact driven by PAE litigations. Our interviews confirm the prevalence of telecommunications-related patents in PAE assertions in Europe.

The frequency of such assertion incidents appears to be on the rise. One of our interviewed stakeholders⁵⁰ stated that whilst in 2008 there was interaction with only one Germany-based PAE, since then, disputes emerged with a growing number of entities (primarily US-based) and, by 2013 almost all of the claims were made by entities that do not have any practicing activities.⁵¹

Our analysis revealed a range of different factors that could explain the predominant use of telecom patents by PAEs (relative to patents in other ICT sectors) for assertion purposes:

⁵⁰ See Case Study 10.

⁵¹ The prevalence of patent assertion activity within the telecom sector was also mentioned in Case Study 1, Case Study 5, Case Study 9, Case Study 10, Expert Interview 1, Expert Interview 2, Expert Interview 3 and Expert Interview 5.

- Compared to telecom-related patents, other ICT sectors may not be as attractive⁵² from a monetisation viewpoint because they may not provide sufficient revenue streams.⁵³
- The European Telecom industry has a large customer base and generates large revenues. Being a vertically differentiated industry, the industry also provides PAEs with the option to target the most vulnerable segment of the supply chain.⁵⁴ The same argument is valid for patents involved in standards.⁵⁵
- There are a very large number of European patents within the telecoms field. Their owners may want to monetise their assets through assertions because their original business model failed (see section 9.6 for more details).⁵⁶
- Telecom patents have applications in a wide range of products and services (discussed in more detail in Section 9.5).⁵⁷
- Free-riding and opportunistic behaviour have incentivised European telecom firms to use PAEs.^{58,59}

However, some clarification must be provided with regards to the specific technological fields of patents asserted within telecommunications as these can vary depending on the PAE in question. For instance, in the past, PAE assertions were much more focused on the standard of core radio technology (NACE code 6010). Nowadays, commercialised technologies like audio, video, Wi-Fi and internet related applications are being incorporated into smartphones. This has resulted in a wider range of telecommunications technologies being targeted including core network (NACE codes 6110, 6210) and handsets (NACE codes 2611, 2612).⁶⁰

Moreover, patents may be asserted within a given telecoms technological field despite not being intended to apply in this field when originally filed. More specifically, PAEs in Europe may assert older and likely dormant patents that read on widely adopted technologies by applying them to fields that they were not initially intended for.⁶¹

In contrast to telecommunications, other ICT sectors have been mentioned as not being conducive for patent assertion activity due to the limited monetary proceeds that can be extracted. There are two conflicting forces in play in this respect: on the one hand, as it is becoming increasingly difficult to get an injunction over SEPs, SEP do not appeal to PAEs as much;⁶² on the other hand, SEPs can remain attractive for PAEs because of their wider use.

4.5 Revenue structure

Evidence from literature and our stakeholders suggests that PAEs reap monetary benefits from a variety of sources. Chuang (2006) suggests that PAEs generate revenue

⁵² The consumer electronics sector may be regarded as an exception due to the heightened degree of PAE litigations, mainly in the US. See e.g.: https://www.ftc.gov/sites/default/files/documents/public_comments/2013/12/00066-87874.pdf

⁵³ See Case Study 1.

⁵⁴ See Case Study 8 and Case Study 9.

⁵⁵ See Case Study 8.

⁵⁶ See Case Study 8, Case Study 11.

⁵⁷ See Case Study 8, Case Study 9, Case Study 11.

⁵⁸ See Case Study 1 and Case Study 8.

⁵⁹ Interviewees have also indicated that the previous reluctance of some telecom operators to challenge assertions by PAEs may have also made the sector a more vulnerable target. See Case Study 9.

⁶⁰ See Case Study 10

⁶¹ See Case Study 8.

⁶² See Case Study 1.

from the licensing of patents, while Ruther (2013) adds the sale of patents as an additional revenue stream. Our interviews also suggested PAEs collect revenues from the administration of patent pools and consulting services. PAEs receive income through:

- The attainment of single licensing programmes and the associated fees. This revenue stream can be affected by the bilateral agreements with the original patent owner in case solely commercialisation rights are obtained, or ownership rights with a fee structure contingent on the outcome of monetisation attempts.
- Administration and management fees in case of involvement in the setting up of pools and other forms of IP aggregation.
- The sale of patents owned.
- IP consulting services.

PAE may enjoy multiple sources of income simultaneously. For instance, our interviewed EU-based IPR management and promotion company (Case Study 4) indicated that they engage in all four of the above activities.

However, some degree of specialisation is also present. For instance, PAEs may solely engage in single licensing programmes while agreeing on revenue sharing contingent fee mechanisms with their clients. According to a PAE, such actions are not always related to large monetary proceeds as there are cases where licensing revenue is below €1 million.⁶³

Moreover, in the case of bilateral agreements between the PAE and the original patent holder, two types of agreements were mentioned:

- agreements that only take into account the client's existing patents
- agreements that seek to strengthen the clients' future patent position by helping them build different patent portfolios around few isolated patents

The income received from such assistance being offered to patent holders is also related to consulting services and other administrative processes towards building a decent patent position. PAEs may also be interested in assertions initiated by other companies.⁶⁴ PAEs may obtain a sizeable chunk of revenue from settlements prior to litigation or damage awards post-litigation.⁶⁵

⁶³ See Case Study 1.

⁶⁴ See Case Study 3.

⁶⁵ See Case Study 1.

5. Interactions of PAEs with practicing firms

In this section we examine how PAEs may interact with stakeholders in the innovation ecosystem. Overall, there are various ways through which such interactions may take place, ultimately leading to PAEs serving multiple roles. These different roles are expected to have different impacts on innovation and technology transfer within the ICT sphere (these are discussed in detail in Section 6).

In this section, we present these different roles played by PAEs, namely:

- The role of PAEs in counter-balancing hold-out problems.
- The role of PAEs as a monetisation tool for practicing firms.
- The role of PAEs as IP consultants.

5.1 The role of PAEs in counter-balancing hold-out problems

Implementers of technologies have a strong incentive to minimise the amount of money they spend on licencing other companies' IPR as this maximises their profits. As a result, they have a strong incentive to free-ride on innovative companies' inventions by avoiding to pay the required licencing fees (i.e. hold-out). Such practices have been illustrated in the literature (Chien, 2013; Golden, 2013) to result in practicing firms seeking the PAE services as a counter-balancing measure. Along these lines Conrad (2007) argues that inventors or SMEs do not have the capacity to both develop an invention and pursue infringers.

In this sense, it is suggested that even if PAEs were to assert low quality patents this could have positive impacts on the functioning of the system by highlighting areas where the current system remains conducive for free-riding behaviours. PAEs would be motivated to identify and target free-riding entities.

In this respect, hold-out was portrayed as one of the most pronounced problems that practicing firms face when trying to assert their patents. For SMEs this is mainly attributed to the limited capability that they have in asserting their patents, especially against large infringers.⁶⁶

By using the services offered by PAEs, patent holders and especially SMEs (due to their limited resources) can overcome some of the challenges associated with hold-out and free-riding behaviours. Therefore, PAE activity can assist in avoiding such problems and in doing so foster the incentives to innovate – this view is shared by both a PAE and a PAE target.⁶⁷

Hold-out is also an issue for large practicing firms in their attempts to recoup their R&D investments, thus impeding their incentives to innovate. Depressed licensing revenue, due to hold-out practices, were also suggested to lead in less incentives for large firms to participate in standardisation. Therefore, PAEs counterbalancing hold-out problems can assist firms to obtain an adequate remuneration for their R&D investments.⁶⁸

However, an important distinction needs to be made as regards the quality of the SEPs asserted by PAEs.⁶⁹ If these are high quality SEPs then PAEs are effectively alleviating hold-out by promoting legitimate and welfare improving licensing programmes (welfare implications are discussed in more detail in Section 6.3). If the SEPs are low quality then their assertion is likely to be a mere exploitation of the inefficiency of the patent system.

⁶⁶ See Case Study 1, Case Study 8, Case Study 10, Case Study 11.

⁶⁷ See Case Study 1, Case Study 6.

⁶⁸ See Expert Interview 2.

⁶⁹ See Case Study 1.

PAEs can help counterbalancing hold-out problems and assist firms in obtaining an adequate remuneration for their IP. In fact, assigning patents to PAEs may be the only option left to practicing firms facing intense hold-out problems in the IP market.⁷⁰

Some stakeholders have pointed out that some practicing firms in ICT behave opportunistically. This behaviour threatens inventors' incentives to innovate. PAEs can play a role in alleviating these problems. A number of factors have been mentioned as contributing to the presence of such opportunistic behaviours, namely:

- Lobbying pressure of new market players in the telecom sectors — new entrants into the telecommunications markets are increasingly questioning the validity and essentiality of incumbents' SEPs while established licensing holders have continued the practice of inflating the number of patents in their licensing portfolios. Therefore, the monetisation opportunities associated with these patents are reduced, ultimately decreasing innovation incentives.⁷¹
- Legal precedents — legal cases granting injunctions to infringers committing hold-out can act as a deterrent of future hold-out practices due to the risk of injunction being the most effective pressure mechanism towards the achievement of licensing agreements between patent holders and potential infringers. In the absence of the risk of injunction, the incentives to innovate are largely diminished as potential infringers have limited incentives to seek to reach a licensing agreement.⁷²
- Imbalance in bargaining power — SMEs and individual inventors frequently find themselves unable to address large practicing firms' increasing tendency to infringe their patents. Ultimately, this can reduce incentives to innovate.⁷³

5.2 The role of PAEs as a monetisation tool

Literature on the positive aspects of PAEs' operations suggests that their activities may create a secondary market for inventors as, irrespective of hold-out concerns, entities involved in the early innovation stages do not always have the in-house capabilities or capacity to set up and promote licensing programmes in order to monetise their IPRs (Fusco, 2014).

Consistent with the above, our case studies indicate that the significant extent of human resources required in order to monetise IPRs may incentivise SMEs to outsource these tasks to PAEs. There is evidence from PAE clients and an expert that SMEs may have trouble monetising their patents as they do not have dedicated personnel dealing with such issues.⁷⁴ Therefore, establishing licensing programmes and promoting their portfolios for licensing purposes would be a costly endeavour if developed in-house. In contrast, larger firms may have internal departments for IPR monetisation which involves all types of IPRs (i.e. patents, trademarks etc.).

PAEs can play an instrumental role in this respect as they provide stakeholders like SMEs an appealing avenue towards monetisation. However, the extent to which engaging a PAE is beneficial for an SME will depend on the specific arrangement agreed between the two parties. The arrangement would determine issues such as:

- Which entity retains IPR ownership.

⁷⁰ See Case Study 6, Expert Interview 2.

⁷¹ See Case Study 6, Case Study 8.

⁷² Supported by Case Study 1.

⁷³ Supported by Case Study 3.

⁷⁴ See Case Study 5, Case Study 7, Expert Interview 2.

- The cost associated with the services provided by PAEs and the proportion of revenues to which each party is entitled.
- Whether any additional services will be provided by the PAE.

It is, however, important to stress that the monetisation services offered to practicing firms by PAEs may not be solely driven by the limited capacity and/or experience of practicing firms with monetisation as is the case with patent privateering. Overall, the benefits accrued to practicing firms from assigning patents to the privateers are twofold:

- *Strategic purposes* as patent assertion against competitors can be carried out in a concealed way via the establishment of shell companies (“patent privateers”).
- *Reputational costs* as some practicing firms may wish to maximise the monetisation potential of their IP assets without the reputational costs associated with being perceived as licensors by other market participants. By doing so, they manage to hedge against backfire risks (e.g. reputational costs, infringement counter-suits). This view is shared both by an expert in the field and by a PAE client.⁷⁵

Our interviews highlight that, at present, PAEs have not asserted IP against European SMEs, Universities, and Research Organizations.⁷⁶ As such entities do not sell any products or offer any services, there is limited revenue that can be generated, thus reducing the cost/benefit ratio and, by extension, lowering PAEs’ incentives to target them. However, as US-based PAEs explore opportunities in Europe, it cannot be excluded that SMEs might become targets in the future (asserting and settling against small players can help establish precedents that can then be leveraged against larger firms).

5.3 The role of PAEs as IP consultants

To a limited extent, PAEs may interact with practicing firms in ways not related to the assertion of patent rights. More specifically, PAEs may assist patent holders by providing consulting services and other administrative processes towards building a decent patent position.

Furthermore, another dimension of PAE interaction, that is beneficial for SMEs, relates to cases where Member States have introduced tax breaks for companies that engage in R&D activity. Patent applications can be useful in demonstrating that a company has actually engaged in such activity.⁷⁷

Therefore, PAEs, apart from monetisation services, may also offer advisory services to SMEs in order to help them explore and develop potentially patentable technologies. By doing so, they assist SMEs to obtain much needed tax breaks by providing stronger evidence of R&D activity. As mentioned earlier, these services come at a cost (which we have not been able to assess) and are also not likely to be at the core of PAEs’ modes of operation.

⁷⁵ See Case Study 5, Expert Interview 4.

⁷⁶ See Expert Interview 5, Case Study 4.

⁷⁷ See Case Study 7.

6. PAEs` impact on innovation

6.1 The impact of PAEs` activities on ICT patenting costs

Literature appears to be highly polarised on whether PAEs play a positive role by addressing the costs associated with patenting as opposed to exacerbating them.

Some authors note that PAEs tend to acquire older or unexploited patents (Chuang, 2006). These might consist of practicing firms that went bankrupt or firms that have decided to liquidate some or all of their patent portfolios (Fusco, 2014). In practice, this leads to the disintegration of large portfolios into smaller portfolios whose **ownerships becomes scattered** across a large number of firms.

In turn, this results in higher IP **monitoring costs**, which may be exacerbated in case PAEs conceal their patent holdings (Orr, 2013) for firms wishing to practice a technology, due to the need to enter into agreements with a large number of counterparties, and potentially higher royalty stacking issues. Within this context, a recent report (2013) from the Executive Office of the President of the United States on PAEs has highlighted the exacerbation of patent privateering and the requirement imposed on those who settle to sign non-disclosure agreements. Such actions make it difficult for defendants to form common defensive strategies, such as sharing legal fees and not having to settle individually. Along these lines, Reitzig et al. (2007) show that it is optimal for PAEs to assert primarily weak patents because these are hard and costly to monitor.

Similarly, **transaction costs** and **costs of obtaining freedom to operate** can become prohibitively high in the presence of PAEs that amass patents with the sole purpose of maximising royalty fees or generating suits and settlements in a way that limits potential infringers` operations as well as public access to the inventions (Yanagisawa and Guellec, 2009; Galiakhmetov et al., 2014).

In light of the above, Chien (2013) conducted a survey to capture the impact of PAE assertions on the performance of targeted entities. The primary conclusion is that the activities of PAEs have significant operational consequences. PAEs have also been associated as **exacerbating the legal uncertainty** of the patent system due to a number of reasons such as:

- the fact that they might assert low quality low value patents against practicing firms that might be infringing unintentionally (Mello, 2006; Chien; 2013); and
- the difficulty involved in assessing invalidity and determining damage awards within novel technological areas, in which PAEs tend to operate (Bisthoven 2013, Lemley and Melamed, 2013).

However, establishing a causal relationship between aggressive patent assertion and legal uncertainty might not be as straightforward. Specifically, Lemley and Melamed (2013) state that the emergence of these entities constitutes a symptom of systemic issues in the patent system within ICT-related industries. The issues include:

- too many patents interpreted too broadly (mainly in the US);
- a remedy system that routinely awards excessive damages and enables patent holders to bargain for excessively costly settlements (mainly in the US); and
- a significant royalty stacking problem (globally).

Other authors have emphasised that PAEs, through their patent aggregation activity, represent a centripetal force in the patent systems and consequently decrease the inefficiency related to patent fragmentation. For example, the business models of certain PAEs aim precisely at decreasing **IP monitoring costs**, **transaction costs**, and **costs of obtaining freedom to operate** especially in those ICT areas that rely heavily on technology standards (i.e. those areas where the inefficiencies associated to these costs

have the greater impact on innovation and the adoption of new technologies). More specifically certain PAEs operate by:

- Identifying and providing expert opinions on SEPs (thus decreasing IP monitoring costs).
- Liaising with parties holding SEPs in order to decide licensing terms, fees and royalties (thus decreasing transaction/negotiation costs).
- Obtaining exclusive licences from holders of SEPs in order to offer a joint licence of SEP portfolios to potential customers who wish to practice a technology covered by these SEPs (thus decreasing costs of obtaining freedom to operate).

Similarly, McDonough (2007) argues that PAEs, by acting as an intermediary and providing liquidity, fulfil a market clearing function and thus improve the overall functioning of the market. Shrestha (2010) also illustrates that PAEs may serve a valuable role in enhancing innovation by identifying and acquiring high value patents, which are subsequently licensed to practicing firms, thereby reducing IP [monitoring costs](#) and encouraging innovation.

Along these lines, Feldman and Lemley (2015) develop the “efficient middleman hypothesis” arguing that PAEs serve an intermediation function by finding patents and providing them to companies that can put them to use. In this sense, PAEs enhance the role of patents as a mechanism to overcome Arrow’s (1962) information paradox and allow inventors to provide their new idea to someone who can make use for it.⁷⁸

6.2 Impact of PAEs’ activities on ICT market participants’ incentives

Evidence from the ICT sector is consistent with the notion that patent owners have greater incentives to adjust their patenting strategies according to their bargaining power.⁷⁹ According to the relative bargaining power theory, outcomes from an exchange are a function of the dependency of one of the parties on the other to secure needed resources (Blau, 1964; Lukes, 1974). A critical aspect of this theory is that, because the most effective form of power is often implicit, it is difficult to measure (Lukes, 1974). Given these challenges, scholars have assumed that the owner of the needed resource is likely to possess the greatest bargaining power. Accordingly, issues related to negotiating strength have been consistently identified as major determinants of the incentives of firms to actively assert their rights and, hence, of the incentives of practicing firms to develop new technologies or adopt existing technologies.

On the one hand, evidence from literature suggests that PAEs may engage in opportunistic assertion activities aimed at extorting practicing firms with the ultimate purpose of forcing them to engage in a licensing scheme or reach a settlement. The frequency and impact of such activities on firms’ incentives to innovate or disseminate invented technologies is likely to be more pronounced when addressed towards target companies that stand to lose the most in a costly patent infringement suit (Mello, 2006). Such targets, particularly in the US, may include:

- companies that cannot afford the financial and reputational costs of litigation;
- companies that cannot afford to pay monetary damages in case of unfavourable court decision; and
- companies that cannot afford the business impact of a permanent injunction.

This is primarily due to the fact that, for the asserting entity, the downside risk of litigation — should the licensing offer be rejected — is limited to the possibility of losing

⁷⁸ Arrow argues that sellers will not disclose information to buyers in the absence of legal protection and, consequently, buyers will be unable to value that information.

⁷⁹ OECD (2004) “Patents, innovation and economic performance: OECD conference proceedings”.

attorney fees and/or having patents invalidated whilst the upside involves substantial damage awards, especially in the US. The limited exposure of PAEs to downside risk is also strengthened by their non-practicing status, thus rendering them invulnerable to counter-claims of patent infringement (White House, 2013). Overall, the above conducts are expected to impede incentives to innovate or disseminate technology.

On the other hand, PAEs may increase such incentives by:

- [securing an adequate remuneration for inventors](#), thus further encouraging them to engage in innovative activities; and
- [providing insurance](#) to practicing firms against infringement.

More specifically, in contrast to the above studies, evidence suggests that PAEs may in fact benefit innovation and incentivise further the dissemination of developed technology. Specifically, Pohlman and Optiz (2013) argue that PAEs may use their increased bargaining power and assist small inventors in assertion activities against large dominant incumbent firms. Fusco (2014) further argues that by doing so PAEs benefit innovation in ICT by creating a secondary market for (mainly small) inventors who, according to Conrad (2007), do not have the capacity to both invent and pursue infringers. Thus, PAEs can [alleviate free-riding incentives](#), ultimately securing an adequate remuneration for the inventors of the technology.

6.3 Impact of PAEs on mature and declining markets

Disruptive events can lead to a significant rebalancing of the technological landscape. In particular, the development of new technologies, such as smartphones, brought a number of successful players in the market who were not previously present. These new players can then become more effective in obtaining market shares than the incumbents and can therefore result in displacing them from the market. A prime example was the transition from standard mobile phones to the currently prevalent smartphones.

Previously established companies were caught in what was, for them, a maturing market and were not as successful as new entrants were in establishing themselves in the newly developed market for smartphones. Developments of this kind can lead companies to strategic decisions that involve either no longer practicing a technology or effectuating a substantial shift in how they define their business models.

However, in the complex technological world of standards (i.e. market-wide adoption of common technologies and the ability of devices to communicate with each other) there exist aspects of older technologies (covered by patents) that are necessary even for new radically innovative technologies. To add to that, even the most advanced devices are required to be able to operate in some of the older networks and have the capacity to carry out previously established functions and operations. Insofar as these older technologies are based on patents held by companies that are part of the maturing markets they give rise to valid monetisation claims on their behalf.

The, often large, patent portfolios of firms that are no longer able to practice a technology profitably can still generate monetisation value thereby becoming an attractive asset for PAEs. For reasons explored earlier in Section 5.2 PAEs can be more effective in monetising IPR. This comparative advantage is more pronounced when comparing them to SMEs but it is also evident when comparing them to companies that used to practice a technology and no longer intend to do so.

Such practicing companies, as evidenced by several of our case studies, despite their size, might be unwilling to commit the funds and resources to actively pursue monetisation. On the other hand, PAEs specialise in this type of activity and have both the resources and the expertise to do so. This generates an attractive trade opportunity for both parties:

- The practicing companies that can no longer extract value from their patent portfolio efficiently, if at all, can agree a revenue sharing scheme

with a PAE or even sell their patent portfolio to them. In either case, the transaction will generate an expected revenue stream.⁸⁰

- While the practicing company might be primarily active in a maturing market, their ownership of IPR can relate to technological markets that are currently thriving. PAEs can tap that potential and can pursue monetisation opportunities relating to the patent portfolio in consideration.

Viewing this transaction from a purely monetary dimension, the fact that practicing companies can be remunerated for their investments in developing technologies that are still used, even though they may not be practicing these technologies anymore has a considerably beneficial impact on the innovation process. The beneficial impact operates through two channels:

- An ex-ante increase in the incentives that innovating companies have to innovate. An asset that has a potential resale value or that can generate a future stream of income becomes more valuable and renders investments in it more attractive.
- In an ex-post dimension, there is a transfer of income from practicing (potentially innovative) companies to (at least previously) innovative companies; during this transfer of income, a share is maintained from PAEs. Depending on the final redistribution of income and the extent to which each company engages in R&D, the final outcome has the potential to favour innovative companies.

There is, however, an additional non-monetary dimension to this discussion; patent strength. If practicing firms transfer the monetisation rights of weak patents to PAEs that focus on exploiting inefficiencies in the system or asymmetries of bargaining power then negative impacts can arise. These impacts relate to impeding the assessment of freedom to operate, limiting the extent to which practicing firms can recoup their R&D investments, negatively affecting their financial well-being by requesting extortive licensing fees and, within a more general context, hindering the overall innovation activity.

To conclude, while the ability of previously innovative companies to obtain a higher return on their R&D investments has a considerable beneficial impact on the incentives involved in the innovation process, the aggregate impact experienced in the market is more uncertain. The approach implemented by the PAEs in their assertion and the strength of the asserted patents are going to be the two factors that determine whether PAE involvement at this stage will ultimately result in a positive or negative impact.

6.4 Overall assessment of impact on innovation

Overall, the impact of PAEs on innovation depends crucially on the extent to which their assertion activities strike the right balance between providing innovators with appropriate rewards whilst ensuring that practicing firms (and ultimately consumers) are not faced with excessively high costs. In this respect, the activities of PAEs cannot be viewed as directly affecting technology transfer as they are primarily focused on already commercialised technologies. Rather, PAEs can have an indirect effect in this area by providing a monetisation avenue to innovators who, as a result of their activities, enhance technology transfer. It is for these reasons that views regarding the impact of PAEs are rather mixed. However, based on our interviews, the following high-level findings emerged:

- [Different typologies of PAE assertions impact differently on innovation.](#) Overall, the views on the impact of PAEs on innovation are mixed and depend on the specific behaviour displayed in each assertion of the

⁸⁰ See Expert Interview 3.

entity in question.⁸¹ More specifically, it was indicated that the behaviour of a PAE in a given assertion approach could be assessed through the following dimensions:

- The quality of the patent asserted (i.e. low vs. high).
- The royalties requested (i.e. reasonable vs. extortionist).
- The extent to which litigation is actually the last resort.

"[the activity of PAEs] can have positive impacts provided that the quality of the patents is good and that they behave reasonably" (Case Study 6: EU-based international technology company).

- PAEs can represent an effective tool to counterbalance hold-out problems (see Section 5.1).
- PAEs can be an important monetisation tool for European SMEs, Universities, and Research Organizations. PAEs in Europe can promote the overall business success of SMEs, universities and research organizations. PAEs provide monetisation opportunities that SMEs, Universities, and Research Organizations could not reach because they have limited capability to engage in IP monetisation.⁸² However, their patents are generally thought to be of limited interest to PAEs considering the low litigation value they have.

"The activity of PAEs in Europe is likely to promote the overall business success of SMEs. This is the case for a number of reasons, e.g., PAEs reduce transaction costs, and help SMEs in the monetisation process which further enable them to grow" (Expert Interview 2).

- PAEs may also assist SMEs to address procedural frictions in case of litigation.⁸³ This is due to the business model of certain PAEs being based on the conduct of activities that are beneficial for firms wishing to valorise their IP assets.⁸⁴ Such entities provide a one-stop destination for licensors and licensees, thereby contributing considerably towards minimising freedom to operate costs. Thus, PAEs that engage in these activities play a key role in promoting innovation by fostering incentives to innovate.
- **The assertion of high quality patents has a positive impact.** When a PAE asserts a high quality patent, it should be perceived as facilitating the distribution or sale of products and services whilst ensuring that innovators are rewarded appropriately.
- **The assertion of low quality patents has a negative impact.** If a low quality patent is asserted, it can be thought of as exploiting the transaction costs and IPRs that should have not been granted. It results in costs that are passed on to consumers. Royalty stacking may worsen this problem. When a company settles a low quality patent, it can have ripple effects (i.e. assertion activity in the sector, or in a closely related sector, may lead to companies approaching the PAE on their own requesting a licensing agreement in fear of being asserted against). Because PAEs are not exposed to most risks (i.e. counter-claims of infringement), they may be willing to assert a low quality patent. It is not clear that PAEs knowingly or purposely assert low quality patents.

⁸¹ See Case Study 6, Case Study 11.

⁸² See Case Study 6, Case Study 7.

⁸³ See Case Study 1, Expert Interview 2.

⁸⁴ See Case Study 4, Expert Interview 2.

PAEs' portfolios likely comprise patents across the entire quality spectrum.

- The emergence of assertion tactics involving low quality patents by PAEs was suggested to be the result of a significant shift in standardisation processes due to the entry of new players.⁸⁵ In this respect, it is important to stress that if a PAE asserts a low quality patent, it should be regarded as a way of exploiting an existing inefficiency of the patent system (i.e. the inevitable fallibility of patent granting authorities), rather than a cause of such inefficiency.
- Fragmented and unclear ownership of patents is likely to impede practicing firms' freedom to operate by imposing significant searching costs in their attempts to identify patent owners. Prior to the emergence of PAEs, practicing firms could easily identify other practicing firms that could be potential licensees. However, the current fragmentation of patent ownership (particularly of SEPs) renders IP monitoring activities more challenging and costly.⁸⁶
- In case a PAE asserts a low quality patent, such action has been characterised as an effective tax on innovation. This cost is hard to avoid as invalidation procedures are costly and ultimately lead to only a few firms (mainly large ones) being able to counter an assertions of a low quality patent. In contrast, the majority of targets are inclined to settle and likely pass on the costs to consumers.⁸⁷
- Another aspect of assertions of low quality patents relates to the fact that, occasionally, PAEs will try to enforce a patent against multiple targets within an industry, as opposed to solely those firms within the industry that are actually infringing. PAEs may also assert their patents against large practicing firms, hoping that the increased media attention will push other firms within the industry to approach the PAE and request a licensing agreement in fear of being asserted themselves.⁸⁸ Therefore, legal precedents are of major importance as they can reduce uncertainty over legal outcomes and act as a deterrent in case a PAE asserts a low quality patent. Ultimately, this would provide a protective barrier surrounding the European innovative landscape. However, even one PAE-favourable legal precedent is enough to significantly increase assertions, even those related to low quality patents.⁸⁹

⁸⁵ See Case Study 8.

⁸⁶ See Expert Interview 1.

⁸⁷ See Case Study 6, Case Study 8.

⁸⁸ See Case Study 4, Case Study 9.

⁸⁹ See Case Study 8, Case Study 10.

7. Differences between the US and Europe

Traditionally, the US market has been considered a more attractive environment for patent assertion activity, relative to the European one. Such an outcome has been mainly attributed to the high cost and complexities of the US litigation system. However, given a number of institutional and legal changes that have recently occurred and the imminent introduction of the Unified Patent Court (UPC) and the Unitary Patent (UP), the European patent assertion landscape might change significantly in the near future. Accordingly, this section presents:

- Differences in the institutional and legal frameworks of the US and Europe.
- Differences in the market dynamics of the two jurisdictions.
- The potential effects of the establishment of the UPC and the UP.
- An overall assessment of the potential evolution of patent assertion activity in the US and Europe in the near future.

7.1 Institutional and legal frameworks in the US and Europe

Historically, patent monetisation by specialised PAEs has been predominantly a US phenomenon, whilst Europe has been a much less attractive market for assertion activity. Recent studies point to the conclusion that PAEs are currently present in Europe, but their activity is modest compared to their activity in the US. This observation has been mainly attributed to the US legal system, which incentivises a “sue-first” approach in a court of choice, thus preventing the alleged infringer from filing an invalidity counterclaim in another court.⁹⁰ In contrast, the fragmentation of the European legal system does not allow for such behaviours to manifest.

However, the presence of PAEs in Europe appears to be on the rise over the recent years (though data only covers Germany up to 2008), mainly in Germany. Love et al. (2015) illustrate the heightened extent of PAE activity proxied by the number of court cases involving them, which has more than doubled in 2008, relative to 2004. This was also verified during our stakeholder engagement,⁹¹ which indicated the rising number of assertions in Europe over the recent years, originating primarily from US-based entities.

Institutional and legal differences between the US and Europe are thought, among other things, to have played an important role in this respect.

Legal certainty of patent rights

The most common explanations for the reduced presence of PAEs in Europe rely on the increased quality of the patent granting procedures in the EU, relative to the US. In the US, the “non-obviousness” standard seems to be laxer than the European “inventive step” requirement. In addition, the US concept of “utility” is much broader than the European “industrial application” standard (Bisthoven, 2013). Therefore, the patent granting process in Europe, which is more focused on the practical embodiment of the invention, is considered to be stricter than in the US.⁹² As a result, some subject matters that were patentable in the United States in the past were not likely to have also been patented in Europe.

The European patent system provides more legal certainty than the US's. In turn, this is likely to have discouraged the activities of certain typologies of PAEs (which have been witnessed in the US) that base their business models on the consistent assertion of low quality patents with broad and vague claims. The availability of opposition proceedings in Europe has also fostered legal certainty by providing the opportunity to any interested

⁹⁰ Recent regulations in the US have limited the possibility of industry-wide assertions to occur.

⁹¹ See Case Study 8.

⁹² See Case Study 6, Expert Interview 2.

party to invalidate patents at the early phase of their life. Post grant reviews have also been recently introduced in the US.

Juries in the US legal system introduce uncertainty because of their biases or lack of expertise. European courts involve judges. This enhances the likelihood of a consistent decision and possibly accurate. Judges, mainly in Germany, are generally perceived as highly adequate to assess technical patent-related issues.

Damage awards, litigation costs and funds availability

Various academic studies indicate that patent-related litigation costs in the US are significantly higher than in Europe.⁹³ Love et al. (2015) find that damages awards are most frequently below the equivalent of \$1 million, which would place them among US patent suits with the smallest amounts at stake (Barry, et al. 2014). Noticeably, the same study finds that the damages awarded to PAEs are also greater than those awarded to practicing firms in patent litigations.

The average cost of litigation in Europe amounts to roughly \$0.5 million, whereas in the US the amount reaches roughly \$5-10 million.^{94,95} Our interviewees indicated that the average costs for defending one patent infringement lawsuit in Europe range from \$550,000 to \$3.5 million whereas in the US litigation costs stand at \$10 million.

In addition, the US litigation system does not enforce the loser of the trial to cover the other party's litigation expenses. This was suggested to be a highly significant difference between the two jurisdictions as it incentivises striking licensing agreements, as opposed to engaging in litigation.⁹⁶

As some PAEs are highly specialised in patent litigation, the presence of high litigation costs can play at their advantage and against the targeted practicing firms which, under the high financial and managerial pressure may be forced into settling by taking a license. This is due to PAEs with an extensive litigation experience being better able to make a superior assessment of the expected outcome of legal proceedings. This information advantage is highly useful in the US where there is a longer track record of litigation outcomes compared to Europe. The availability of such historical data allows US-based PAEs to make more accurate cost-benefit assessments and to secure funds from external investors to peruse legal action whenever the expected returns of the assertion outweigh the associated costs.

Moreover, the relatively low costs of litigation in Europe were indicated to be likely to provide greater licensing incentives, as opposed to incentives to engage in practices that aim to extract maximum litigation (e.g. targeting end-users). It was therefore suggested that threatening small companies and technology end-users is mainly a US phenomenon, which is unlikely to manifest in Europe.⁹⁷

Jurisdictional fragmentation and market size

Another explanation relates to the absence in Europe of a single jurisdiction for patent litigation (Fusco, 2014) and the lack, at the time the study was conducted, of a European patent with unitary effect. The legal fragmentation of patent protection in Europe means that a single assertion pertains to the alleged infringement of patent rights in a domestic market, which is significantly smaller than the US market.⁹⁸

⁹³ See e.g. Bisthoven, N.J. (2013) "Patent trolls and abusive patent litigation in Europe: What the unitary patent package can learn from the American experience?" Transatlantic Technology Law Forum Working Paper No. 19.

⁹⁴ See Case Study 1.

⁹⁵ See Case Study 1.

⁹⁶ See Case Study 4, Expert Interview 3, Expert Interview 5.

⁹⁷ See Case Study 2.

⁹⁸ See Case Study 10.

In order to assert patents in a market with a value comparable (in terms of size) to the US market, infringement claims must be brought forward in several European jurisdictions. Ultimately, this dis-incentivises carrying out assertion activity on a pan-European scale as it requires an in-depth knowledge of a variety of national patent laws and patent court systems. As a consequence of legal fragmentation in Europe, whenever PAEs have asserted their patent rights in Europe they have tended to do so in the largest domestic markets (Germany being the primary example in this respect, though other factors — discussed further below — may explain why German courts may have been perceived as more attractive from a PAE perspective).

Graham and Van Zeebroeck (2014) show that the frequency of patents reaching judgement in litigation varies widely across European countries. The authors illustrate that the likelihood of patent litigants raising patent validity and infringement claims differs widely across countries in the EU as do the outcomes of such litigations. Courts in England, for example, find against the patent's validity in nearly three quarters of the cases in which "patentable subject matter" is raised,⁹⁹ while the likelihood that the patentee wins on the same grounds in France is much lower, accounting for roughly one third of cases.

Wealth and market size affect PAE incentive to enforce patents in certain jurisdictions (Fusco, 2014). PAE activity appears to be concentrated in the UK, Germany, France, Sweden, Italy, Switzerland, Finland, the Netherlands, Norway and Spain, while it appears to be very limited in Austria, Belgium, Poland and Portugal. Yet, this theory may have some outliers and instead industry concentration plays an important role as well (Fusco, 2014).

Ease of obtaining injunctions

Injunctions in Europe are applied in a discretionary manner and only after careful consideration of the potential impact they might have on the defendants' operations.¹⁰⁰ This limits the credibility of threats that PAEs impose on practicing entities. However, consideration should be given to the German patent court system:

- First, in Germany the threat of injunctions being granted is believed to be more material than in other European courts.
- Second, since infringement proceedings tend to be less complex and quicker than validity proceedings, the presence of a bifurcation system in Germany means that, even if infringement and validity hearings are scheduled to begin on the same date, injunctions may be granted before the completion of the validity proceedings (this is known as the "injunction gap").¹⁰¹ This factor explains why patent assertion cases in Europe tend to occur in Germany.¹⁰²

Moreover, in Germany, an extensive technical document must be submitted to the court prior to the initiation of the hearing. In contrast, filing an infringement in the US remains a relatively easy process. Similarly, German patent courts are well known for their high level of technical expertise, which limits significantly the number of assertion cases based on low quality patents.

Overall, such differences in legal and institutional settings across countries are expected to affect PAE litigation activity. Graham and Van Zeebroeck (2014) have also

⁹⁹ Patentable subject matter, also known as statutory or patent-eligible subject matter, refers to elements that are susceptible of patent protection. For instance, the laws or patent practices of many countries provide that certain subject-matter is excluded from patentability, even if the invention is novel and non-obvious.

¹⁰⁰ See Expert Interview 4.

¹⁰¹ See Case Study 1, Case Study 8, Case Study 10, Expert Interview 4.

¹⁰² For cases where invalidation has a significant chance of success, however, courts declare infringement and grant an injunction pending on the final outcome of the invalidation hearings.

amalgamated these differences. The most prominent differences are argued to exist in the average cost of litigation, which is significantly greater in the US, and the presence of a separate court for invalidity hearings in Germany, as a result of its bifurcated legal system. Moreover, the US separates itself significantly from European jurisdictions as a result of the greater number of courts that handle patent cases and the presence of punitive damages awarded, which add to the already very high level of damages.

In light of the above, Love et al. (2015) argue that patent monetisation by PAEs is pursued less often in Europe, relative to the US, due to some combination of:

- higher barriers to patenting software;
- steeper cost of enforcement due to national segregation;
- cheaper cost of defence;
- smaller damages awards; and
- more frequent attorney's fee awards.

7.2 The advent of the UPC and the UP

Views as to whether the advent of the UPC will increase PAE assertions or not are neutral, on average and tend to rely on the following arguments:

- **The possibility of injunction with unitary effect** on a very large market being granted, irrespective of the likelihood of such an event occurring, would increase the litigation value of a patent, thus increasing PAE activity. In contrast, the possibility of invalidity with unitary effect, although in principle would serve as a counter measure.¹⁰³
- **The potential presence of a bifurcated system.** As the UPC is proposed to follow the German bifurcated system, which grants injunction prior to assessing invalidity, there is a greater possibility that Europe-wide injunctions will be granted. The likely resulting increase in PAE activity can be counter-balanced, however, by the extensive and highly technical evidence of infringement that needs to be provided to German courts prior to the commencement of injunction hearings. This is another factor rendering invalidity hearings less important.¹⁰⁴ It needs to be stated in this respect that injunction proceedings as well as the separation of injunction and validity hearings within the UPC have been programmed to be decided on a case-by-case basis by qualified professional judges.
- **The possibility to engage in forum shopping,** either on the base of the court's ability to handle cases in a predictable manner, or due to potential judgment biases that may arise as a result of court competition to attract more cases. The presence of regional and local courts lacking technical expertise could potentially result in some of them gaining a reputation for being excessively patentee-friendly.¹⁰⁵ Nevertheless, the possibility for forum-shopping to occur is likely to be restrained to a great extent given:
 - **The quality and technical expertise of judges** — since the UPC will consist of a number of local and regional courts, technical expertise may not be uniform across the different courts.¹⁰⁶ The Local court based in Germany has been indicated as an example of a preferred venue for litigation given, among other things, the extensive expertise of German patent judges. Litigation is carried out by PAEs only after thorough analysis of the potential benefit

¹⁰³ See Case Study 5, Case Study 10.

¹⁰⁴ See Case Study 1, Case Study 8.

¹⁰⁵ See Case Study 12, Expert Interview 5.

¹⁰⁶ See Case Study 12 and Expert Interview 5.

and costs of doing so, and the reliability of the patent judge plays an important role in rendering such an assessment more accurate.

- **The implementation of case uniform standards to all UPC-related courts the presence of a centralized appeal system** —Concerns have been raised that some local divisions may apply the law in a more patentee-friendly way in order to attract more litigation activity.¹⁰⁷ Such an outcome can be limited, however, in the presence of a central court of appeal and the application of uniform standards to all UPC-related courts, thus increasing consistency in judgements.¹⁰⁸

However, as the establishment of the UPC and its procedural specifications are not yet finalised, its overall effectiveness will ultimately depend on the final rules governing its operations and the extent of technical expertise characterising its judges.¹⁰⁹ Lastly, there were also views expressed implying that the advent of the UPC will not have any material effects¹¹⁰ as a result of:

- The European patent system being better equipped towards preventing the granting of low quality patents.
- Courts in the EU being more critical and not easily granting injunctions.
- Given the high attention that is being paid to getting uniform standards applied by the Courts under the UPC, PAEs in Europe are less likely to engage in forum-shopping, while market participants are keen on ensuring that the same court ruling standards be applied to the UPC.

In contrast to the UPC, the introduction of the UP was suggested to have a minimal impact, primarily due to the fact that firms operating within the ICT sphere file patents in countries with the biggest markets and expected revenues, namely Germany, France, the UK, Italy and Spain. Thus, the establishment of a UP with a Europe-wide effect was characterised as a step of limited usefulness for most sectors.¹¹¹ However, one important factor that is likely to affect the effectiveness of the implementation of the UP is the related costs, mainly the maintenance fees.¹¹²

7.3 Factors likely to affect the patent assertion activity in the US and Europe in the near future

There have been some recent developments in the US that have been described as game-changing events with the potential to increase assertion activity in Europe over the coming years. More specifically:

- The America Invents Act, which was passed by Congress in US on 16th of September 2011, is thought to make it more difficult for PAEs to monetise their assets.
- A number of US court decisions have set legal precedents that are likely to limit the granting of an injunction and the acquisition and assertion of software-related patents.¹¹³

¹⁰⁷ See Case Study 12 and Expert Interview 5.

¹⁰⁸ See Expert Interview 4.

¹⁰⁹ See Expert Interview 5.

¹¹⁰ See Expert Interview 4.

¹¹¹ See Expert Interview 1, Expert Interview 3.

¹¹² See Expert Interview 2.

¹¹³ This is due to software patents being more vague due to the prevalence of "functional claiming" in these patent classes. A claim term is "functional" when it recites a feature by "what it does rather than by what it is". Thus, functional claiming involves claiming exclusive rights over any device that performs a given function, regardless of how that function is performed, which is likely to facilitate the monetisation attempts.

- A patent reform law has been introduced, which extends the type of prior art that can be used as well as the way in which this can be used for the purpose of invalidating patents. A patent opposition phase similar to the one used for European patents has also been introduced.¹¹⁴
- The median damages award in the US is on a downward trend over the last 15 years.¹¹⁵
- The number of patent-related lawsuits filed in the US in 2014 dropped by 13% relative to previous years, constituting the first drop observed since 2009.¹¹⁶

The above developments in the US should be viewed in relation to the aforementioned upcoming establishment of the UPC and the UP. Overall, it is plausible to think that, anything else being equal, the characteristics of the US and European patent systems are shifting in a way that will make Europe a more assertion-friendly environment. However, there are a number of other factors that may limit the possibility of observing a large scale rise in patent assertion activity in Europe in the near future:

- It is not clear whether and when the declining trends in litigation cases and damage awards observed in the US will affect PAEs. Damage awards granted to PAEs in the US are still very high (compared to those granted to practicing firms) so it is likely that the US market will remain lucrative for quite some time. It needs to be mentioned however that the changes in the US patent/legal system have put a lot of pressure on the business models of PAEs, ultimately resulting in their business declining or even being discontinued.
- US PAEs still lack the know-how to litigate effectively in Europe and it will take time for them to reach the level of sophistication required to litigate effectively in Europe.¹¹⁷
- PAEs' decision to litigate is based on a careful assessment of the expected returns against the costs involved. In order for such assessments to be accurate it is essential to have a track record of litigation outcomes in Europe.¹¹⁸ Since such data is currently too scant it may take a few years of "tests and trials" at European courts for US-based PAEs to be able to decide whether the European market provides a lucrative opportunity.
- The possibility of patent invalidation with unitary effect could counterbalance the potential impact of Europe-wide injunction because it will expose PAEs to the risk of an invalidity counter claim resulting in the loss of patent protection across the whole Europe.¹¹⁹ Such an effect is expected to be considerably material in Europe given the lower discovery costs and the strictness with which validity criteria are applied, relative to the US.¹²⁰
- The presence in Europe of a loser pays system is a highly significant deterrent of patent assertion activity. The US litigation system does not require the loser of the trial to cover the other party's litigation expenses (the trial winner can request litigation expenses when he can prove the suit to be frivolous). Loser pay rules are also likely to deter holders of low quality patents towards engaging in an infringement lawsuit.¹²¹

¹¹⁴ See e.g. *Alice Corp. v. CLS Bank*.

¹¹⁵ See Barry, C., Swanson, K. and Arad, R. (2014)"Patent litigation study" PWC

¹¹⁶ See Barry, C., Swanson, K. and Arad, R. (2014)"Patent litigation study" PWC

¹¹⁷ See Case Study 8.

¹¹⁸ See Case Study 12.

¹¹⁹ See Case Study 10 and Expert Interview 4.

¹²⁰ See Case Study 8 and Case Study 12.

¹²¹ See Case Study 4 and Expert Interview 3.

8. Key findings

8.1 How do PAEs operate and make profit?

The first overarching finding is that there is no consensus in the existing literature on how to define PAEs and describe their business models. Existing definitions of PAEs tend to encompass primarily non-practicing entities (NPEs). However, the precise way in which they operate and generate revenues can differ greatly. For example, the term PAE can be used to describe a wide range of entities:

- IP/technology and licensing firms that invest resources to develop new technologies and build patent portfolios for monetisation purposes.
- Licensing firms that assist IP owners in monetising their assets.
- Assertion entities that acquire low quality patents from a variety of sources with the sole purpose of exploiting their litigation value.
- Patent aggregators that acquire problematic patents (i.e. patents that are already litigated or patents that are for sale and may fall into the hands of PAEs) in order to remove them from the market, thus deterring active IP enforcers from acquiring them and lowering the probability of their members being faced with costly and damaging litigation.
- Patent privateers which are shell companies, set up and funded by practicing firms. These PAEs are associated with vigorous enforcement practices primarily against competitors.
- Patent pools that aggregate and administer patent portfolios on behalf of third parties and monetise patents through well-publicised licensing programmes. In some cases, it can be difficult to distinguish pools from other types of PAEs.

Furthermore, the boundaries between different PAE business models are not clear:

- PAEs adhering to a specific business model can occasionally, and depending on the situation, also adopt a different assertion strategy.
- PAE business models are fast evolving.
- The boundary between strategic assertion strategies traditionally adopted by practicing firms and assertion activities carried out by PAEs is blurry (e.g. practicing firms can sometimes assert patents in a similar way to PAEs).

Notwithstanding the above, some recurring patterns across PAEs' business models observed in Europe have emerged from our analysis. These patterns appear to be related primarily to the following dimensions:

- Sources of funding.
- Extent and nature of R&D investments.
- Provision of patent-related services to third parties or lack thereof.
- Revenue-generating strategies.

Whilst PAEs' sources of funding can vary greatly (these include hedge funds, venture capital firms, banks, universities and research institutes, governments, and private or publicly-listed companies), there appears to be a correlation between the specific sources of funding and other aspects of the business models.

For example, PAEs funded by hedge funds and venture capital firms tend to adopt a short-term profit-oriented business model that relies on aggressive assertion in order to lever on the litigation value of patents.

These entities view patents primarily as monetisation assets and have little interest in their technological applications. Accordingly, any R&D activity carried out is more likely to focus on activities which aim to increase the litigation and monetisation value of patents (e.g. developing a good prosecution practice, or making effective use of continuation and divisional applications), rather than enhancing their technological applicability or conducting strict validity testing. Moreover, some of the interviewed stakeholders indicated that there can be instances where R&D activity, however defined, may not be conducted as a viable source of revenue but rather, as a PR strategy.

Licensing fees collected from alleged infringers represent the primary source of revenue for these types of PAEs. In Europe, firms operating in the Telecoms sector are the favourite assertion targets and the number of these assertions (initiated primarily by US-based entities) appears to have risen in recent years. Though the specific strategies used by PAEs in their interactions with targeted firms are heterogeneous and evolving, they share the following common features:

- The segment of the supply chain targeted — assertions are primarily targeted at the lower segment of the supply chain (i.e. telecom operators), which helps create leverage towards manufacturers/suppliers.
- Forum shopping — the majority of assertions in Europe have been initiated in Germany. This can be explained by the large size of the German market and by PAEs' deliberate attempts to exploit the bifurcation system to their advantage and by the relative availability of injunctions. In this system, injunction proceedings are initiated separately from invalidity hearings. This can be exploited by PAEs, because targeted companies are at a disadvantage due to the limited time they have for gathering evidence of invalidity. Moreover, proceedings for infringement are much faster than proceedings for invalidity. Therefore, delays between decisions are inevitable even if proceedings are commenced in parallel. This puts alleged infringers on the back foot as an injunction can be granted prior to an invalidity decision.

As far as the quality of these PAEs' patent portfolios is concerned, opinions are divided. On the one hand, PAEs tend to claim that they are only interested in asserting high quality patents, while, on the other hand, targeted entities tend to claim that the patents PAEs assert against them are often low quality. At the same time, some targeted entities do acknowledge that not all PAEs have low quality patents and that it is, at least in principle, possible to observe a separation between PAEs that assert low quality and those that assert high quality patents.

Evidence from the literature points to the high revocation rate of patents held by PAEs: this amounts to 73.3 and 55.35% in the UK and Germany, respectively. These studies, however, do not provide a comprehensive data set on PAE patent litigation in Europe based on IPC classes, and we have relied on our interviews for additional insights. Moreover, the data that they examine only looks at litigated patents which can be reasonably expected to have fundamental differences to patents that never reached litigation. Their findings should therefore be viewed with caution and should not be extrapolated across the entire patent portfolios of PAEs when making comparative statements.

These high invalidity rates may not be sufficient to deter PAEs from exploring assertion opportunities and strategies in Europe. Some stakeholders believe that the relatively low success of many US-based PAEs is due to a lack of sophisticated knowledge of European legal systems. However, they appear to be refining their approach and to be improving their assertion strategies:

"US-based PAEs are becoming more sophisticated in their assertion strategy. Initially they made several mistakes in approaching European targets; they are, however, learning fast and do not repeat the same mistakes in subsequent interactions" Case Study 10 (EU-based international telecommunications company).

In addition to the PAEs described above, there are other entities that engage in several peripheral activities that complement patent assertion. Even though the specific business models of PAEs in this group can vary greatly, these PAEs appear to share a number of distinctive features.

First, they are more likely to have established some form of cooperation with universities and research organisations — and some are even government funded. Second, they are not focused solely on exploiting the litigation value of patents for monetisation purposes, but provide specific services to third parties and engage in research activities aimed at exploiting the full potential of existing technologies.

As a result of the wide range of services provided, PAEs receive revenue from a variety of sources. These include IP administration and management fees, consultancy fees and shares of revenue, which originate from licensing programmes. The latter may also be subject to contingent fee mechanisms that have been agreed with the original patent owners. Even though these entities may occasionally rely on litigation, they tend to do so as a last resort. Patent monetisation is typically achieved through well-publicised licensing programmes and approaches to potential infringers in the form of lengthy interactions where information is shared in an open and transparent manner.

For example, an initial technical discussion is typically accompanied by exchanges of claims charts and other technical documentation. Once an agreement on the technical aspects has been reached, a final phase of discussions over the monetary aspects of the licensing agreement takes place. Litigation is used as a last resort and only if a final agreement is not reached.

PAEs report that they conduct strong prior art research and stringent validity tests:

"[...] one of the initial and resource-intensive tasks the company needs to accomplish prior to assertion relates to the examination of the extent to which an invalidity claim by a potential infringer may be successful. This is primarily achieved through a thorough investigation of prior art. This due diligence process does not vary significantly across jurisdictions as proving the validity of a patent is an intensive task irrespective of judicial idiosyncrasies. As a result, when the company asserts a patent that is infringed, there is a strong internal conviction that this is indeed the case" (Case Study 3: EU-based patent licensing and monetisation company).

We do not have sufficient evidence to determine whether these peripheral types of activities are a substantial part of PAEs' business models as a revenue generating stream or if they are undertaken merely as a form of PR to improve the acceptance of PAEs.

8.2 Which organizations assign patents to PAEs and why?

When assessing the origins of the patents asserted by PAEs, a distinction needs to be made between patents asserted in Europe and patents asserted in the US.

The majority of patents asserted in Europe (especially those asserted by US-based PAEs) are believed to originate from large practicing firms operating in the telecom sector. However, there is a general lack of transparency with regards to both the ownership status (i.e. whether PAEs own the patents asserted, as opposed to monetising them on

behalf of third parties) and the precise origin of such patents (i.e. the original patent owner). This lack of transparency is due a number of reasons:

- PAEs may be affiliated with other practicing entities (i.e. they may act as patent privateers) but such links are often difficult to identify. For instance, if the shell PAE is headquartered in a jurisdiction other than that in which litigation occurs, there is no means of obliging the shell PAE to disclose its exact corporate structure and affiliations.
- Transparency is also constrained by the fact that, whilst in theory, during the discovery process a patent's true owner should be identifiable; in practice this might not be feasible due to the practice of establishing shell companies in different jurisdictions.

Large practicing firms assign patents to PAEs for various reasons. Since a clear mapping of all the transactions that take place in the secondary market is not feasible, identifying these reasons is a challenging task. Notwithstanding these limitations, the interviews have highlighted the following motives as being potentially valid.

- Market events that led to changes in business models — in the Telecoms sector in the 90s and early 2000s. A few players were responsible for generating and subsequently practicing the vast majority of Telecoms-related patents. As a result, these firms recouped their R&D and patenting costs by practicing the related technologies in the marketplace. In the mid-2000s, however, the entry of new players and the rapid erosion of market shares (and subsequent market exit) of some of the established players resulted in the latter adopting new business models, which relied more heavily on IP licensing as a source of revenue.
- Changes in licensing practices — new entrants in the telecommunications markets are increasingly questioning the validity and essentiality of incumbents' SEP portfolios. Since new entrants often do not possess patent portfolios that are large enough to engage in cross-licensing agreements, they often prefer to adopt an "infringe and then settle" approach as opposed to agreeing to what they perceive as excessively high licensing fees. This has led to a shift in the licensing environment: whilst cross-licensing between practicing firms used to be the norm, nowadays the licensing environment is more confrontational, and specialised PAEs can be used in attempts by SEP owners to increase monetisation outcomes:

"New entrants into the telecommunications markets are increasingly questioning the validity and quality of incumbents' SEPs, i.e. the fees for portfolio licensing. Meanwhile established licensing holders have continued the practice of inflating the number of patents in their licensing portfolios. Initially, this was seen as a means to match other manufacturers' portfolios for the purpose of achieving better terms for a cross-licence. However, the lack of quality of patents in some portfolios is meeting stiff resistance from implementers without the ability to cross licence. This seems to impact licensing revenues of companies with large patent portfolios (including SEPs) and has incentivised incumbent patent holders to seek other means of monetisation (e.g. through PAEs)". (Case Study 8)

Similarly, it was mentioned during Case Study 6 (EU-based international technology company):

"One of the concerns [the company has] relates to the behaviour observed by American technology-implementing companies. In effect, they apply significant lobbying pressure to stakeholders, especially those involved in the

standardisation process, towards adopting policies that would result in decreased rewards for patent owners. In turn, this results in a decrease in the value of patents as the monetisation opportunities generated by owning a patent are reduced. On the one hand, this has straightforward benefits for implementers as it reduces their costs. On the other hand, maintaining the incentives for inventors is of high importance and as a consequence, supporting the advent of new, marketable technologies".

- Reputational costs — some practicing firms may wish to maximise the monetisation potential of their IP assets without the reputational costs associated with being perceived as licensors by other market participants. By outsourcing monetisation activity to external entities these costs can be avoided.
- Strategic purposes — patent assertion against competing firms can be carried out in a concealed manner via the establishment of shell companies ("patent privateers").

Notwithstanding the above, it must be noted that PAE assertion in Europe also involves — though to a lesser extent — patents owned by small firms and universities. However, in these situations the original patent owners tend to retain full ownership rights of their assets. Moreover, patent portfolios may be managed by PAEs in a non-exclusive way so as to allow the original patent owner to also seek alternative means of monetisation.

SMEs' patents are usually ahead of the commercialisation curve (i.e. they are quite innovative and there is no actual commercialised technology that is widespread and would offer profitable opportunities). This decreases the litigation value of these patents, thus rendering them potentially less attractive, relative to those of large practicing firms.

Instead, the inability of European SMEs and Universities to challenge infringements and the opportunistic behaviours of large corporations appears to be the most important motive for seeking the services of specialised firms that can devote resources and licensing expertise to ensure that inventors are rewarded appropriately.

"[in the absence of a collaboration with PAEs, the company] would not have been reasonably able to engage with any US-based companies in order to negotiate licencing arrangements". Case Study 5 (Government space agency)

"[without the monetisation assistance offered by PAEs, the company] would not have been able to go through with such a process in-house as it is too complicated, too new and too costly for them". Case Study 7 (France-based software development company)

The economic literature suggests that SMEs play a more prominent role in providing IP assets to PAEs in the US than they do in Europe. This is largely due to the fact that, in Europe large practicing firms account for the vast majority of patent filings. In this sense, innovative SMEs in the US can also use the high expected value of their IP assets as collateral in their attempts to raise funds.

8.3 Which ICT sectors and firms are most affected by PAEs activity?

In Europe, the Telecoms sector is the ICT field which attracts the most PAE activity. This is consistent with evidence from literature suggesting that roughly 60% of PAEs' assertions in Germany and the UK involve patents related to [telecommunications technology](#), whereas practicing firms most often assert patents related to manufacturing technology and pharmaceuticals.¹²² The experience of a leading European telecom

¹²² See Love et al. (2015).

operator interviewed provides a sense of scale: in 2008 this operator interacted with only one Germany-based PAE, but since then, disputes have emerged with a growing number of entities (primarily US-based). By 2013, almost all of the claims against the operator were made by entities that do not have any practicing business.

Information gathered from a wide range of stakeholders (both within and outside the Telecoms field) confirmed that patent assertion initiated by PAEs in Europe occurs primarily within the Telecoms sphere. The following reasons have been provided as an explanation for this:

- There are many patents in the field which comprise complex technologies and combinatory innovations
- European firms played a key role in the development of Telecoms standards in the 80s and 90s and, as a result, a very large number of EPO patents were granted in this field.
- Many European players that participated in the development of the standards are no longer active in the same markets. As a result, some have resorted to PAEs in order to monetise a share of their remaining IP assets.
- Free-riding and opportunistic behaviours, allegedly by the new market leaders in the Telecoms sectors, have incentivised European Telecoms firms to turn to PAEs in order to secure what they perceive as a fair return on their R&D investments.
- Large portions of the Telecoms portfolios that have been passed to PAEs comprise SEPs, which can be asserted against a wide range of products.
- Telecoms patents are more likely to be practiced — and potentially infringed — by many firms, most frequently large ones (partly because Telecoms patents read on a wide range of products and services), thus increasing litigation value.
- The European Telecoms industry is extremely large in terms of customer base and economic value generated. These reasons and the fact that it is a vertically differentiated industry, give PAEs the option to target the most vulnerable segment of the supply chain.

Regarding the specific Telecoms technologies involved, whilst assertion claims used to be focused on the standard of core radio technology (NACE code 6010), recently a wider range of technological areas is being targeted: software (NACE code 5829), services (NACE codes 6311, 6312, 6391, 6399), core network (NACE codes 6110 and 6120), and handsets (NACE codes 2611, 2612). Moreover, some recent cases in Europe have shown that PAEs also assert older, dormant patents that read on widely adopted technologies by applying them to technological fields that these patents were not initially intended for. As a result, the number of potential infringers is increased, ultimately increasing the litigation value of the patents asserted.

Another factor that contributes to this outcome is the increasing interoperability present in ICT sectors. This results in patents that were originally intended to cover a specific technological field ultimately reading on a broader technological spectrum. In this sense, the automotive (NACE code 2910) and the white goods (NACE code 2751) sectors are likely to see increased PAE activity in the future as a result of the increased scope for electronic communications within and between cars or appliances that recent technological developments have enabled (e.g. the Internet of things). In contrast, semi-conductor patents are thought to offer limited revenue opportunities to PAEs as they are mostly applied to chip-sets. As chip-sets are not expensive, were litigation to be successful, the current SSPPU regime would only generate limited revenue.

As regards which firms are affected the most by PAEs' assertions, Telecoms operators appear to be the favourite target in the supply chain for a number of reasons:

- Convenience — bringing action against the Telecom operators as the distributors of infringing products is practically more feasible than targeting multiple manufacturers.
- Increased bargaining power — suing a Telecom operator because it practices patented technology. The high risk, to which operators are exposed if an injunction is taken out, puts PAEs in an advantageous bargaining position. In the context of SEPs in Europe, however, it must be said that under FRAND terms one cannot obtain an injunction for SEPs unless the alleged infringer is unwilling to take a license.

"PAEs claim that they are bringing actions against large operators as it is difficult to bring action against so many manufacturers. However in reality this choice is likely to be driven by the fact that operators are considered as the "soft underbelly" of the supply chain (due to the size of the markets that they have access to, and to the severe consequence of a risk of injunction may bring). If action is brought against operators who distribute standard compliant handsets, the consequence to an operating for halting distribution would be very damaging. An injunction on one function of one of the components used in a device distributed by an operator can result in switching off the entire network. Therefore the high risk to which operators are exposed to thus incentivise them to apply pressure on manufacturers to successfully conclude their respective licencing negotiations (as a result, lot of the decisions to contest these cases are driven by the supplier themselves)" (Case Study 10: EU-based international telecommunications company)

- Increased uncertainty — when facing assertion claims, an operator must engage the supplier to evaluate the merits of the claims. However, the supplier may not be in the position to provide an accurate assessment (e.g. because there is uncertainty at which level a court would define the royalty base). PAEs can benefit from this uncertainty as it limits significantly the alleged infringers' ability to engage in a fruitful technical discussion.

In contrast to large Telecoms firms, European SMEs are not the primary targets of assertions involving low quality patents at the moment. Rather, they appear to be the ones benefiting from the presence of certain types of PAEs as these assist them in:

- Effectively identifying potential licensees and entering into licensing negotiations with them.
- Adequately recouping their R&D investments by securing licensing revenues that are higher and fairer than those they would have been able to achieve in the absence of PAEs.

The importance of the above increases in light of evidence suggesting the presence of hold-out incidents by mainly large practicing firms in the ICT sphere who often engage in opportunistic behaviours of this kind. However, there might be an indirect cost associated with this outcome as the legal uncertainty introduced into the patenting system by the presence of PAEs may impede SMEs' attempts to raise funding at the early stages of technology development.

In this sense, the interplay between PAEs and SMEs in Europe is different relative to the US. Despite this not being the primary goal of the analysis, it emerged during our interviews that the presence of PAEs in the US, insofar as it provides a potential demand for IP assets and increases their value as collateral, can help SMEs and highly innovative start-ups to secure financing.

At present, there is no evidence that European SMEs are a primary target of assertion claims brought by PAEs. However, as US-based PAEs explore opportunities in Europe, the possibility that SMEs might become prominent targets in the future cannot be excluded. For instance, asserting and settling against small players can help establish precedents that can then be leveraged against larger firms.

8.4 The characteristics of the patents asserted

When assessing the impact of PAEs, patent quality is very important. This conceptual aid that arose from our analysis and does not reflect a hypothesis on the types of patents held by PAEs or on the extent of prevalence of low quality patents in the system. We should also clarify that, in this context, patent quality does not refer to the monetary value and monetisation potential of the asset but rather to the likelihood that it would survive an invalidity counterclaim if challenged in court.

It is clear that the assertion of a low quality patent has negative welfare implications regardless of the outcome of the assertion. More specifically:

- If assertion leads to the targeted entity agreeing to pay a licensing fee, this effectively results in a firm paying for the use of patent rights that should not have been granted in the first place. This outcome may lead to even greater welfare loss due to “ripple effects”: litigation against one market participant often leads to other market participants seeking to license for fear of being litigated.
- If assertion results in the asserted patent being challenged and subsequently invalidated in court, the costs associated with the above ripple effects can be avoided. However, there is still a welfare loss in the costs associated with the invalidation procedure.
- Even if assertion does not take place, insofar as its potential threat is perceived as material, there is increased legal uncertainty within the patent system.

Even though we have evidence of some European Telecoms operators being extremely successful in defending themselves against the assertion of low quality patents by challenging the validity of the patents in Court, the welfare implication of large-scale assertions of low quality patents should not be underestimated:

- Since invalidation procedures are costly only a few firms (mainly large ones) are likely to have the financial resources and expertise to counter assertions. In contrast, the majority of practicing firms are more inclined to settle or pass on the costs to consumers.
- Given the litigation threats imposed by PAEs, companies must reserve funds either to litigate or to settle and, therefore, PAE assertions of low quality patents are reducing resources that could be used for R&D.
- Even one PAE-favourable legal precedent is enough to significantly increase assertions, even those related to low quality patents. This possibility is significant with regards to the development of new standards, such as the upcoming development of 5G, as it creates uncertainty which may dis-incentivise firms from participating in the relevant processes.

Notwithstanding the above, it is of key importance to draw a clear distinction between the societal costs associated with the presence of low quality patents within the system — which are to a certain degree unavoidable — and the costs that arise as a direct consequence of PAEs’ activities.

With regards to assertions of high quality patents (i.e. patents that are likely to survive an invalidity challenge in court), the welfare implications can be either positive or negative. More specifically:

- Patent assertion has a positive impact insofar as it helps address opportunistic infringement behaviours (i.e. hold-out problems) and rebalance bargaining power asymmetries by offering patent holders with little licensing expertise an effective means of securing appropriate rewards for their innovations.
- Patent assertion facilitates the enforcement side of the patent system on which both the innovation incentive and the technology transfer effects are based.
- Patent assertion may have a negative welfare impact if licensing agreements are enforced on an excessively wide range of market participants including non-infringing firms (e.g. in situations where it is not clear whether a standard is being practiced) or if royalty fees are excessively high.
- A careful consideration of whether the negative welfare impact described above is present is important in the presence of SEPs because:
 - when asserted, SEPs are more likely to result in licensing agreements including all companies within an industry (which may occasionally include entities for which the ground of infringement is not always clear).

8.5 Differences between the US and Europe

In order to assess how patent assertion could evolve in Europe, we have adopted a comparative approach. More specifically, the US has been traditionally considered a more attractive environment for PAEs than Europe. This is mainly due to the high cost and complexities of the US litigation system, which may put defendants in a patent infringement case under high financial and managerial pressure and may force them into settling by taking a license. Such an outcome is exacerbated by the nature of the US legal system, which incentivises a “sue-first” approach in a court of choice, thus preventing the alleged infringer from filing an invalidity counterclaim in another court.¹²³

Traditionally, the US market has been considered a more attractive environment for PAE activity than the European one due to a range of factors, namely:

- The legal certainty of patent rights — patent-granting procedures in Europe are stricter than in the US. Some subject matters likely to involve low quality patents with functional claims are patentable in the US but not in Europe. Opposition proceedings in Europe provide the opportunity to any interested party to invalidate patents at the very early phase of their life. These factors result in higher legal certainty in the European patent system than in the US system. In turn, it discourages the assertion of low quality patents.
- Damage awards, litigation costs and availability of funds — damage awards and litigation costs are significantly higher in the US than they are in Europe.¹²⁴ As some PAEs are highly specialised in patent litigation, the presence of high litigation costs can play to their advantage as PAEs with an extensive litigation experience are able to make a superior assessment of the expected outcome of legal proceedings. In addition, the US litigation system does not force the trial loser to cover the other party’s litigation expenses, whereas the European system does.

¹²³ Recent regulations in the US have limited the possibility of industry-wide assertions to occur.

¹²⁴ For instance, the average cost of litigation in Europe amounts to roughly \$0.5 million, whereas in the US the amount reaches roughly \$5-10 million. Similarly, damages awards in Europe are most frequently below \$1 million, which would place them among US patent suits with the smallest amounts at stake.

Combined with the ample availability of historical litigation data in the US, the above allow PAEs to secure funds from external investors and litigate whenever the expected returns outweigh the associated costs.

- Jurisdictional fragmentation and market size — legal fragmentation of patent protection in Europe means that each individual assertion pertains to a Member State's domestic market which is significantly smaller than the US market. This dis-incentivises PAEs from carrying out assertion activity on a pan-European scale as it requires an in-depth knowledge of national patent laws and patent court systems. Rather, whenever PAEs have asserted their patents in Europe they have tended to do so in the largest domestic markets (mainly Germany).
- Size of jury awards and the possibility of forum shopping — jury awards granted by US courts tend to be on average larger than those granted in Europe. Moreover, some US federal courts have been known to adopt an IP owner-friendly stance. This has incentivised PAEs operating in the US to engage in forum-shopping in order to increase the likelihood of positive litigation outcomes.

8.7 Recent and future institutional changes and the potential evolution of patent assertion in Europe.

The factors listed above provide a rationale of why the US patent system has traditionally been a more conducive environment for PAEs (especially those consistently asserting low quality patents) than Europe's. However, recent developments in the US and the imminent introduction of the Unitary Patent and Unified Patent Court in Europe have both been described as game-changing events that could increase assertion activity in Europe over the coming years. More specifically:

- The America Invents Act, passed by Congress in the US on 16 September 2011, is perceived as having made it more difficult for PAEs to monetise their assets.
- A number of US court decisions have set legal precedents that are likely to limit the possibility of obtaining an injunction and of acquiring and asserting software-related patents.¹²⁵
- The UPC will provide the possibility of injunction with unitary effect in a very large market and this should attract more assertion.
- There is a risk that, once the UPC has been established, PAEs might engage in forum shopping and select the most favourable local or regional court, (either because of a court's ability to handle cases in a predictable manner, or because of potential judgment bias that may arise as a result of competition between courts to attract more cases).

Notwithstanding the above, a number of factors are likely to limit the possibility of observing a large-scale rise in PAE assertion in Europe in the near future. More specifically:

- The possibility of patent invalidation with unitary effect is likely to act as an important deterrent against assertion attempts in Europe. The effectiveness of this deterrent is likely to be further amplified by the strictness with which validity criteria are applied in Europe, and the existence of a "loser pay system".
- Damage awards granted to PAEs in the US are still very high (compared to those granted to practicing firms) so it is likely that the US market will remain lucrative for quite some time.¹²⁶

¹²⁵ See e.g. *Alice Corp. v. CLS Bank and eBay Inc. v. MercExchange*.

- US-based PAEs may still lack the know-how to litigate effectively in Europe and it will take time for them to reach the required level of sophistication. Moreover, PAEs' decision to litigate is based on a careful assessment of the expected returns against the costs involved. In order for such an assessment to be accurate it is essential to have a track record of litigation outcomes in Europe. Since such data is currently too scant it may take a few years of "tests and trials" at European courts for US-based PAEs to be able to decide whether the European market provides a lucrative opportunity.
- Injunction hearings and the separations between injunction and validity procedures will be considered on a case by case basis by qualified professional judges. In particular, the possibility for forum-shopping to occur is likely to be restrained to a great extent, given the special training and composition of judges of the UPC's regional/local courts.

8.8 Conclusion

A direct way to limit large-scale assertion of low quality patents is to ensure that the standards maintained in [patent granting procedures are of the highest quality](#). This could be achieved in the following ways:

- by continuously promoting effective ways of conducting prior art search that fully utilises technological advancements. Prior art searches by the EPO are already considered of higher quality than those conducted by other patent offices around the world and EPO considers that continuously improving search quality is an ongoing priority.
- by using patent fees as a market-based mechanism which acts as a screening device to "raise the quality bar".

Policy could also be directed towards [minimising legal uncertainty](#). By minimising uncertainty, companies can improve their information sets and, by extension, can commit to decisions that better reflect market dynamics. At the same time, the behaviour of some PAEs that exploit this exact type of uncertainty can be reduced by:

- increasing patent ownership transparency;
- ensuring that the UPC courts strive for the highest quality, supported by highly technical, specialised judges who have substantial experience in the subject matter; and
- Increasing the clarity of FRAND licensing commitment for SEPs.

The institutional and legal framework in Europe has not allowed the more negative consequences associated with PAEs to materialise to the same extent as it has, according to some economic literature, in the US. Moreover, some of the negative consequences that we have identified are hypothetical in their current form and are based on stakeholder evidence which can be susceptible to bias. Further research would be helpful. In particular, it would be useful to conduct a quantitative empirical analysis to test whether, all else being equal, PAEs tend to assert lower or higher quality patents than practicing entities, or if there are particular types of PAEs that focus on asserting lower or higher quality patents. Moreover, further analysis is required of companies that enforce their patents with the help of PAEs in comparison with those that carry out their own enforcement.

It is expected that significant changes in the coming years in the European patent system will fundamentally alter the dynamics of the market. The introduction of the

¹²⁶ For instance, over the period 2010-2014 the median damages awards yielded to PAEs amounted to roughly \$9 million, whereas for non-PAEs they were roughly \$2 million (Barry et al., 2014).

Unitary Patent and the Unified Patent Court will have a considerable impact on PAEs. In addition, the ongoing debate on FRAND licencing and any subsequent changes will have significant effect on PAEs.

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List of abbreviations and definitions

ADR: Alternative Dispute Resolution

CPU: Central Processing Unit

EPO: European Patent Office

ETSI: European Telecommunications Standards Institute

EU: European Union

FRAND: Fair Reasonable And Non Discriminatory

GDP: Gross Domestic Product

GPU: Graphic Processing Unit

IC: Integrated Circuit

ICT: Information and Communication Technology

IEEE: Institute of Electrical and Electronics Engineers

IP: Intellectual Property

IPC: International Patent Classification

IPR: Intellectual Property Right

ISV: Independent Software Vendor

ITC: International Trade Commission

JRC: Joint Research Centre

MNO: Mobile Network Operators

NACE: Nomenclature des Activités dans la Communauté Européenne/ Classification of Activities in the European Community

NPE: Non Practicing Entity

OECD: Organisation for Economic Cooperation and Development

PAE: Patent Assertion Entity

PR: Public Relations

R&D: Research and Development

ROI: Return On Investment

SEP: Standard Essential Patent

SME: Small and Medium-sized Enterprise

SoC: System on Chip

SSO: Standards Setting Organisation

SSPPU: Smallest Saleable Patent Practicing Unit

UI: User Interface

UK: United Kingdom

UP: Unitary Patent

UPC: Unified Patent Court

US: United States

USD: United Stated Dollar

USPTO: United States Patent and Trademark Office

VC: Venture Capital

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APPENDIX 1: QUESTIONNAIRES

Questionnaire for PAEs

Section 1: Background information

We would like to start by asking for some general information about your company and your role within it.

Q1: What is your position and job description?

Q2: Please provide the year of founding of your company, the location of your headquarters and the location of secondary offices and/or affiliations:

Q3: Please indicate in which countries your company is currently active:

Q4: Please quantify the following points for as many past years as available:

- number of employees;
- investments in R&D; and
- annual turnover.

Q5: Please describe your company's corporate structure and, in particular, whether it has any affiliations to parent or subsidiary companies that entitle your company to an additional revenue stream or that are entitled to a portion of your company's revenue stream.

Q6: Does your company receive funding? If so, please name the main investors; if this information is confidential please refer to the type of investors (e.g. private equity, venture capital, individual etc.).

Q7: Please describe in three or four bullet points the history of your company.

Q8: What are the main products/services offered by your company?

Section 2: Information on your patent portfolio

We would now like to ask for some information about your patent portfolio, including both patents you own and patents you manage on behalf of third parties.

Q9: Approximately, how many patents do you currently have in your portfolio? Please differentiate between patents for which you have ownership rights and patents owned by third parties that you manage on their behalf.

Q10: Approximately, what percentage of the patents you own or manage on behalf of third parties are European patents (either granted by the EPO or by a European National Patent Office) which are relevant to the ICT sector?

Q11: What are the ICT sectors to which these European ICT patents are relevant?

ICT sector	Tick those that apply
Software	[]
Telecoms	[]
Computer programming	[]
Data processing	[]
Web portals	[]
Other (please specify)	[]

Q12: Of these European ICT patents, which share do you own as opposed to manage on behalf of third parties?

Section 3: Revenues generated through patent-related activities

Q13: Approximately, what share of your revenue is generated from the following patent-related activities?

Activity	Share of revenues
Monetisation of European ICT patents for which your company has ownership rights	[]
Fees/royalties/commissions for the management and monetisation of European ICT patents on behalf of third parties	[]
Practicing (i.e. selling product or services related to) ICT technologies covered by European ICT patents you own	[]
Other (please specify)	[]

Section 4: Information on patent acquisition

We would like to ask a few more questions in relation to the European ICT patents you own and the European ICT patents that you manage on behalf of third parties.

Q14: Approximately, what percentage of the European ICT patents you own has been acquired from third parties as opposed to having been granted to your company?

Q15: Approximately from how many entities have you acquired European ICT patents over the last five years?

Q16: Approximately, on behalf of how many entities do you currently manage or have managed European ICT patents over the last five years?

Q17: Please provide a few names of (1) entities you have acquired European ICT patents from and/or (2) entities on behalf of which you manage or have managed European ICT patents over the last five years, distinguishing between the following types of entities.

Type of entity	Names of entities you have acquired patents from	Names of entities on behalf of which you manage patents
Practicing firms (large or SME) still active in ICT		
Firms (large or SME) no longer active in ICT		
Non-practicing entities		
University, Government, Research Institution, or Public body		
Individual inventors		
Other (please specify)		

Section 5: Patent assertion information

We would now like to know more about the specific assertion strategy you follow for the European ICT patents you own as well as the ones you manage on behalf of third parties. By patent assertion we mean: (1) any attempt to license a patent or demand that an entity obtain a license; (2) any communication related to alleged infringement of a patent; (3) any legal action pursued with regards to a potential patent infringement.

Q18: Please describe your general strategy for patent assertion.

Q19: In relation to patents you have asserted against third parties can you please elaborate on the following points? In answering think about your patent assertion activity during the last five years. In case where multiple cases involving different third parties are concerned please complete additional copies of the table below.

Questions	Answers
Was the assertion case involving a patent you own or a patent that you manage on behalf of third parties?	Owned / Managed on behalf of third parties
Name of third party against whom assertion was made	
In which country did the assertion occur?	
Date of interaction	
How did you identify the third party against whom you asserted the patent(s)?	
How did you contact the third party? (E.g. formal letter, email, phone etc.)	
Was the assertion specifically directed to one organisation or to a broader group?	
How many patents did you assert against the third party?	Single/Few/Portfolio
What were the asserted patents' average age and trading history?	
Were any patents SEPs?	
What was the outcome?	E.g. litigation, licensing agreement, private settlement, damage award, injunction, patent invalidation etc.
What were the associated costs and revenues of the assertion activity in question? Please answer both in terms of one-off costs/revenues as well as recurring ones.	

Section 6: General description of your business model

Q20: Please describe your company's corporate structure and, in particular, whether it has any affiliations to parent or subsidiary companies that entitle your company to an additional revenue stream or that are entitled to a portion of your company's revenue stream.

Q21: What differentiates your business model from the ones of your competitors? Please name a few examples of your direct competitors in Europe.

Q22: Do you expect the way you generate revenue from patents to change within the next five years? Why? Give examples of legal and institutional changes if relevant.

Q23: What has been the effect of the recent surge of innovation in the ICT sphere on the evolution of your business model?

Section 7: Geographical areas of operation

Q24: Why did you decide to operate in Europe? In case your company has affiliations in other Member States, could you please indicate some of the reasons (i.e. tax, legal, or regulatory) for choosing to set up such affiliations?

Q25: Do you also operate in the US? If so, what are the main differences, relative to operating in the EU?

Q26: What do you think would be the effect of the Unitary Patent and the Unified Patent Court on patent assertion activities in Europe?

Q27: Please indicate which of the following aspects related to the US and European patent systems are most important in shaping your company's patent assertion strategy and why:

- patent laws;
- the strictness of patentability criteria;
- the patentability of certain subject matters (e.g. software and business methods);
- the average costs of litigation; and
- precedents of patent-related judgments.

Section 8: Impact on innovation and technology transfer and the functioning of ICT markets

Q28: Do you believe that the activities of your company facilitate the transfer of technology and knowledge? If so, please state the main reasons why.

Q29: Do you believe that the activities of your company enhance the functioning of ICT markets? If so, please state the main reasons why.

Q30: Do you believe that the activities of your company promote innovation in the IC sector? If so, please state the main reasons why.

Questionnaire for clients of PAEs

Section 1: Background information

We would like to start by asking for some general information about your company and your role within it.

Q1: What is your position and job description?

Q2: Please provide the year of founding of your company, the location of your headquarters and the location of secondary offices and/or affiliations:

Q3: Please quantify the following points for as many past years as available:

- number of employees
- investments in R&D; and
- annual turnover.

Q4: Please describe in three or four bullet points the history of your company.

Q5: What are the main products/services offered by your company?

Q6: In which European countries does your company operate or sell product /services?

Q7: In which European countries does your company have production facilities for patent-protected products?

Section 2: PAE characteristics

In this section, we would like to know more regarding the PAEs your company is currently a client of, or has been in the recent past.

Q8: Please provide the names of PAEs with which your company is currently engaged (or has been engaged during the last 5 years) in a licensing arrangement and the year of initial interaction. Please, also include defensive patent aggregators,¹²⁷ if relevant:

Q9: Please indicate the main reasons for engaging in a licensing arrangement with each of the above PAEs:

Q10: Have you assigned patent rights to PAEs? If so, please provide the names of the PAEs and differentiate by:

- Assignment of solely commercialisation rights.
- Assignment of ownership rights with an obligation on behalf of the PAE to return part of the generated revenue.
- Assignment of ownership rights to the PAE with no post-sale commitments on behalf of the PAE.

Q11: Please indicate the main reasons for deciding to engage in the above activities:

Section 3: Characteristics of patents licensed from defensive patent aggregators

If possible, we would like to know more about the characteristics of the European ICT patents over which your company is currently in a licensing arrangement with a defensive patent aggregator.

Q12: Is your company offered a joint license to a patent portfolio? If so, please indicate:

¹²⁷ Defensive patent aggregators constitute member-based non-practicing companies involved in purchasing patents or patent rights and licensing them to their members in order to prevent such patents from being asserted over their members by either practicing or non-practicing firms.

- The number of patents comprising the portfolio:
- The technological field in which the patent portfolio applies to. Please differentiate by:
 - Software
 - Telecom
 - Computer programming
 - Data processing
 - Web portals
 - If other, please specify
- Were the patents comprising the portfolio granted by the European Patent Office (EPO) or by a European National Patent Office? In the latter case, please specify which:
- If feasible, please indicate the average age and trading history of the patents comprising the portfolio:

Q13: Alternatively, if your company is issued licenses for a single/few patent(s), please indicate the following:

- In which ICT field does the patent(s) apply to? Please differentiate by:
 - Software
 - Telecom
 - Computer programming
 - Data processing
 - Web portals
 - If other, please specify
- Was the patent(s) granted by the European Patent Office (EPO) or by a European National Patent Office? In the latter case, please specify which:
- If feasible, please indicate the age and trading history of the patent:

Section 4: Characteristics of patent portfolios licensed from PAE

In this section, we would like to know more about the characteristics of the portfolio of European ICT patents over which your company is currently in a licensing arrangement with a PAE.

Q14: Please indicate the number of patents included in the portfolio:

Q15: In which technological field does the patent portfolio apply to? Please differentiate by:

- Software
- Telecom
- Computer programming
- Data processing
- Web portals
- If other, please specify

Q16: Were the patents comprising the portfolio granted by the European Patent Office (EPO) or by a European National Patent Office? In the latter case, please specify which:

Q17: If feasible, please indicate the average age and trading history of the patents comprising the portfolio:

Q18: Are any of the patents included in the portfolio SEPs? If so, please specify the number of patents:

Section 5: Characteristics of single/few patents licensed from PAE

In this section, we would like to know more about the characteristics of the European ICT patents over which your company is currently in a licensing arrangement with a PAE.

Q19: In which technological field does the patent(s) apply to? Please differentiate by:

- Software
- Telecom
- Computer programming
- Data processing
- Web portals
- If other, please specify

Q20: Was the patent(s) granted by the European Patent Office (EPO) or by a European National Patent Office? In the latter case, please specify which:

Q21: If feasible, please indicate the age and trading history of the patent(s):

Q22: Is the patent(s) an SEP?

Q23: If feasible, please indicate the age and trading history of the patent(s):

Section 6: Characteristics of patents assigned to PAE

In this section, we would like to know more about the characteristics of the European ICT patents that your company has assigned to PAEs. In the following questions please differentiate your answers based on the type of assignment stated in question Q10.

Q24: In which technological field does the patent(s) apply to? Please differentiate by:

- Software
- Telecom
- Computer programming
- Data processing
- Web portals
- If other, please specify

Q25: Was the patent(s) granted by the European Patent Office (EPO) or by a European National Patent Office? In the latter case, please specify which:

Q26: Is the patent(s) an SEP?

Q27: If feasible, please indicate the age and trading history of the patent(s):

Section 7: Fee characteristics

In this section, we would like to know more about the fee characteristics of the European ICT patents that your company is currently being licensed from PAEs or has assigned to PAEs.

Q28: For a patent portfolio licensed from a PAE, what is the fee charged and how often must the license be renewed?

Q29: For an individual patent licensed from a PAE, what is the fee charged and how often must the license be renewed?

Q30: For an SEP licensed from a PAE, is licensing under FRAND terms?

Q31: For a patent(s) assigned to a PAE what percentage of generated revenue is returned to your company?

Q32: What do you think would be the effect of the Unitary Patent and the Unified Patent Court on patent assertion activities in Europe? Do you think that licensing fees and generated revenues returned to your company will be affected and if so towards which direction?

Questionnaire for entities affected by PAEs

Section 1: Background firm information

We would like to start by asking for some general information about your company and your role within it.

Q1: What is your position and job description?

Q2: Please provide the year of founding of your company, the location of your headquarters and the location of secondary offices and/or affiliations:

Q3: Please quantify the following points for as many past years as available:

- number of employees
- investments in R&D; and
- annual turnover.

Q4: Please describe in three or four bullet points the history of your company.

Q5: What are the main products/services offered by your company?

Q6: In which European countries does your company operate sell product /services?

Q7: In which European countries does your company have production facilities for patent-protected products?

Section 2: Information on patent assertion against your company

We would like to know more about instances of patent assertion initiated against your company. We are primarily interested in assertions initiated by patent assertion entities (PAEs) as opposed to assertions initiated by your direct competitors. If several entities have asserted their patent rights against your company, and it is therefore difficult to provide information for each of one of them, please focus only on those entities with which interactions have been more frequent and/or those that have affected your business operations the most.

Q8: Please provide the names of PAEs that have recently (e.g. over the last 5 years) asserted their patent rights against your company as well as the year of initial interaction:

Q9: Which of the above assertions were initiated in Europe and were related to the development, manufacturing, or sale of ICT products by your company?

Q10: In which European country was each of the above assertions initiated?

Q11: Which of the following best describe the events that initiated the assertion of patent rights by PAEs?

- ICT products/services under development by your company.
- ICT products/services that had already been developed and tested by your company but which had not yet been sold/provided.
- ICT products/services that your company had already started selling/providing.
- ICT products/services that your company uses (e.g. as inputs) but which are sold/provided by another firm.
- Many (or all) of the above (this depends on the PAE asserting).

Section 3: Information on patents asserted

If possible, we would like to know more about the characteristics of the European ICT patents that have been asserted against your company. We are aware that the information we aim at gathering here may vary depending on the PAE in question.

Therefore, if convenient, please focus only on those PAEs with which interactions have been more frequent and/or those that have affected your business operations the most.

Q12: How many patents did the assertion involve? Please differentiate between assertion of single/few patents and assertion of an entire patent portfolio.

Q13: To which ICT field was the patent (or patent portfolio) relevant to? Please differentiate by:

- Software
- Telecom
- Computer programming
- Data processing
- Web portals
- If other, please specify

Q14: Was the patent (or the patents comprising the portfolio) granted by the European Patent Office (EPO) or by a European National Patent Office? In the latter case, please specify which:

Q15: Could you please specify, if possible, the age and trading history of the asserted patent(s)?

Q16: Did the assertion involve Standard Essential Patents (SEPs)?

Section 4: Assertion method and outcome

We will now ask a few questions that would help us gain a better understanding of the assertion strategy adopted by those PAEs with which you have frequently interacted and/or have affected your business operations the most.

Q17: Did the assertion take place after a potential infringement had occurred or was a licensing agreement offered in advance to allow your company to integrate the patents in the development of your products/services?

Q18: If the assertion was based on the ground of alleged infringement, were you able to identify the relevant patents as a potential threat to your freedom to operate before the assertion was initiated? If not, please explain why.

Q19: If the assertion was based on the ground of alleged infringement, did the PAE provide specific evidence of such infringement?

Q20: If licensing agreements were offered to allow your company to integrate the patents in the development of your products/services, were consultancy services to help you in this process also provided?

Q21: How were you contacted by the PAE?

Q22: To the best of your knowledge, was the assertion initiated only against your organisation or were other groups of organisations / companies / institutions also targeted?

Q23: To the best of your knowledge, were the PAEs operating on behalf of your direct competitors (e.g. monetising patents on their behalf)?

Q24: What was the outcome of the assertion for your company? More specifically we would like to know whether it resulted in:

- Your organisation agreeing to pay licensing fees.
- Your organisation filing an invalidity counterclaim.
- Your organisation reaching a settlement.

- Full escalation to court (in which case we would like to know the final outcome).

Q25: If the assertion resulted in your organisation committing to a licensing arrangement, once agreeing to meet with the PAE in order to negotiate licensing terms, did its representatives engage in aggressive negotiating tactics? If so, please specify:

Q26: In case of assertion over a Standard Essential Patent (SEP), was licensing under FRAND terms achieved?

Section 5: Impact on freedom to operate and innovation

We will now ask a few questions that would help us gain a better understanding of the extent to which the assertion of patent rights affected your operational performance and innovation activity.

Q27: Which of the following activities of your organisation was mostly affected by the assertion of patent rights and how? Please elaborate in relation to the:

- Ability of your company to raise funds from investors.
- Development of new products/services by your company.
- Ability of your company to transfer knowledge and technologies to and from other sectors
- Ability of your company to launch and commercialise innovative products/services.
- Ability of your company to secure sufficient rewards form innovative activity.
- Ability of your company to maintain a competitive advantage over competitors.

Q28: Do you rely on the services of external firms/organisations/professionals in order to deal with potential assertions of patent rights by PAEs against your organisation? If so, please specify:

Q29: How would you quantify the costs that PAEs impose on your business relative to the budget that your company typically allocates towards R&D?

Q30: What do you think would be the effect of the Unitary Patent and the Unified Patent Court on patent assertion activities in Europe?

APPENDIX 2: SUMMARY NOTES OF CASE STUDY INTERVIEWS

This section includes the case study interview summary notes that have been approved by the interviewees.

Expert Interview 1 – Head of Standardisation and IPR Management in EU-based international telecommunications company

Background information

The interviewee is the Head of Standardisation and IPR Management in EU-based international telecommunications company.

General description of PAE business model

PAEs focus their efforts towards licensing portfolios of low value patents at the highest price possible. Such tactics were also mentioned to be aggravated by the tendency of many practicing firms to sell patents to PAEs for purely monetisation purposes.

PAEs have started to bring their operations to Europe, and many Europe-based PAEs have started to emerge as well. In Europe, the activities of PAEs are concentrated primarily in the largest markets (i.e. Germany, the UK, France, Italy and Spain). One exception to this trend is Romania where a court precedent might make this country more attractive for PAEs in the future.

The main business model of PAEs operating in Europe was indicated to relate to entities seeking expensive licensing agreements (an anecdotal quote of up €100 mil. for a single license was mentioned) from large firms. SMEs were not suggested to be greatly affected as, in Europe, the common business model observed in the US involving serial assertions against small practicing firms is rather infrequent.

With regards to business models involving the assertion of patent rights against large practicing firms, three sub-categories were identified. These include:

- “buy and sue” business models involving acquiring patents and initiating patent infringement lawsuits against potential infringers;
- business models involving the acquisition of R&D divisions of firms or small R&D oriented companies with the purpose of developing patents and subsequently monetising them; and
- patent pools, which do not engage in aggressive assertion of patent rights and focus primarily on facilitating.

A distinctive feature that makes patent pools different from other aggressive PAEs is the explicit effort made to determine licensing terms that are reasonable (this is often a lengthy process that requires significant time and resource investments on behalf of the patent pool). In contrast, aggressive PAEs simply aim for the highest licensing fees possible. Another significant differentiating factor relates to the reluctance of patent pools to engage in litigation. Nevertheless, in some instance — e.g. in cases where potential infringers engage in holdout practices — even patent pools might, out necessity, engage in litigation practices.

Information on PAE patent portfolio

PAEs were depicted as holders of numerous low quality patents, the vast majority of which are normally nullified (about 60 to 70 %), while they were also characterised as “misusing the idea” of portfolio licensing.

Information on PAE R&D activity

There exist some PAE business models involving the acquisition of R&D divisions of firms or small R&D oriented companies with the purpose of developing patents and subsequently monetising them.

Patent assertion strategy

Court precedents were mentioned as being important drivers of PAE activity. Moreover it was suggested that many courts in Europe are ill-equipped to address patent-related cases, and as a result they might be prompt to grant injunctions too easily which may further encourage the activity of PAEs.

Potential future developments

With regards to the expected establishment of the UPC, it was suggested that its success will heavily depend on the final form of the implied rules and procedures. Within this context, the final selection of judges was suggested to be a crucial factor as their knowledge and expertise on IP rights constitute highly significant factors in securing fair outcomes to litigation procedures. Nevertheless, the various local and regional divisions of the UPC may facilitate forum shopping, especially in case some of the latter are perceived as PAE-friendly.

It was suggested that bifurcated legal systems (particularly in Germany and less so in Hungary and Austria) may have also contributed to increased PAE activity. In light of the above, it was suggested that the establishment of the UPC is likely to attract PAEs and enhance their operations in Europe.

In contrast, the introduction of the UP was suggested to have a minimal impact as firms operating within the ICT sphere primarily file patents in countries with the biggest markets and expected revenues, namely Germany, France, the UK, Italy and Spain.

Impact on innovation and other considerations

Impact on innovation and technology transfer

A clear distinction was made between PAEs and patent pools. The former were regarded as impeding innovation and rendering practicing firms' freedom to operate more difficult. On the contrary, the latter were portrayed as beneficial to innovation, facilitating knowledge transfer and freedom to operate.

Overall, PAEs are likely to impede freedom to operate for the following reasons. First they aim at licensing patents at unreasonably high costs and the alternative for practicing firms (i.e. engaging in litigation to invalidate the asserted patents) is also extremely costly. Second, the emergence of PAEs has made scanning the patent marketplace to identify patents those patents that might limit freedom to operate more difficult. Prior to the emergence of PAEs, practicing firms could easily identify other practicing firms that could be approached in order to request a license. However the current landscape is characterised by a fragmentation of patent ownership across a large number of patent holders which renders IP monitoring activities more challenging and costly.

It was mentioned that, by virtue of their non-practicing status, PAEs heavily rely on bargaining power asymmetries in order to secure more favourable licensing terms. Whilst practicing firms have a balanced relatively bargaining position in negotiations with other practicing firms, they are at a disadvantage when the counterparty is a PAE.

The impact of such bargaining asymmetries was illustrated to be particularly damaging to the telecom sector. As telecom operators offer a continuous service and, in case of injunction, customers would be forced to switch providers, thus inducing a substantial damage to the telecom provide, which may even lead to bankruptcy.

Furthermore, it is dubious whether PAEs would benefit inventors and foster incentives to innovate by increasing the demand for patented technology. Such alleged benefits are unlikely to be material because PAEs acquire patents, primarily from practicing firms or firms that are no longer active in specific technological field. In contrast, patent pools were once again portrayed as beneficial instruments towards the enhancement of incentives to invent and the remuneration of inventors.

It was further suggested that the activities of PAEs are likely to impede incentives to form start-ups, because their activities represent a threat of infringement lawsuit at the early stages of a company's life cycle. Moreover, despite not currently targeting SMEs, one cannot discount the possibility that they might do so in the future. This was suggested to have devastating effects on their performance, and eventual survival, as many SMEs lack the financial and legal resources to address the PAEs claims, especially in case of prolonged legal disputes.

Europe vs US

Consistent with the literature, the inherent differences in the legal systems were mentioned as being the primary factor explaining the greater presence of PAE activity in the US compared to Europe. More specifically, the European "loser-pays" system was portrayed as a significant factor limiting the PAEs' activity in Europe and providing protection to SMEs. As a result, PAEs were implied to be more likely to target larger firms. Other court-specific factors such as patent knowledge of judges and the presence of appointed jury do also have a significant impact as they can incentivise or discourage PAEs activity. This was particularly emphasized in light of recent legal developments in Romania, where judge rendered as FRAND, licensing terms which were far from reasonable.

In contrast, patent system specific factors, mainly the patent granting process, were illustrated to impose a less significant effect. This is due to the recent convergence of the US granting procedures to the European ones in light of recent legislation passed in the US (i.e. America invents act).

Issues related to standardisation

PAEs' activity is unlikely to be beneficial to knowledge transfer and no example in this respect was provided. In contrast, the telecoms sector was indicated as being the most vulnerable to aggressive assertion activity. This is primarily due to one reason.

Products related to the telecoms sector are based, to a large extent, on technological standards and therefore the ability to obtain SEPs under FRAND terms is key to ensure practicing firms' freedom to operate.

However the very same concept of FRAND licensing is extremely vague itself and many patent courts are have limited experience in imposing FRAND terms for SEPs. This provides an environment which engorges aggressive assertion of key patents against practicing firms, a situation that can be improved only after a re-examination and redefinition of what constitutes FRAND licensing term. In contrast, patent pools were portrayed as more reliable in licensing SEPs or portfolios encompassing such patents under reasonable terms.

Expert Interview 2 – IP consultant

Background information

The interviewee is a highly appreciated consultant in the field of Intellectual Property in Europe. He deals with all aspects of I.P., in particular patents and trademarks, and he has a substantial experience in the field of consumer electronics and household appliances.

General description of PAE business model

The interviewee stated that the presence of an aggressive PAE business model – commonly observed in the US – is very limited in Europe. This is primarily due to the lower costs of litigation in Europe (except in the UK) and as a result of this, the decreased ability of PAEs to leverage their position in order to impose settlements. In Europe most NPEs focus on licensing and moreover several well-known practicing firms are currently shifting their business operations and they increasingly engage in practices regularly associated with NPEs, (though, not of the aggressive type).

It was further suggested that PAEs' activity is present primarily in the ICT sector and their business models there are relatively uniform. Specifically, ICT-related sectors (and the telecom sector in particular) were indicated to be more favourable for PAEs' activities due to the substantial number of patents therein. It was further noted that the automotive and the white goods sectors are likely to see increased PAE activity in the future. This is primarily due to the increased scope for electronic communications within and between cars or appliances that recent technological developments have enabled (i.e. smart cars or intercommunicating home appliances). Lastly, the interviewee was not aware of any US-based PAEs already active in Europe in those industries.

Information on PAE patent portfolio

Patents held by PAEs are likely to adhere ICT-related sectors (and the telecom sector in particular) due to the substantial number of patents therein. It was further noted that the automotive and the white goods sectors are likely to see increased PAE activity in the future. This is primarily due to the increased scope for electronic communications within and between cars or appliances that recent technological developments have enabled (i.e. smart cars or intercommunicating home appliances).

Information on PAE patent portfolio

No information on PAE R&D activity was provided.

Patent assertion strategy

Faced with the current debate on PAEs' activities, the interviewee mentioned the need to guarantee the sufficient reward of inventors for their contributions to the betterment of life conditions. Specifically, it was stated that the adequate reward of inventors is a crucial condition that contributes to increasing rates of innovation. At this stage, a clear distinction was made between malignant and benevolent non-practicing entities. The former, also known as "patent trolls", were indicated to take advantage of distortions in the IP market place and extort money from any kind of company. Such distortions in the IP market place primarily relate to increased legal costs and inefficiencies in the patent granting processes (both constitute primarily US phenomena).

In contrast, benevolent non-practicing entities, or "patent elves" help participants of the innovation process by monetising patents. For instance, universities or research labs play an important role in the innovation process but, as they are not commercial entities, they need companies to valorise their IP assets. Evidently, non-practicing entities can assist towards this goal, thus enhancing incentives to innovate.

Potential future developments

The interviewee was optimistic over the implementation of the UP. Nevertheless, one important factor that may impede its success is the related cost. Specifically, it was stated that with the exception of firms operating in the pharmaceutical sector companies normally file a European patent application but transform it to a national patent for Europe's largest economies (i.e. Germany, UK, France, Spain and Italy). Such decisions are, to a large extent, affected by the patent's maintenance fees which may be substantial and are therefore considered along with granting-related costs. Therefore, the cost of the UP shouldn't be greater than that related to a protection in four countries according to the present EPC.

On the other hand, the interviewee was more cautious over the introduction of the UPC. Specifically, it was suggested that such a consolidated patent-related court with a Europe-wide effect may in fact attract aggressive PAEs in Europe or even lead to the creation of such entities in Europe. Thus, the prospect of Europe-wide injunctions may enhance patent holders' bargaining positions and hence enable serial asserters to operate in Europe. Nevertheless, it was stressed that there is a great deal of uncertainty surrounding the effects of the UPC. Consequently, as such forecasts are considerably subject to error, ICT market participants would have to "wait and see" how the introduction of the UPC would affect them.

Impact on innovation and other considerations

Impact on innovation and technology transfer

The interviewee suggested that, in contrast to aggressive entities, the benevolent type of non-practicing entities primarily negotiate and only litigate when faced with no alternative option, particularly when potential infringers commit holdout. Thus, they facilitate transactions and protect the rights of inventors.

Moreover, the use of litigation as a last resort option in the presence of holdout would facilitate practicing firms' freedom to operate. It was suggested that companies that abuse patents and do not want to purchase a license may also be regarded as engaging in discriminative practices.

With regards to bargaining power asymmetries, patent owners are likely to have greater bargaining power during patent licensing negotiations. It was also pointed out that bargaining power is often assessed based on a wrong patent evaluation methodology. Specifically, the interviewee criticised a recent proposal according to which royalties should be estimated based on the smallest saleable device (e.g. semiconductor chips in the case of mobile phones) to which the patent applies. Instead, a more appropriate method would be to estimate royalties based on the value that the patent-related device adds over and above the value of the product as a whole (functional unit).

PAEs that promote licensing programme play also a key role in promoting innovation by fostering incentives to innovate. This is particularly true in the context of standard technology where there is a material risk that firms invest considerable amounts of money to develop a new technology and do not receive adequate returns in exchange. Overall, the relatively low cost of litigation in Europe are likely to provide greater licensing incentives, as opposed to incentive to engage in aggressive litigation practices (e.g. targeting end-users). Therefore, the practice of threatening small companies and technology end-users is mainly a US phenomenon but unlikely to be present in Europe.

The activity of PAEs in Europe is likely to promote the overall business success of SMEs. This is the case for a number of reasons, e.g., PAEs reduce transaction costs, and help SMEs in the monetisation process, which further enables them to grow. In light of the above, PAEs were portrayed as efficient intermediaries that facilitate the flow of the "inventive loop" where a firm conceptualizes an idea, patents it, licenses it and, through licensing revenues, invests further in developing new technologies.

Within this context, the interviewee pointed to the beneficial nature of patent pools. Specifically, the "one stop shop" business aspect of patent pools was indicated to efficiently address royalty stacking problems, particularly in ICT sectors where there is a substantial need for interoperability between products (e.g. mobile telecommunications). Nevertheless, it was stated that the number of European patent pools is very limited, while companies that may encompass patent pool- like features are rather infrequent in Europe. The activities of such firms were suggested to also be beneficial for the case of big universities that cannot monetise their IP assets, either due to delays in filing patent applications or due to limited licensing expertise.

Europe vs US

The interviewee identified several institutional and other factors contributing to the limited presence of PAEs in Europe. As aforementioned, the increased legal costs in the US were portrayed as the most prominent factor. Similarly, the patent granting process in the US was illustrated as more focused on the practical embodiment of the invention, thus resulting in frivolous low value patents being granted. Within this context, the interviewee mentioned the result of a survey made on a certain number of Chinese patent applicants that out of all patents filed in China, around 70 % were granted in the US whereas only 50 % were granted in Europe.

Among less important reasons, the interviewee expressed doubts about the inclusion of jury in the US legal system. Specifically, their involvement was suggested to introduce

uncertainty in case of litigation due to biases or predispositions that jury members may have. In contrast, in case of litigation in Europe, a jury is not involved.

Expert Interview 3 – Former senior patent judge

Background information

The interviewee is a professor in Intellectual Property (IP) Law and a former judge at the High Court.

General description of PAE business model

It was acknowledged that PAEs mainly constitute a US phenomenon that recently started to emerge in Europe as well. There are different types of PAE. For instance, it was noted that the university in which the interviewee is currently employed could be characterised as a PAE. The different sorts of PAE are

- non-practicing firms with no R&D activities that acquire and assert patent rights;
- non-practicing firms that assert patents rights developed in-house through R&D activities; and
- hybrid practicing firms that may have portfolios of patent rights available for licence in some areas but practice their inventions in others.

Information on PAE patent portfolio

It was noted that PAEs active in the ICT sphere are mostly observed within the telecommunications sector. One potential explanation for this phenomenon is the fact that the telecoms industry is particularly characterised by the existence of relatively old patents. Within this context, the interviewee stated that the EPO did not historically examine against published data at ETSI and other standard setting organisations and thus missed important prior art. That has been rectified but it will still be impossible for the patent office to be close to granting good patents only.

Another potential explanation is the well-observed phenomenon of patent thickets as opposed to sectors such as pharmaceuticals, chemicals or engineering, which are characterised by a lesser density of patents. However the interviewee is far from satisfied that there really is a patent thicket problem, neither is he convinced that litigation is more extensive in the field of telecoms than it is, say, in pharma.

Information on PAE R&D activity

There exist non-practicing firms that assert patents rights developed in-house through R&D activities.

Patent assertion strategy

Inefficiencies in the patent and litigation systems are major determinants for the emergence and activities of such companies. The American system, with jury trial, vast unnecessary discovery, inflated damages, lawyers on large contingency fees, litigation of damages with liability (doubling costs), and no loser pays rule has a toxic mix encouraging speculative patent actions, particularly by PAEs. This has to be coupled with the recognition that patent offices are have limited resources to examine so quite a lot of patents are invalid or to wise.

Potential future developments

The discussion over potential future trends was mainly concentrated around the upcoming emergence of the Unified Patent Court (UPC) and the Unitary Patent (UP). Regarding the UPC, the interviewee was reasonably optimistic over the effects of an expert legal body solely responsible for patent-related litigation. Specifically, the establishment of a court jointly responsible for dealing with issues such as infringement,

obviousness, sufficiency and invalidity claims is likely to enhance the efficiency of legal proceedings in Europe. Such an authority is likely to keep PAE activity within reasonable bounds.

Within this context the bifurcation of the German legal system was heavily criticised and portrayed as a factor favouring litigation and the activity of PAEs. The interviewee was also critical on the fact that German courts may grant injunctions on patents whose validity is not established. The success of the UPC was also portrayed to be highly dependent on the final selection of judges and the extent to which experienced judges will be able to efficiently transfer part of their expertise to the less experienced ones.

In contrast to the establishment of the UPC, the interviewee was pessimistic over the establishment of the UP characterising it as irrelevant for a lot of sectors. Specifically, as practicing firms are mostly worried over the negative effects of a potential injunction, they would be mostly inclined to file for patents in jurisdictions which constitute key markets for their operations. Thus, the establishment of a UP with a Europe wide effect was characterised as a step of limited usefulness for most sectors.

[Impact on innovation and other considerations](#)

[Impact on innovation and technology transfer](#)

The interviewee suggested that the activities of PAEs are less likely to have a detrimental impact on innovation in ICT. Within this context, it was stated that blocking patents exist in theory, yet not in practice, as firms can “invent to get round big patents” and in the real world “invent within big patents”. Nevertheless, it can be argued that faced with such dynamics, SMEs are disproportionately disadvantaged, relative to large firms that are better able to engage in such activities or face litigation. However, it was stated that particularly within the telecoms sector SMEs are rather infrequent due to the huge resources required to operate within such a market.

Within this context, an important feature of the European legal system is that injunction cannot normally be awarded for SEPs. Rather, injunction can only be awarded if the potential infringer consistently refuses to pay the patent holder or refuses to accept a FRAND offer. Moreover, if the holder of an SEP does not license the patent under FRAND terms then, according to European regulations, this would constitute a breach of both contractual agreements and competition rules. But competition authorities are now less likely to get involved because a recent case indicates this is a matter for national courts. As a result of the above, the activities of PAEs in Europe are not likely to matter for SEPs. Patent pools were portrayed as an alternative to FRAND or RAND licensing terms.

Noticeably, the idea that patent thickets impede innovation was challenged. Specifically, it was stated that the great number of patents comprising a patent thicket renders reading all these patents particularly hard for practicing firms. But “people carry on innovating” and are prepared to deal with infringement, should such an event occur. Litigation is far from the norm in telecoms. There is a vast mass of working licensing and cross-licensing going on.

Thus, in contrast to theoretical ideas, patent thickets are a symptom of high innovation activity as opposed to a factor hindering innovation. If thickets were deterring innovation, then we would not observe the “colossal current rate of innovation”. This is also facilitated by the fact that big inventions are most frequently followed by smaller inventions. As a result, as the number of patents increases, it attracts further the attention of investors, thus resulting in greater monetary incentives to innovate.

[Europe vs US](#)

It was pointed that the well-observed increased PAE activity in the US, rather than in Europe, suggesting that such difference is mainly attributed to the dynamics of the litigation systems. Specifically, it was indicated that a “toxic mix” of factors is present in

the US, mainly the high costs of jury trials and the over-elaborate discovery¹²⁸ costs. Jury trials are also well known for the implied uncertainty over their outcome. Moreover, in the US, the discovery process may also be oral, as opposed to written, and thus "totally uncontrolled". According to the interviewee, the above constitute evidence of lack of control in the US judicial system.

The increased costs of litigation in the US are further supported by the fact that damages may be assessed at the same time as invalidity claims, thus imposing additional expenses to the parties involved in a trial. The US litigation system also does not enforce the loser of the trial to cover the other party's litigation expenses. As litigation is an "emotion business", loser-pays-all outcomes are likely to deter holders of patents with vague claims towards engaging in an infringement lawsuit. Closely related to this is the uncertainty over the result. Lastly, in the US, roughly 40 % of damages are often awarded to the lawyers of the plaintiff. This provides incentives to lawyers to initiate litigations and encourages juries to increase awards, leading to damages in the US being characterised as "ridiculously high".

In contrast to the US, in the UK the rules forbidding champerty have not been completely abolished although they have relaxed over the past 20 years.¹²⁹ As a result, the English law was characterised as encompassing "more pragmatic" procedures. Nevertheless, in other European jurisdictions, the attitude of courts, particularly towards injunction raises concerns. Specifically, the interviewee noted the German doctrine that there must be an injunction if a patent is valid and infringed, regardless of the significance of the patent in the performance of the product. That is not the position in the US and is probably not in the UK either.

Expert Interview 4 – Former CEO of Intellectual Property & Standards division of a large European technology company.

Background Information

The interviewee is the former CEO of the intellectual property & standards division of an international EU-based technology practicing company and a member of the IP Hall of fame.

General Description of PAE business model

Four categories of business models were provided, focusing primarily on their source of funding. These include:

- PAEs funded by venture capital firms and hedge funds. Such firms are primarily focused on short-term, relatively high returns through aggressive enforcement methods;
- PAEs funded by private or public companies, or individual investors (e.g. Intellectual Ventures);
- government-backed PAEs (France Brevets); and
- licensing-focused PAEs that are not funded by any of the aforementioned sources, but make money by sharing in the licensing proceeds.

On the topic of funding government backed PAEs, it stated that this phenomenon was initiated under an "idealistic proposition" to collect patents from inventors and make

¹²⁸ Discovery is the process through which parties in litigation can request and obtain from opposing parties and third parties information, documents, and testimony relevant to the issues in a lawsuit.

¹²⁹ "Champerty" and "maintenance" constitute doctrines in common law jurisdictions aiming at precluding frivolous litigation. "Maintenance" is the intermeddling of a disinterested party to encourage a lawsuit. "Champerty" is the "maintenance" of a person in a lawsuit on condition that the subject matter of the action is to be shared with the maintainer. This is known as "buying into someone else's lawsuit."

them available to firms willing to practice them, thus accomplishing the dual goal of securing an adequate remuneration for the former and stimulating economic activity. Nevertheless, such attempts were eventually proven to be an “illusion” as the funded entities have evolved to become aggressive PAEs with no innovation or economic stimulation effects.

Regarding the emergence of patent-privateering as a further potential business model typology, it was noted that such types of PAEs belong to the second category (i.e. PAEs funded by private/public companies and/or individual investors). Noticeably, it was stated that one key aspect of patent privateering relates to the quality of patents held as the latter are more likely to be core patents as opposed to non-core ones. In so doing, firms that are primarily affected consist of the competitors of the firm establishing the shell PAE. As a result, patent-privateering predominantly serves the role of impeding the operational performance of competitors.

Nevertheless, PAEs primarily tend to target large companies within a market, aiming at applying pressure to potential infringers, ultimately forcing them to settle or commit to a license agreement. As a result, patent pools should not be mixed with PAEs as patent pools don't buy patents, but only license patents, particularly SEPs, from the companies participating in the pool and facilitate the market growth by licensing, these patents to all interested third parties, including members in the pool. Similarly, it was stated that defensive patent aggregators should not be mixed with PAEs as they engage in acquisitions and licensing of patents in order to protect the affiliated practicing firms from litigations and their royalty demands are significantly lower than PAEs. For PAEs this is interesting as well, because they can get still good money but without having to spend high sums on litigation.

Information on PAE patent portfolio

It was noted that roughly 80% of patents asserted by PAEs were in fact initially purchased from practicing firms. In so doing, practicing firms are portrayed as “feeding the beast” and subsequently complaining over its activities. Also, when most of the patents asserted by PAEs are vague, most of these vague patents will have originated from practicing firms.

When asked why practicing firms may sell their patents rights to PAEs, to the following reasons were mentioned:

- the need to monetise patents that are no longer in practice, or are of no current or future use (e.g. non-core patents); selling to PAEs (with potentially also a share in the upside) provides quick cash for practicing entities.
- the lack of resources or expertise to license these patents; and
- the potential preference of practicing firms to not be perceived as licensors by market participants.

Information on PAE R&D activity

No information on PAE R&D activity was provided.

Patent assertion strategy

Regarding the ongoing debate over the activities of PAEs, it was pointed to the ambiguity over the main arguments of both detractors and supporters of such entities. Such ambiguity was ultimately suggested to render these arguments artificial and even invalid. Specifically, despite PAEs being frequently described as non-innovating non-practicing firms, there is no legal provision in any patent law around the world explicitly stating that a patent holder must practice its controlled patent rights. Similarly, however opportunistic their behaviour might be, it is still not illegal.

In light of the above, it was stated that the real issue underlying the debate over the activities of PAEs relates to the patent system itself and potential inefficiencies during

the patent granting process. Within this context, it was stated that it is the patent office's responsibility to prevent the granting of low value patents with vague claims, which might be eventually asserted over by PAEs. Thus, the emergence of such entities is perceived as a symptom of inefficiencies inherent in the patent system. As a result, focusing solely on the negative aspects of the activities of PAEs and how to tackle them constitute attempts to "tackle the issue from the wrong side". More recently the debate about patent reform in the US starts to focus more on patent quality than on making life for PAEs much harder.

Potential future developments

The introduction of the UP and UPC will not have any material and significant impact on PAEs activity in Europe. This is due to a number of reasons:

- the European patent system is better equipped towards preventing the granting of vague patents that usually are used by PAEs; and
- courts in the EU are more critical and do not easily grant injunctions in case of PAEs, which are basically only want to grant licenses for money and use injunctions to force operating companies to conclude those licenses. In view of this courts may not grant an injunction when the negative impact it may have on the defendant's operations outweighs the benefits for the PAE
- Given the high attention that is being paid to getting uniform standards applied by the Courts under the UPC, PAEs in Europe are less likely to engage in forum-shopping, while market participants are keen on ensuring that the same court ruling standards be applied to the UPC.

The possibility of PAEs' activities being encouraged by the threat of a Europe-wide injunction is balanced by risk of Europe-wide invalidations. Also today PAEs have the possibility to start litigations in a number of designated countries under a European patent, which has almost the same threat as with a Unitary Patent (The big 4 European countries take a large part of the EU market).

Impact on innovation and other considerations

Impact on innovation and technology transfer

It was noted that the vast majority, if not all, of PAEs are active within the ICT sector. More recently they have started to be active in other sectors, like healthcare, automotive, as well, because the profit margins in these sectors are usually higher than in the ICT sector. Nevertheless, there is no contribution to innovation mainly due to the dynamics of the aforementioned business models. Specifically, the aim to attain quick returns on IP investments results in PAEs focusing on existing technologies rather than developing new ones. As a result, PAEs target firms already practicing the patents, effectively raising their (transaction) costs.

Proponents of the activities of PAEs base their arguments on the financial help provided by such entities to small inventors and companies who may not otherwise be able to license large companies and receive an adequate return on their investment. Nevertheless, the observation that roughly 80 % of patents held by PAEs were sold to them by practicing companies once again lowers the validity of such arguments.

However, PAEs are not portrayed as impeding practicing firms' freedom to operate. Rather, it is suggested that whether patents are under the control of PAEs, or not, does not significantly affect the process that needs to be conducted by a practicing firm in order to determine its freedom to operate and whether it might be infringing any potential patent rights. This argument is further enhanced by the fact that asserted patents existed before their acquisition by a PAE, thus also weakening the view that conducting such a process is further impeded by monitoring costs.

In fact, PAEs are portrayed to be facilitating practicing firms' freedom to operate as their main goal relates to monetising their controlled patent rights through licensing instead of blocking companies to use these patents. Consequently, asserted patents held by PAEs provide a form of assurance that licenses will be granted as opposed to patents held by competitors who might be more interested in blocking the firm's operations, ideally through an injunction decision in case of litigation.

Within this context, potential asymmetries in bargaining power during the negotiation process are justified or better inevitable as, when confronted with a PAE, a firm is by definition in the market and irreversible investments are likely to have occurred. In contrast, the negotiating tactics employed by practicing entities differ substantially and are generally less aggressive when they assert patents against another practicing entity.

Regarding the potential impact of PAEs on SMEs, it was stated that potential targets are most likely to consist of large practicing firms as the expected monetary benefits from asserting patent rights against such targets are greater. Nevertheless, SMEs are also targeted by PAEs, in particular the ones that use mass mailings to assert their patents against a large number of SMEs or shops of chains and demand a relatively low settlement amount so that the target companies can avoid litigation. These types of PAEs' activities are harmful for SMEs, particularly in case the underlying patents are of low value and with vague claims. Measures have recently been introduced in the US to put more strict requirements on these type of PAE activities. Nevertheless, even if that is the case, the patent system is to blame for granting these low quality patents in the first place.

Europe vs US

Consistent with existing evidence, it was noted that the activities of PAEs are more pronounced in the US, rather than in Europe. The following reasons were mentioned as the most important ones:

- Higher litigation costs in the US than in Europe
- The "loser pays" system present in Europe and absent in the US, although very recently the US introduced the possibility of "fee-shifting".
- The patent granting process in the US is allegedly more lenient than the European one which results in more patents with vague claims being granted in the US.

Nevertheless, it was specifically stated that even if the two jurisdictions had a similar patent granting process, the higher litigation costs in the US would still play a key role in determining a higher PAE activity.

Expert Interview 5 – Competition expert.

The interviewee is a competition expert with significant European exposure.

General Description of PAE business model

From a competition perspective it is more relevant to observe market behaviour on a case-by-case basis rather than try to establish an all-inclusive upfront definition. It is possible to have entities acting in a harmful way (particularly those that possess SEPs and engage in anti-competitive practices) but at the same time it is possible to observe beneficial effects (as in the case of patent pools). These two extremes were characterised as distinct business models that a company would not be expected to practice simultaneously.

In more general terms, there are three broad categories of PAE business practices that are usually not used in a mixed manner by individual companies:

- more aggressive ones;
- defensive ones; and
- patent pools.

All three business practices are observed in Europe. Based on telecommunications sector experience, the defensive model is observed more often in software, the more aggressive model in hardware (where the presence of firms that have made irreversible investments in production may be an easier target for PAEs) whilst the presence of the pooling model can be observed across the board.

In terms of knowledge transfer, there exist assertion entities, primarily in the US (evidence of this model in Europe appears limited), acting on behalf of universities by taking over the licensing process. Universities give over their assertion rights in order to monetise them effectively.

PAEs are based both in the US and the EU but the majority of them would be in the US. More specifically, more aggressive PAEs are more likely to be from the US while patent pools are primarily European.

Information on PAE patent portfolio

In most cases in the telecoms market patents will be acquired from firms exiting the market or refocusing their business model; the contracts transferring the patent ownership often include clauses that allow the original holders to participate in future profits. To a lesser extent, patents are acquired by companies that do not wish to actively engage in managing their patent portfolio.

The objective of the PAE will drive their selection of the type of patents acquired. For instance:

- A more aggressive PAE will ideally be looking to obtain an SEP patent due to its essentiality;
- patent pools would seek to obtain a broad patent pool; and
- defensive PAEs would target very specific patents depending on the technological field of operation.

FRAND commitments are an issue as far as SEPs are concerned as some SSOs have not specified whether upon transfer of a patent the commitment is maintained for the new owner.

Information on PAE R&D activity

No information on PAE R&D activity was provided.

Patent assertion strategy

PAEs exacerbate asymmetry in bargaining power asymmetries because often PAEs have very little to lose. They often target entities that have an entirely different business model and the threat of counter-injunction does not represent an effective and credible threat. PAEs have however also a positive impact as they can be thought of as leading to improved efficiency as far as monetisation is concerned.

In Europe the more aggressive types of PAEs have tended to target only large practicing companies or large distributors, and the patents asserted have been mainly SEP patents (ETSI). In Europe, SMEs have typically not been the target of aggressive PAEs

Potential future developments

Currently, the limited geographic scope of injunctions in the EU does not help PAE activities. The exception is Germany where injunctions are quick to be given and would only very rarely be stopped because of an invalidity claim. The first PAE case was observed in Romania. At the same time, in the US, the geographical scope of an injunction facilitates PAE activity.

The extent to which the UPC will be similar to the current operational rules of the German courts will be a very important factor that might have consequence in determining whether we should expect an increase in the activity of PAEs in Europe. More specifically, the following aspects will be particularly important

- Whether there will be discretion regarding injunctions ; and
- whether injunction and validity be considered separately (bifurcation)?

The UPC is likely to lead to forum shopping and this will depend strongly on different countries' frameworks and whether they have an interest to incentivise patent holders to sue there or not.

A lot will also depend on how effectively the court of appeals monitors the various local bodies.

Overall, Europe may become more attractive for cross-Atlantic entities and their activity is unlikely to be deterred by the potential for Europe-wide invalidity. This is the case because if an entire patent portfolio is asserted it is sufficient to have only one valid patent in order to make assertion activity profitable. The possibility of a single action Europe-wide invalidity will only lead PAEs to change the parameters of their internal risk assessment (i.e. how many of their patents they expect to be profitable etc.).

Legal fees would need to be prohibitively high in order to discourage PAEs who stand to gain exceeding expected revenue from their successful cases.

Impact on innovation and other considerations

Impact on innovation and technology transfer

In terms of high level impacts:

- PAEs have a negative impact on freedom to operate: this is simply a result of the fact that the disaggregation of large patent portfolios previously owned by large practicing firms and the consequent patent ownership being across a multitude of entities makes the task of assessing freedom to operate more challenging.
- PAEs exacerbate asymmetry in bargaining power asymmetries because often PAEs have very little to lose. They often target entities that have an entirely different business model and the threat of counter-injunction does not represent an effective and credible threat. PAEs have however also a positive impact as they can be thought of as leading to improved efficiency as far as monetisation is concerned.

In Europe the more aggressive types of PAEs have tended to target only large practicing companies or large distributors, and the patents asserted have been mainly SEP patents (ETSI). In Europe, SMEs have typically not been the target of aggressive PAEs

In principle, SMEs may even stand to gain by the presence of patent pools as these might act as a catalyst that facilitates licensing the process. However, the model of patent pools in Europe has not yet taken off to its full potential (as in the case of G5 technology), because of a lack of agreement between the interested parties.

Europe vs US

There are some key differences between the European and US patent/court systems that are responsible for explaining the relatively higher presence of PAEs in the US compare to Europe:

- the existence of the eBay judgment in the US;
- The presence of a "loser pays" system in the EU;
- The absence of jury trials in the EU enhance stability and predictability; and
- The fact that damage claims in the EU are far lower than in the US (partly associated with jury presence).

However some European jurisdictions are likely to favour the activity of PAEs. For example, in Germany, bifurcation allows invalidity to be determined in a different court thereby separating decisions on validity and injunction. At the same time it is easy to get an injunction in the first place.

APPENDIX 3: CASE STUDIES

Case Study 1 – EU-based patent licensing company

Background Information on the company

The interviewee is a state-funded patent monetisation and licensing firm founded in March 2011 headquartered in central Europe; its main operations are supported by a network of attorneys and trusted private firms across the globe.

The scope of the company's operations is Europe-wide. The company employs 19 employees, making it one of the companies with the highest concentration of seasoned experts in patent licensing in Europe.

General Description of business model

In contrast to US-based and other aggressive patent monetisation firms, the firm is not a private initiative mainly aimed at profit-generation but rather endeavours to provide a benefit to the industry. Thus, its main intention is to help those who do not have the means to defend their patent rights on their own; namely SMEs and public research centres. Therefore, a major differentiating factor that separates the firm from its competitors relates to its assertion approach which is not of the "litigate first" type as is the case with many US-based or other aggressive PAEs.

Patent ownership usually remains with the inventor. Occasionally, the inventor may want to have a transfer of ownership mainly due to their preference not to be disturbed, or to appear in the frontline, during the assertion/litigation procedures. In addition the firm generally advises its clients to keep ownership of the patents as such a tactic increases transparency. In contrast, less than 10 % of the firm's clients have opted to transfer ownership. In general, the firm offers two kinds of agreements to its clients. These include:

- agreements that only take into account the client's existing patents; and
- agreements that seek to strengthen the client's future patent position. These agreements help clients build different patent portfolios around few isolated patents. Thus, this second type of agreement may be perceived as an extension of the first type. Typically, the agreement revolves around a 5-year horizon and helps the research team identify patentable inventions.

Overall, the company represents the patent rights of roughly 30 different SMEs and research centres. The latter typically seek to monetise their patent rights.

The firm takes care of all administrative processes towards building a decent patent position. Furthermore, the company commits to fund all related actions and agrees on revenue sharing contingent fee mechanisms with its clients. Thus, the firm's return on investment is largely dependent on the success of its licensing operations.

The vast majority of revenues sources from a recent peace treaty agreement reached in 2014 with a practicing company after the initiation of litigation.¹³⁰ No substantial revenue is yet generated from non-litigious cases, although the firm does not intend to litigate on a systematic basis. There are also some small cases where licensing revenue is below €1 million. Despite their small revenue size, such cases are important due to the relief and protection provided to inventors. Due to the early stage in the life cycle of the company, turnover is still limited.

¹³⁰ The exact amount of licensing revenue could not be disclosed.

Information on patent portfolio

The firm undertakes a global strategy in its patent acquisition processes. It possesses hundreds of patent families including both SEPs and non-SEPs.¹³¹ Roughly 90 % of patents relate to the ICT sector. Telecoms is the largest technological area followed by data processing, computer programming and semi-conductors.

As a general rule of conduct, the company does not focus on a very large number of different patent families as an estimated 10 % of total patent families have sufficient strength in their claims to justify the granting of injunctions. This is the case even when the company explores portfolios incorporating thousands of patents as, once eliminating the inherent “noise” in the portfolio, roughly 1-5 % of included patents can sustain a legitimate injunction request in case of infringement.

All patent families incorporate European patents along with their US, Japanese and Chinese counterparts. This is due to the realisation that in case an invention is valuable, then the stakes need to be addressed at a worldwide level.

Information on R&D activity

As the firm assists its clients towards building a decent patent position, R&D may be conducted in-house as an incubation mechanism.

Patent assertion strategy

The firm follows stringent rules when approaching potential infringers. Initially, potential infringers are approached and are invited to engage in technical discussions accompanied by exchanges of claim charts and other technical documentation justifying the case of infringement. Large players generally agree to enter into such discussions, which may last up to 2 years. On average, one licensing agreement on FRAND terms per year is accomplished throughout these discussions. Typically, once an initial agreement has been reached at the technical stage of the discussions, a final agreement in monetary terms may take an additional year in order to be reached. If a conclusion is not reached, the option of last resort is that of litigation.

In what follows, several examples of assertion cases provided are presented:

Example 1: Firm against Practising Company 1.

Questions	Answers
Was the assertion case involving a patent you own or a patent that you manage on behalf of third parties?	The asserted patents were a combination of owned ones and ones managed on behalf of third parties
In which country did the assertion occur?	US, Germany
How did you identify the third party against whom you asserted the patent(s)?	Through our own market intelligence
How did you contact the third party? (E.g. formal letter, email, phone etc.)	We contacted the company through the head of our local representative office in Korea. Further, we knew a number of licensing exec in the company A certain number of face-to-face meeting took place before filing litigations

¹³¹ The exact number of patent families was unavailable during the time of the interview.

Questions	Answers
Was the assertion specifically directed to one organisation or to a broader group?	The assertion was directed to the whole group
How many patents did you assert against the third party?	We offered a license under a portfolio of 10 to 15 families and asserted a smaller portion (5 titles)
What were the asserted patents' average age and trading history?	5 to 10 years till expiration
Were any patents SEPs?	yes
What was the outcome?	licensing agreement within 8 months
What were the associated costs and revenues of the assertion activity in question? Please answer both in terms of one-off costs/revenues as well as recurring ones.	The signed licensing agreement commands non-disclosure of such details.

Example II: Firm against Practising Company 2.

Questions	Answers
Was the assertion case involving a patent you own or a patent that you manage on behalf of third parties?	Combination of owned and managed patents
In which country did the assertion occur?	US, Germany
How did you identify the third party against whom you asserted the patent(s)?	Through our own market intelligence
How did you contact the third party? (E.g. formal letter, email, phone etc.)	We contacted the company through direct approach. A certain number of face-to-face meeting took place before filing litigations
Was the assertion specifically directed to one organisation or to a broader group?	The assertion was directed to the whole group
How many patents did you assert against the third party?	We offered a license under a portfolio of 10 to 15 families and asserted a smaller portion (5 titles)
What were the asserted patents' average age and trading history?	5 to 10 years till expiration
Were any patents SEPs?	yes
What was the outcome?	pending

Example III: Firm against Practising Company 3.

Questions	Answers
Was the assertion case involving a patent you own or a patent that you manage on behalf of third parties?	Combination of owned and managed patents
In which country did the assertion occur?	France
How did you identify the third party against whom you asserted the patent(s)?	Through our own market intelligence
How did you contact the third party? (E.g. formal letter, email, phone etc.)	We contacted the company through the head of our local representative office in Japan.
Was the assertion specifically directed to one organisation or to a broader group?	The assertion was directed to the whole group
How many patents did you assert against the third party?	We offered a license under a portfolio of 2 families and asserted a smaller portion (the French title)
What were the asserted patents' average age and trading history?	10 years till expiration
Were any patents SEPs?	no
What was the outcome?	pending

Potential future developments

The advent of the UPC is expected to make patent monetisation more effective in Europe mainly by addressing the creativeness of infringers who tend to take advantage of their subsidiary companies across European jurisdictions in order to hide and/or divert the attention of authorities when accused of infringement. The expected adequacy of the UPC to ameliorate the patent licensing landscape in Europe was suggested to be mainly sourcing from its expected similarities to the German patent litigation system.

The latter is particularly proficient in handling patent infringement cases mainly due to its high technical expertise. For instance, filing a complaint in the US is not an intensive process, whereas in Germany a 40-page document explaining all the relevant technical details needs to be submitted and assessed by the court prior to the initiation of the hearings. In light of the above, the potential for Europe-wide invalidity is of lower importance relative to the potential for Europe-wide injunction.

More specifically, the risk of injunction is the most effective pressure mechanism towards the achievement of licensing agreements between patent holders and potential infringers. In particular, in the US, since the EBay case it has become practically impossible to grant injunctions. This leads to an increased frequency of damages being granted which nevertheless may be smaller in size than the amount achieved through proper negotiations. This limits the extent to which inventors secure an adequate return on their R&D investment. If injunctions become scarcer in Europe, then China would become the future most prominent patent litigation jurisdiction.

For instance, in light of the current trend towards transforming mobile phones into credit cards through online payment applications, a key patent for such an endeavour has been filed by an SME. In the absence of a means to reinforce their assertions against large infringers, such entities would fail to secure a return on their investment and would be forced to exit the market and stop innovating.

Impact on innovation and other considerations

Impact on innovation and technology transfer

Securing an adequate return on inventors' R&D investments is vital for the evolution of innovation in Europe particularly in the ICT sector. In particular, excluding licensing income for all innovative SMEs in the French and European ICT sector ultimately reduces these companies' revenue to almost zero and discourages investment in innovative companies. Accordingly, the nature of PAEs' activities enhances technology transfer and ameliorates the functioning of the ICT sector.

Patents enhance the safety perceived by inventors in sharing information. As such, they fuel open innovation and the transfer of knowledge and technology. If such protection is eliminated, which would be the case if the aforementioned attack on SEPs is successful, the consequences would be devastating. This is due to the fact that it is more evident to prove infringement in case of SEPs as, by virtue, infringement is shown if a product is in conformity with the established technology standards. As a result, any attack currently being witnessed against SEPs should be perceived as an attack against patents and innovation in general.

The firm advocates for a strong patent enforcement environment as the right base for further investments in innovation leading to the creation and development of a strong community of innovative companies.

Europe vs US

A significant factor differentiating the American patent litigation system from its European counterpart relates to the increased costs of litigation in the US, relative to the EU.¹³² Another major difference between the two jurisdictions relates to the absence of jury trials in Europe. This enhances the likelihood of a fair decision being reached as judges, particularly in Germany, are highly adequate to assess technical patent-related issues. Plus, filing litigation in Germany requires an in-depth supporting file, thus limiting the number of cases based on lower quality patents.

Another difference of substantial importance between the two jurisdictions relates to the fact that in Germany, judges will not grant an injunction unless a significant, yet prohibiting for SMEs, amount is placed in escrow.¹³³ This increases the importance of having an entity, such as the interviewed firm, covering all financial matters related to litigation as SMEs are not expected to possess the resources to cover such requirements. Lastly, the importance of patentability differences between the two jurisdictions has reduced over the recent years, mainly due to recent decisions in the US and is not of grave importance.

Issues related to standardisation

During the course of the interview, it was mentioned that the main problem that the innovation community is currently facing in its attempt to monetise IP relates to IEEE standards that a number of large American IT corporations are advocating for. In particular, IEEE standards are making it impossible for any kind of injunction to be granted around SEP patents. Currently, it is nearly impossible to get an injunction of hardware patents. Moreover, marginal SEP patents are being pushed towards becoming

¹³² The average cost of litigation in Europe was suggested to reach roughly \$0.5 million, whereas in the US the amount reaches roughly \$5-10 million.

¹³³ An indicative figure of \$10 million was mentioned.

SEPs. In the absence of the risk of injunction, the incentives to innovate are largely diminished as potential infringers have limited incentives to seek to reach a licensing agreement. In light of the above, forbidding the granting of injunctions may be perceived as a license to infringe.

Another issue that is likely to endanger future licensing revenue relates to current push towards rendering SSPPU rates a standard for the calculation of royalties.¹³⁴ This would result in a considerable drop in licensing revenue overall as, currently, FRAND terms are determined based on a multi-criteria approach including the added value that the patent brings to the final product. IEEE is trying to change that being pressured by CISCO, HP, APPLE, SAMSUNG, GOOGLE, MICROSOFT and INTEL. If successful, inventors' return on R&D investment would be diminished further, thus further reducing incentives to innovate.

Lastly, an additional issue generated by IEEE rules relates to their requirement that the amount of royalties to be paid to the original patent holder in case of infringement should be a function of all patents that are relevant to the infringer's invention. This often leads to the total number of relevant patents being purposely inflated by infringers, ultimately lowering the significance and, hence, the value of the infringed patent with regards to the final product. Moreover, this process does not account for whether all the relevant patents include SEPs or other core patents. Ultimately, the above decreases further the total amount of royalties that need to be paid to the original patent holder. The latter, particularly SMEs, do not have the resources to challenge such approaches when practiced by large corporations.

Case Study 2 – US-based patent licensing company

Background Information on the company

The interviewee is the firm's Chief Policy Counsel based and headquartered in the US.

The company has approximately 500 employees in their headquarters where they also have a laboratory conducting research in a variety of fields. Offices in other cities include: Bangalore, Beijing, Dublin, Seoul, Silicon Valley, Singapore, Sydney and Tokyo.

Company employees include numerous lawyers and engineers, a considerable number of which hold PhDs; a number of finance professionals; and a relatively large number of IT employees managing the networks.

The base of their European operations is in Dublin, especially in terms of patent acquisition and licencing. Litigation in Europe would be run out of litigation department in the US.

The parent company operates as the manager of three investment funds:

- Invention science fund.
- Invention development fund: working with inventors and research labs worldwide.
- Invention investment fund: Buys and licenses in 50 tech areas.

The company's initial focus was to create an investment mechanism for inventions. A lot of the research and the subsequent inventions created in the past had been done by smaller firms or individuals that were never recognised and rewarded accordingly. The objective of the founders was to create an invention capital market. Over time they developed a model of creating these investment funds; their acquisition work probably began around 2005 to 2007 around the same time as their licensing activities.

In terms of funding, there is currently a number of Fortune 500 companies, university endowments, and other investors that have invested in their funds. In the early years it

¹³⁴ In particular SSUP rates were paralleled to convincing a writer of having his book rights linked to the cost of the paper.

was primarily capital raised by the founders, their close contacts and possibly a private company.

General Description of business model

The firm is a very different company compared to other assertion entities largely due to its large portfolio in various technological areas. This enhances their reach in terms of prospective licensees. They have a number of highly skilled trained professional who can handle multiple negotiations in a number of areas. They operate more efficiently than most PAEs and are driven by a long term model of deriving value from their assets for their investors.

Due to the uniqueness of the firm's business model (i.e., build, buy and partner), the amount of capital under management and the size of the asset portfolio, there are no companies directly comparable. Some major practicing companies, which may not be thought of as NPEs due to their own technology development activities, are closer to their business model than might otherwise be recognized due to the majority of their revenues being derived from licensing technologies they've developed and acquired. In Europe, there is one PAE that could be considered close to a competitor; moreover two large previously practicing companies could be considered relevant comparators due to their capacity as licensors.

The firm has shifted more and more to buying patents outright. One reason for this could be that the price of patents has been falling due to the difficulty of enforcing them in US. An alternative reason could be that there are significant accounting costs involved in estimating future royalty streams.

The approach is in most cases (around 90 %) either initiated by clients who are looking to sell or by the large broker network looking out in the field for opportunities to acquire and sell (or arrange the deal as brokers). It is less common (around 10 %) for the firm to be reaching out in order to acquire patents.

Information on patent portfolio

The firm has patents in 50 different technological areas, one of which is ICT. ICT receives a lot of attention because of the widespread adoption of communication devices that are based on patents required to operate.

More information on the share of acquired versus the share of managed patents could follow after the extensive review from all teams. Over time, the firm has acquired approximately 80,000 patents. The company currently has approximately 40,000 patents in active licensing programmes. Patents are typically in bundles, but only certain of the acquired patents may be most useful in licencing programmes. The remainder may be sold, or retired thus creating a difference between the overall number acquired and the number presently in licensing programmes.

The firm files hundreds of patent applications annually on inventions created in their Lab, often as many as 500 per year

The interviewee has no information on the share of original innovation (i.e. development and patenting of new technologies) as opposed to marginal innovation (i.e. patenting around existing technologies) based on acquired patents. Their teams in the labs are mostly consultants who work with a number of other companies and businesses. He would expect that a number of patents would involve several other parties in the development process. Thus he could not provide an estimate of how many of them would be on internally developed technologies. There can also be cases where companies ask them to consider certain technologies and work with them to improve on an existing patent portfolio.

A significant number of patents has been acquired from established large technology companies

All acquisition methods can apply to the firm's case:

- They could pay cash up-front and then no royalty stream (this is becoming the case more and more as tracking royalty revenues back to hundreds of entities would be a great deal of admin work).
- There are also cases where patent holders keep some percentage of revenues; this is quite common. As this is not a perfectly liquid market and it is difficult to assess the value of the patent a buyer would want to pay less and potentially provide royalties if they occur. On the other hand, the seller could believe in the product's future performance and thus be motivated to enter in such a type of agreement.

A reason for companies to sell their patents could be that patent portfolios have grown in ways that were outside the expected path of the original holder. For instance, a large company might want to buy a smaller company with a variety of patents, only a small percentage of which is relevant for the co-buyer.

Very often a buyer of patents or a tech development company winds up with patents in their holdings that do not fit their product and technologies very well. This creates "orphan patents"; they don't want to focus on them so they view them as assets that they can monetise.

Another reason is that a company might want to sell their patents to other entities in order to assert them as they would not want to draw unfavourable attention to their assertion activities since they could be harmful for their public image. PAEs, on the other hand do not have issues of public image being crucial for the future viability of the company.

The interviewee disagreed with claims that PAEs tend to assert low quality patents. On the contrary, the value of the assets asserted is of the utmost importance. The novelty of a particular technology is one of the most important value generators for a patent. The firm always conducts a lot of forecasting on the direction where technologies in different areas are headed in order to stay ahead of the technology curve. This is even more important as a patent has a relatively limited life and might only be viable as a technology only in the near short-term. The firm looks for high quality assets with a long life which are of intrinsic value to the technological field.

On the other hand the interviewee recognised that there can be parties looking to buy lower quality assets. There may be small law firms that buy 5 or 10 patents that people are looking to get rid of because no value or applicability was identified.

A company like the interviewee's has acquisition teams which are specialised in evaluating patents and have separate licensing teams with contacts and connections worldwide that better in understanding of the market conditions.

Information on R&D activity

In its headquarters the firm has a laboratory conducting research in a variety of fields. Their R&D model also makes it hard to identify competitors. The firm files hundreds of patent applications annually on inventions created in their Lab, often as many as 500 per year. There can also be cases where companies ask them to consider certain technologies and work with them to improve on an existing patent portfolio.

Patent assertion strategy

The firm undertakes litigation purely to protect an asset that is being used without protection; licensing is the priority. Their strategy is clear: they acquire assets in markets where they understand the technologies

The approach is not based on a "we think you are infringing, you owe us X, pay or we sue" type of strategy. Litigation is only used as a last resort; they have a number of licensing professionals who try to initiate conversations with companies who use the relevant technologies as a first step. These conversations could go on for half a year or

even up to 2 years. They are looking to provide maximum value to their licensees and they are looking to understand what the value of these technologies to their business is.

Where a licensing agreement was not possible there were two options available:

- when the cost, inconvenience and uncertainty involved in litigation is too high then no further action might be taken; or
- litigation over use of what they believe is their technology.

The firm only have a couple of dozen cases pending in Europe; their first case came to trial in beginning of last year.

This process can delay significantly as there are often parallel invalidation proceedings going on in court and patent and trademark office; this can make the findings very complicated.

The market conditions that they would prefer to assert their patent rights are those of a technology that is being used very commonly and has limited licencing activity so far.

Larger companies are generally much harder to get agreements with, primarily because they are more likely to engage in hold-out. They are used to adopting strategies aimed at not compensating patent holders, as they hold the belief that they are not infringing; as a result their first reaction when faced with a licensing request is to fight back. However, if it is possible to gather sufficient evidence that infringement has occurred in relation to an appealing package of technologies to be licensed, then even large companies can be eventually convinced to license.

Independent inventors trying to assert their rights with a large company will frequently say that they are unable to get anyone to even talk to them. The interviewee identified their lack of leverage as a potential reason (they are not in possession of a large portfolio which would increase their bargaining power).

The interviewee was not aware of substantial differences in assertion models adopted for ICT patents as opposed to patents in other sectors. However, there does seem to be a more challenging licencing environment in the ICT sector which could have to do with the widespread adoption and the corresponding magnitude of liabilities.

In terms of litigation locations; Germany is where they felt they had significant IP rights being infringed. It is commonly believed that Germany is an efficient place to litigate for the following reasons:

- If you have German assets you are starting with a high quality asset; validity of patent is believed to be strong (finding of validity more likely than not).
- Higher skilled judges and not subject to a jury trial. The considerable experience of judges provides confidence in outcome of their decisions.
- Bifurcation, should it be a factor, can increase efficiency and decrease amount of time taken to litigate.
- Possibility of injunctive relief: if infringement is sound then injunction should be issued. If such relief is available (which is not the case anymore in the US) it makes the process more efficient because it encourages the parties to negotiate.

The initial approach pursued by the firm when asserting is invariant to whether they operate in the US or in Europe.

Potential future developments

The advent of the UPC is a positive development; the creation of an asset that will be effective over all EU Member States will create a broader market for technology and licensing which will help bring more activity and technology development to the EU. Because of the relative efficiencies that the UPC could provide with respect to enforcement it would be a positive development. The EPO assets that they have seen so

far are very high quality and thus the presumption of validity will be helpful in generating economic activity.

The issue of forum shopping is a natural element of any legal system. This is not a concern that can be driven out of the litigation system. However, it might be more complicated in Europe due to relationships between Member States. This concern could be partly mitigated by the fee structure of the UP; this is a concept mentioned in IPR circles but no particular rationale was offered during the interview. The interviewee's expectation is that the gaming of the system would not be any worse in the future.

With regards to other developments, the interviewee does not think that any change will occur in the way that they generate revenues from IPR; this is principally through licensing, though they occasionally sell patents too.

Impact on innovation and other considerations

Impact on innovation and technology transfer

The firm has a business model that facilitates the transfer of technology. They work with world class institutions around the globe to better understand the direction of technology development and the opportunities for monetisation. There should be no question that the secondary patent market and the free exchange, transferability and enforceability of patent assets facilitate technology transfer.

Practicing companies in many cases want to keep practicing a technology and not pay licensing. Some of their technological advancements are in the form of trade secrets and they have no interest in licensing such technologies; thus no incentives to cross-licence. In stark contrast, in the hands of a patent aggregator, or in the secondary market, patents are freely available to all parties. The efficiency gain of providing such free access constitutes a strong benefit.

It has been suggested by critics that, because of the secondary market, end product prices could go up; that was stated to be absolutely wrong. Prices for tech products, however, have not been observed to be increasing; if anything it could be claimed that they are going down while utility is increasing. Secondary markets keep technology flowing and keep prices down while also provides access to technology that otherwise might not be present.

An example of the secondary market's usefulness for smaller companies was mentioned during the interview. NEST (the programmable thermostat maker) had a big problem with the dominant player in that market who was suing them for market infringement. They were then able to acquire patents from IV and licence additional ones from the too, eventually helping them to increase their bargaining position and to resolve the problem with the incumbent.

It is, in principle, possible for some parties in the market to be abusing a small handful of assets which would in turn result in increasing costs for some products; however, no good quality statistical data exists to indicate that there is any substantial problem there.

In the recent US debate on patents and patent reform, there have been references to increased litigation as a result of more patent lawsuits. The number of lawsuits is, however, more or less stable over time at 1.5-2 % of total patents so there really has not been an increase in that respect. The interviewee suggested that the vast majority of these claims (supported by a study by the department of commerce) comes from competitors suing other competitors.

Europe vs US

There is a much higher volume of activity in the US as compared to Europe. The market in the US for licensing technology has been under development for a considerably longer period of time. Using patents as an asset class is a concept that has been more familiar

in the US over a long period of time. This is coupled with the availability of venture capital in the United States.

The development of technologies that could be licenced in a wide scale had been principally done in Europe by some large companies that kept it to themselves and did not license it out.

The strictness of patentability criteria could be a very important aspect; not, however, as far as the firm is concerned. In general terms, ensuring ways to increase the quality of patented asset is critical to the interests of the UP.

There is a general assumption that patentability criteria became too broad in the US and that, coupled with a lack of resources for the US PTMO, this resulted in granting patents with the motivation to clear backlogs of patent applications: this eventually conspired to lower the quality of patents.

The average cost of litigation can also be a major factor. The ability of DE, FR, UK and NL to proceed expeditiously and efficiently and to keep a low cost for the process is something that affects the developments of patent markets and the development of technology. If litigation expenses run out of control, like in the US, that would create perverse incentives to either cease licensing and patenting or only enforce the highest value assets. This would have a detrimental impact; the impact of litigation costs should not be underestimated.

Case Study 3 – EU-based patent licensing and monetisation company

The interviewee is an attorney and senior counsel for a privately-owned limited liability patent monetisation and licensing company. The founder started a licensing company after acquiring a patent portfolio of about 600 patents and patent applications. The entity's headquarters are located in Central Europe.

The company's operations are global in nature as it is currently active in Europe, the US, Japan, Taiwan, China and South Korea.

General description of business model

The business model of the firm may be perceived as that of an amicable patent monetisation/assertion firm. In particular, SMEs and individual inventors frequently find themselves unable to address large practicing firms' increasing tendency to infringe their patent rights. In such cases, the patentee has limited power and resources to address such concerns, ultimately reducing incentives to innovate. Thus, the majority of sellers of patents to the firm tend to be smaller practicing entities.

Firms who are seeking to monetise patents, yet without the primary intent to engage in litigation can be viewed as competitors.¹³⁵ At a very limited frequency, the firm also invests in patent assertions initiated by other companies. A break-down of licensing revenue across various patent characteristics could not be disclosed. Licensees are usually interested in global licenses across multiple jurisdictions.¹³⁶

Information on patent portfolio

Initially, the company's patent portfolio consisted of US, European and Asian patents related to electrical engineering. The acquisition process focuses on whether a patent is infringed or not. The type of seller (i.e. SME, individual inventor, large enterprise) was suggested not to play a significant role. Occasionally, patents are also acquired from universities.

¹³⁵ Competing firms operating in Europe could not be disclosed.

¹³⁶ A break-down of licensing revenue by country could not be disclosed.

Currently, the company owns about one hundred patents and patent applications, including ICT-related patents, for the majority of which it enjoys ownership rights.¹³⁷ The number of SEPs in the patent portfolio is very limited. In contrast, the patents held are more likely to be old patents that have been traded in the past.

Information on R&D activity

Occasionally, the firm engages in R&D, yet not internally, as the company files patents on its own, particularly in case patent applications are acquired. Therefore, R&D is conducted so as to enhance the potential for monetisation by strengthening the respective patent portfolio. In light of the above, the company will rarely invest in a new/unrelated technology unless an exceptional opportunity manifests.

Patent assertion strategy

Where there is sufficient evidence of infringement, the firm engages in litigation as a last resort, in case no other viable solution is reached. Accordingly, one of the initial and resource-intensive tasks the company needs to accomplish prior to assertion relates to the examination of the extent to which an invalidity claim by a potential infringer may be successful. This is primarily achieved through a thorough investigation of prior art. This due diligence process does not vary significantly across jurisdictions as proving the validity of a patent is an intensive task irrespective of judicial idiosyncrasies. As a result, when the company asserts a patent that is infringed, there is a strong internal conviction that this is indeed the case.

The assertion process is not likely to involve SEPs in light of recent regulations over FRAND licensing terms and case laws. As a result, SEPs for patent monetisation are no longer preferred assets. In contrast the assertion process is more likely to involve old patents as it takes time for a market to grow and potential infringement cases to become apparent. Many times, asserted patents have been traded in the past.

The vast majority of infringers are large practicing companies that infringe the patent rights of both large and small corporations. This illustrates the value added provided by the firm in terms of heightened negotiation and litigation power.

The increasing infringement frequency by large practicing firms was, to a large extent, attributed to the reduced frequency of injunctions being granted, particularly in the US. This decrease in injunction frequency lowers the risks faced by practicing firms and, hence, their incentives to engage in negotiations for a licensing agreement, ultimately increasing litigation frequency. As a result, patentees lose their leverage over practicing firms, which further reduces incentives to innovate. If immediate actions are not taken to alleviate such concerns, innovation will be left at the hands of large corporations who have limited incentives to innovate and greater incentives to sustain their market power.

Potential future developments

The advent of the UPC is one development that will significantly affect Europe's patent monetisation landscape. In particular, the UPC will become the primary patent litigation venue for both PAEs and operating companies. The court is expected to be patentee-friendly due to the current intention to create an efficient and fair court system which will attract litigation cases due to its lower cost and greater decision speed. Overall, despite the negative criticism being advocated by special interest groups, the UPC will be a well-designed major step for Europe with regards to IP.

Apart from the UPC there are not any other developments that are likely to affect patent monetisation in Europe. In contrast, patent assertion is likely to decrease in the US in light of recent case laws from the US Supreme Court rendering particularly unpredictable what may be considered as patentable subject matter and the generally hostile

¹³⁷ The exact number of patents as well the exact share of ICT-related patents and their breakdown across ICT sectors could not be disclosed.

environment for patent holders generated by the recent America Invents Act. Nevertheless, these US developments are not likely to appear in Europe due to inherent differences in legal systems.

Impact on innovation and other considerations

Impact on innovation and technology transfer

PAEs bring value to innovators. This is particularly evident in the US where it is extremely hard for a patentee with a valid claim to assert against an infringer. In particular, large companies extensively free-ride and infringe the patent rights of small and medium sized companies. By acquiring infringed patents and asserting them against the infringers, PAEs provide an adequate remuneration to the original patentees which enables them to invest further in R&D and feed new technological inventions.

Thus, patent assertion drives innovation as a patentee realises that he can secure a return on his investment and invest in new technologies. By allowing the patentee to valorise his IP, a healthy IP monetisation system feeds innovation as large corporations are usually not the main innovators. This is to a large extent verified by the fact that the majority of sellers of patents to the firm tend to be smaller practicing entities. Thus, the stream of revenue generated through the monetisation process is subsequently reinvested in R&D ultimately resulting in new innovative products/services being developed.

The valuable role of PAEs is further verified by the limited enforceability and litigation success rate of low quality patents. Ultimately this illustrates the value-enhancing property of proper due diligence at the identification stage of the patent and/or the potential infringer. Assuming that infringers mainly consist of large practicing entities with significant resources being directed towards their technical and legal departments, asserting low quality vague patents is highly likely to result in their invalidation.

In light of the above, low-quality patents is a general problem generated by the same large practicing firms who consistently file these applications.¹³⁸ Overall, PAEs favour all efforts towards the enhancement of patent quality as only high-quality patents are most likely surviving be a challenge in court. Inferior patents may not even succeed in reaching a trial in court. Moreover, it is extremely difficult, if not impossible, to monetise an asset of very low value.

Europe vs US

There are no significant differences between the nature of operations in the US and Europe. Litigation costs are significantly higher in the US but, nevertheless, the difficulty in proving a case of infringement remains unchanged across jurisdictions.

Case Study 4 – EU-based IPR management and promotion company

Background information on the company

The interviewee is the CTO of the Group and CEO of its R&D subsidiary. The responsibilities for his position include the formulation of the medium to long-term technical roadmap for the company, the support of licensing activities and the organization of internal R&D.

The company was founded in 1982 as a result of increased competition by German and Japanese manufacturers. The company was formed initially as a type of defensive aggregator. Subsequently, with the addition of substantial private investments, the company became a licensing company.

¹³⁸ The problem of patent quality is more prominent in the US due the superior efforts placed by the EPO, relative to its US counterpart, in securing high patent quality.

At present, the firm is a privately-owned company with offices in 3 continents: Europe (Italy, Germany and UK), US (Washington DC), and Asia (Tokyo and Hong-Kong) and headquartered in Central Europe. The company operates independently from the industries related to its patent portfolio and has no affiliations with downstream markets.

General description of business model

The firm's main goal is to facilitate access to new patented technologies. The firm's business model incorporates three main avenues for patent monetisation:

- Single Licensing programmes and bilateral agreements (the firm assists patent owners in making their patented technology available to the market through tailor-made licensing programmes).
- Patent pools and other forms of IP aggregations (the firm acts as an independent administrator in the licensing under FRAND conditions of patents essential to the same standardised technology but owned by different parties. The purpose is to facilitate the licensing of standard essential patents by creating a "One stop shop").
- Licensing or technology transfer (i.e. sale or attached to licensed technology) of patents owned or developed/co-developed internally.

With regards to the patent acquisition and patent development activities of the firm, the main goals of such operations relate to:

- the achievement of sufficient diversification; and
- the identification of technological areas with significant revenue to be made in the future through patent licensing.

With regards to revenue sources, the on licensing programme was indicated as the largest programme to date, generating billions of euros worth of revenue. This programme incorporates patents aggregated from several European practicing firms.

In case of pools of patents, there exist differences across programmes due to divergent agreements with patent owners and diverse commitments regarding the opportunity to litigate and coverage of litigation costs. Some patent pools are also characterised by less administrative tasks and, hence, fees. A "One-size-fits-all" approach does not work. Technologies and markets are constantly developing. An approach that was successful in one field, or geographical region, at one time may not always be the best alternative for every programme. The firm develops tailor-made programmes designed to maximize results while meeting patent owners' business and administrative needs.

More recently, the firm was chosen as the administrator of some important patent pools and joint licensing. Among the patents being licensed, there is roughly a 50-50 split between patents owned by the firm and patents managed on behalf of third parties.

Information on patent portfolio

The vast majority of patents (an estimate of more than 2,000 patent families was mentioned) being offered for licensing by the firm relate to the ICT sector and cover, among others, broadcasting and wireless communications. Roughly 90-95 % of these patent families include a European counterpart.

The firm also manages third parties' patent portfolios in a non-exclusive way. This provides the original patent owner with the ability to seek alternative means of monetisation, independently from the firm. Information on the exact ratio of exclusive to non-exclusive patent holdings was not available during the interview.

The firm works closely with the whole industry in its patent acquisition process. The company both acquires patents from and manages patents for:

- large practicing firms;
- large firms that are redefining their business model and seek to increase revenue from their patent portfolios;

- SMEs;
- research centres;
- universities; and
- individual inventors.

The share of patents obtained from SMEs, research centres, universities and individual inventors is smaller relative to that obtained from large firms mainly due to the larger amount of patents being filed by the latter. The geographical location of patent sellers is very diverse and follows the company's evolution from a purely European patent licensing firm to a global player in the IP licensing landscape.

The firm is fairly focused in its patent acquisition process. As such, it does not acquire patents that cannot be reviewed internally or for which there is a lack of expertise with regards to licensing or internal technical support. Evidently, this limits the scope of patents of potential interest to the firm as patents related to materials or semi-conductors tend not to attract the interest of the company.¹³⁹

Regarding the age of the patents acquired, it tends to differ, to a certain extent depending on the IP holder from where the assets are acquired. For instance, when dealing with universities or research institutes focus is given on a long-term basis as the associated technologies are at an early stage of development. As a result, such patents are expected to be relatively younger.

The age of patents acquired from large companies is more likely to vary. The firm may acquire patent portfolios from large industry players that include a substantial number of patent applications (i.e. young patents) for which the firm may manage the prosecution process. Within this context, the firm may incubate these younger patents and allocate substantial R&D resources on them, ultimately increasing their value. Thus, although existing, differences in patent characteristics obtained from small and large entities are not greatly generalizable.

A key determinant of whether a patent is worth being acquired relates to its potential monetisation value. This is to a large extent based on the company's internal assessment which mainly focuses on the following:

- whether there is evidence of infringement;
- whether the patent is essential to some international standards;
- whether the patent could become essential to a future standard. This is more relevant for younger patents for which there is more flexibility during the prosecution process of the patent; and
- whether the patent is relevant to a future key technological area.

Overall, the assessment of a patent's expected monetisation value heavily relies on intangible assets such as experience and expertise.

Information on R&D activity

What differentiates the firm from its main competitors¹⁴⁰ is its in-house technical capabilities. This expertise has offered valuable help in the identification of key technological areas to engage in R&D investments as well as in technical discussions, in-house support and the identification of potentially infringing products. The substantial expertise of the firm has been widely acknowledged as several companies seek the advice of the firm in general IP matters.

¹³⁹ Semi-conductor patents were not preferred due to the limited revenue opportunities encompassing them. More specifically, semi-conductor patents are mostly applied to chip-sets. As chip-sets are not expensive, in case of litigation success, the current SSPPU regime allows for very limited revenue to be generated.

¹⁴⁰ No direct competitors of the firm were suggested to exist in Europe.

Patent assertion strategy

The company firmly believes that licensing discussions can be very effective and, as a result, prioritise negotiations and technical discussions over litigation. Such discussions are to a large extent based on the internal technical assessments of the relevant patents. Within this context, it was suggested that numerous large practicing firms, particularly those headquartered in Asia, tend to rely on holdout strategies with a view of gaining a competitive advantage over direct competitors. As a result, the firm tries to ensure that the entire market is licensed in order to ensure that competition takes place on a level-playing field

The company is not only focused on the assessment and granting of licenses, but also on the complex monitoring phase of products declared as licensed by the single companies. Because the data reported to the firm does not always comply with real production data, compliance is a fundamental activity: every three months each company sends a report on products sold (largely a self-declaration), that is analysed by a verification and compliance team with the help of appropriate software, to determine possible discrepancies. The same product can appear a number of times in the chain (e.g. made in China, with trading company in Hong Kong, imported into Italy and then perhaps sold in another European country) and the firm must verify that only a single royalty is paid on that product even if more than one company in the chain is licensed.

The vast majority of the firm's licensees are implementers of the technology. The firm does not assert patents upstream at the supply chain of a product (e.g. chip manufacturers). Downstream, there exist licenses at different levels of the distribution chain, mainly due to large distributors' tendency to engage in licensing agreements so as to minimize the risk of injunction.

The company only uses litigation as a last resort, particularly in cases where potential infringers delay or refuse to engage in discussions. Along these lines, it was mentioned that the European Court of Justice has confirmed the correctness of the general approach to assertion adopted by the firm, particularly in the case of SEP patents for which the firm always offers licenses on FRAND terms. However, if perspective licensees are often unwilling to reach a licensing agreement, escalation to court is used as a last resort. This is likely to result in a ripple effect as litigation against one market participant often leads to other market participants seeking to reach a licensing agreement. This is mainly attributed to increases in their perceived risk as a result of the initial litigation.

With regards to preferred litigation jurisdictions, Germany was suggested to involve many proficient courts in ICT matters. This is largely due to the heightened skill-set and experience of the presiding judges, ultimately securing a fast and fair outcome to the case. In contrast, having a jury for a patent case (as in the US) was mentioned as a cause leading to uncertain and sometimes unfair judgment outcome.

Potential future developments

The interviewee was not in the position to discuss the implications of the advent of the UPC due to unfinished concurrent internal discussions on the same matter.

Europe could lead the efforts towards 5G. In fact, the European success in the development of 5G is contingent upon the allowance for all market participants to take part in the discussions for the formation of standards. This ultimately will prevent stakeholders that help develop the industry from abandoning the market. Within this context, the disintegration of large patent portfolios owned by entities abandoning the market was suggested to introduce a short-term risk on the development of 5G, but not a long-term loss for society.

Rather, a bigger loss would be incurred in case companies diverted solutions towards trade secrets, thus moving away from open innovation and standards as proprietary solutions are greatly monopolistic. Many companies and innovators will weight participation to standardisation activities also in light of the potential return on

investment (ROI) that they could generate by allowing access to their patented technology. If their contribution is not recognized, some of them, to the detriment of innovation, may decide to avoid participation in the standardisation process and revert to proprietary, closed solutions or trade secrets. As a result, open standards should be protected.

Impact on innovation and other considerations

Impact on innovation and technology transfer

A patent conveys the right to exclude and a secondary market for patents will always exist as long as patents are an asset. Within this context, if companies are unwilling to take licenses and use a technology that somebody else has developed, injunctions become a matter of justice. Aggressive assertion practices related to weak low-value patents are of limited effectiveness in Europe as large practicing firms, which constitute the vast majority of potential infringers, will assess their low-risk exposure and will not agree to a licensing agreement while also seeking to invalidate the patent.

Thus, assertion of high value patents, or SEPs, is an indication of a healthy IP market that guarantees an adequate remuneration for investors. This is the main advantage offered by PAEs to SMEs and individual inventors who find it particularly hard to extract compensation from large practicing companies even when substantial evidence of infringing by that the latter is present.

In this sense, patent pools and other forms of IP aggregation support the licensing of standard essential patents by creating a one-stop shop for patent licensing. As a result, the creation of pools is supported to a great extent. Some SSOs are also becoming more proactive towards such a one-stop shop direction encouraging owner of SEPs to meet under the supervision of a pool facilitator. Nevertheless, occasionally pools may not achieve the expected critical mass of licenses, mainly due to practicing firms engaging in free-riding.

In general, the formation of pools is an effective means to address free-riding problems as implementers can account ex-ante for the exact cost of developing a technology through the use of key patents. Thus, an entire industry achieves a clear indication of IP-related costs. This ultimately enhances incentives to engage in R&D as it is a costly endeavour that requires an adequate return on the investment.

To sum up, patent pools have significant pro-competitive effects, including:

- Defining FRAND licensing terms and conditions in a context that takes account of the interests of licensors and licensees;
- Avoiding royalty stacking by establishing a single royalty rate thereby reducing the likelihood of litigation;
- Providing more certainty and predictability to the market with regards to IP costs;
- Reducing transaction and administrative costs.

Similarly, FRAND has worked quite effectively and efficiently so far. It is a compromise determined by market dynamics and negotiations that allows standards to have a broad application. As a result, it would be a mistake to involve in the standardisation process irrelevant factors that go beyond the conceptual framework of what is a technology standard. For instance, there is zero empirical evidence of the existence of holdup for SEPs, while there exists plenty of evidence on the existence of holdout, which has received limited attention.

Europe vs US

The current patent licensing environment in the US has become particularly hostile as can be seen by the reduced frequency of injunctions granted. In contrast, recent developments in Europe render this jurisdiction a more interesting venue for patent monetisation and highly protective of innovation.

Case Study 5 – Government space agency

Background information

The company is a Government space agency. It was founded in 1968. Its headquarters and technical centre are located in Central Europe. The company employs 3,000 people and invests several millions of euros in R&D.

The company's products/services relate to its substantial space expertise and space-related R&D. The main goals of the company are to:

- facilitate the industry to gain access to space;
- contribute to the expertise of companies wishing to gain access to space; and
- make government investments in space more valuable to taxpayers.

General description of PAE business model

It appears that banks are investing in PAEs and are involved in the purchase of patent portfolios. Licensing in the space domain is not as aggressively conducted as in the telecommunications domain.

The company is currently working with IP licensing firm in order to capitalise on its licensing expertise; this approach was initiated by the IP licensing firm. The current agreement involves an exclusive revenue sharing agreement.

Information on PAE patent portfolio

The firm has exclusive licencing agreements with an IP licensing company for roughly 20 patent families, whereas single patents are not licensed. These patent families encompass around 100 patents all of which are linked to navigation; within navigation there are several sub-categories included such as software, telecommunications, computer programming, data processing and positioning. The entirety of these patents were granted by the EPO, whereas the average age amounts to seven years.

Some of these patents are SEPs for a standard that is yet to be implemented.

Information on PAE R&D activity

No information on PAE R&D activity was provided.

Experience with PAE assertion strategies

No information on specific patent assertion strategies was provided.

Potential future developments

The introduction of the UP and the UPC is expected to increase the value of patents held by PAEs. Their implementation is also expected to attract foreign entities seeking to assert their patent rights against European firms with the ultimate possibility of litigation on the basis of infringement. In particular, patent owners are inclined to use their patents in their own countries. PAEs on the other end are inclined to go wherever there is an opportunity. With the unitary patent the number of countries offering the potential for revenue to be extracted increases and, therefore, more PAEs are expected to be attracted. This is expected to become particularly more pronounced as the European satellite navigation system is currently being developed and constitutes a both a complement and a direct competitor to similar applications, which originate from the US and China respectively.

With regards to UPC, Fighting a court battle in several countries is expensive and time consuming. Having a competent court would make the outcome of a trial more predictable in terms of success, cost and duration. These are parameters which are expected to be factored by PAEs, ultimately increasing their presence in Europe.

With regards to the potential for forum-shopping, it is of lesser importance as a determinant of assertion activity, relative to the value of the patent. Nevertheless, concerning the court, language, cost, duration and quality are expected to play a role. In this sense, Germany has been used by the tech industry and has proven its status.

As the firm is not engaged with any PAEs, the aforementioned effects are not expected to affect its licensing fees and generated revenues.

Impact on innovation and other considerations

The cooperation between the company and the IP licensing firm allows companies from various industries to create new products and services using the innovations of the firm. The main reason for this collaboration is to complete the limited extent of licensing expertise characterising the firm. Moreover, in the absence of cooperation with the IP licensing firm, the interviewee indicated that the firm would not have been reasonably able to engage with any US-based companies in order to negotiate licencing arrangements.

The respondent indicated that there will not be a one-for-one relationship between revenues generated from licencing and R&D expenditure. R&D decision making is primarily determined by exogenous factors.

With regards to other PAEs currently operating in Europe, the interviewee mentioned that they are not considered a threat to the firm and that they have not received any incoming assertions from PAEs over the past ten years. However, they would find a European PAE as problematic if it were to target them since the firm is a main contributor to the European Space Agency.

Case Study 6 — US-based commercial research and engineering organization

Background Information on the company

The company is a publicly listed commercial research and engineering organization. The company's headquarters are located in the US. Offices in the US also exist in multiple states as well as in Canada, the UK and Asia.

The company has active R&D centres in North America, Europe and Asia.

In addition to its predominantly self-funded research and development, the company participates in Horizon 2020 and receives funding for several EU projects related to 5G network technology. The company also received funding in 2014 relating to intelligent transport projects in the UK and EU.

The company participates in a joint venture along with a practicing firm and an investment company relating to internet of things technology.

The company also has affiliated subsidiaries.

General Description of business model

The company's business model relates to investing in the early stages of wireless technologies by conducting R&D and developing patents that are ultimately licensed to manufacturers in the wireless industry.

Most revenues come from licensing. The company engages in a worldwide licensing programme. Other sources of revenue include engineering services and tech solutions.

Information on patent portfolio

The company possesses over 20,000 patents and patent applications. From the latter roughly 13,000 are granted patents having a worldwide scope. All patents are owned. The company does not manage patents on behalf of third parties.

Approximately one quarter of these patents relate to ICT and are branded in Europe. Most national patents are branded at least in the UK, Germany and France.

The large majority of patents held apply to mobile telecommunications and wireless technologies. Some patents are SEPs and the company is active in standards development activities. A sizeable portion of the patent portfolio relates to standardised technology.

Roughly 80% of the European patents held are developed internally. The company also occasionally acquires patents from third parties. The most common type of seller relates to practicing firms that continue to have operations. The company acquires very few patents from small parties and rarely from companies in financial distress.

Information on R&D activity

The company engages in significant R&D activity and develops new patents in emerging wireless and communications technologies. In so doing, the company has long-term relationships with roughly 10 or more universities worldwide on a yearly basis especially with regards to emerging wireless technologies.

Patent assertion strategy

The company is well-known in the industry as a leader in the research and development of future wireless technologies and has ongoing licensing relationships with many practicing firms. The overall assertion strategy involves negotiations over the licensing of patent portfolios relating to newly emerging and existing technologies and the renewal of existing licensing arrangements. The company also scans the market and engages new market entrants in order to negotiate license agreements. During the initial introductions with firms, usually held in meetings, the company explains to the potential licensee the patent portfolio in question and discussions advance from there. These involve comprehensive negotiations and communications. This process has, on a reasonably consistent basis, resulted in license agreements between the parties on mutually-acceptable terms. The company does not engage in extortive approaches or immediate litigation actions with a potential licensee.

The company does not compete in the downstream markets and therefore the goal is to arrive at a negotiated agreement that is agreeable to both sides and that enables the licensee to operate and develop its products successfully.

When identifying infringing devices, the company reaches out to the alleged infringers, explains the details of the infringement and engages in comprehensive negotiations. Litigation is resorted to as a last resort and the frequency of litigation cases throughout the company's history is very low.

In particular, during the last 5 years the company has initiated two ITC actions in the US, along with customary parallel actions in district courts. The company is a member of ETSI and has made commitments to be prepared at all times to license Essential patents on FRAND terms and conditions. However, after lengthy negotiations to agree on a license, in these instances no resolution was reached by the parties. Ultimately there was no finding of violation in these ITC actions. However the company did win in US District Court with respect to several patents.

The company has not asserted any patents in Europe in infringement actions.

Potential future developments

There is uncertainty over the impact of the UPC and the UP. The company advocates for a reliable and predictable patent system that works for everyone and on which patent holders can rely. The company monitors the conversations over the emergence of the UPC and the UP but remains uncertain over their effects.

Impact on innovation and other considerations

Impact on innovation and technology transfer

It is important to recognise the usefulness of negotiating licensing agreements. Currently, there are some companies within SSOs attempting to come up with specific and unbalanced definitions of what FRAND is. Rigid definitions of FRAND terms are unnecessary and impractical. Despite the sometimes lengthy and difficult negotiations involved in reaching a license agreement on FRAND terms and conditions, this practice is a model of unprecedented success as the current regime and policies have worked to the benefit of innovation. Good-faith negotiations between companies involve frank and arm's length discussions aimed at reaching an agreement that reflects the needs of both parties while remaining consistent with FRAND principles. Therefore, apart from the potential compliance costs, attempts to introduce specific unbalanced definitions of FRAND can impede rather than facilitate access to SEPs and the negotiation of license agreements on FRAND terms and conditions. Similarly, proposals to make licensing at the component level a requirement, or to base royalties on the cost of components rather than allowing the well-established industry practice of using the final device price, can disrupt efficient licensing practices and lead to the under-compensation of patent owners. This, in turn, will reduce entry and increase the risks of investments in innovation, ultimately stifling it. An example of this is the PC processor chipset manufacturing industry, which provides lower functionality at higher costs and was an ecosystem that ultimately evolved to an oligopoly. The current FRAND regime has demonstrated that it encourages and drives innovation and there needs to be extreme caution before attempting to change it. What is needed is certainty in how the laws are applied and that the patent system, as a whole, is predictable.

Europe vs US

It is difficult to make comparisons due to different legal systems between the two jurisdictions. For example, in the US, some of the aspects of patentability are currently very much evolving. The patentability criteria for software patents or business method patents are very unclear in the US, as opposed to Europe where there is currently more clarity.

Case Study 7 – France-based software development company

Background information

The interviewee is the CEO of the firm and has been with the company since 2006. The current business line of the company is developing and selling software products. The company was founded in 2002 and it also has a presence in the US.

The firm has always been R&D intensive and it first started as a professional service company developing innovative User Interfaces (UI) for customers. They started R&D around multi-touch technology around 2005. In 2011, thanks to venture capital (VC) money, they changed from a professional service company to an independent software vendor (ISV). This happened gradually and has now led to 95 % of their revenue sourcing from ISV activities through software licences and subscriptions and only 5 % of

service revenues. They sell software in 55 countries with around half of their revenue sourcing from the US, 10-15 % from Asia- and less than 10 % coming from France.

The company has been active in the field of patents pretty early in their life; their first patent was filed in 2004 and their most major patent filing was in 2008 in the US.

General description of PAE business model

The firm has only interacted with an IP licensing firm who has helped them drive the licencing and monetisation of their patent portfolio. They never attempted to monetise any patents before this IP licensing firm. The focus was initially on innovation and not monetising; this did not change in the first years of VC funding. They have never sold their IPR to third parties. They have never been on the incoming end of patent assertion. In one instance, when the patent for multi-touch technology was granted in the US they were contacted by two UK-based patent brokers by email.

The IP licensing firm, as agreed, has taken control of all commercialisation aspects of the firm's patents and in return they have agreed to a share of future revenues. The IP licensing firm also helps the company by setting up a "patent factory" with them; this relates to funding of the development of new patents by the company. In 2015 in particular, the company was able to file for two new patents with the IP licensing firm's help. The interaction takes place through assignment of exclusive commercialisation rights to the IP licensing firm with ownership of the patents being retained by the firm.

The IP licensing firm are experts at patent filing and patent matters in general as opposed to the firm; or more generally, what a small scale operating company can be expected to provide. They also take care of all required fees which can be very expensive. The IP licensing firm is also good at incentivising the firm and managing the process from a patent angle.

Additionally, there are some tax incentives in France for R&D in private enterprises. Through the establishment of the "patent factory" arrangement with the IP licensing firm, the company increases their patent applications thereby having evidenced R&D activity and securing the tax incentives.

Information on PAE patent portfolio

The patents assigned to the IP licensing firm relate to software, where someone who is not a developer can create several things through the user interface. Their product is for creative people to create interactive applications without programming knowledge; this is called user oriented programming.

The second technological field relates to processing interactive events in relation to a screen (touch, gesture etc.).For their technologies they have been granter single patents. Two of them have been split and are currently being worked on a follow-up basis as parts of the same family (patent grapes).They do not hold any SEPs and therefore no SEPs have been provided to the IP licensing firm.

At first when they were not supported by the IP licensing firm (before 2013) they filed a couple of patents in France; then in 2008 they went directly to the US where they were granted a patent and in parallel went to the EPO.

Now they start with EPO and then go to the USPTO; since the IP licensing firm took over commercialisation they are the ones responsible for filing strategy.

Information on PAE R&D activity

Limited evidence of PAE R&D activity is provided and relates primarily to the IP licensing firm offering assistance in the development of new patents through the establishment of "patent factories".

Experience with PAE patent assertion strategies

No information on PAE assertion strategies was provided.

Potential future developments

In Europe, when applying for patents they used to do it in France because, back in 2004, EPO was not as developed. The firm believes that the simplicity brought forward by a Unitary Patent will be beneficial for them. They would welcome one European patent covering the entire union. Also, directly applying in English was not seen as an issue for their company (even though it can be for several other companies).

Impact of PAEs on innovation and other considerations

If not for their interaction with the IP licensing firm, the firm would have looked closer to patent brokers; especially for their multi-touch patent they would have explored extensively for monetisation opportunities.

However, they would not have been able to go through with such a process in-house as it is too complicated, too new and too costly for them.

Their interaction with the IP licensing firm has allowed them to focus 100 % on their core business and they are now in a better position to understand the commercial value of IPR. They have also received significant help in understanding better the trade-off in going to market quickly and the time it takes to prepare for a patent filing before it reaches the market.

Case Study 8 – Trade association

Background information

The entity is an association representing the interests of practicing companies.

General description of PAE business model

In the past few years, we have seen radical changes to the prime use of patent portfolios. Initially they were used to preserve a company's "Freedom to Operate" (i.e. the ability to bring their products to market by seeking large portfolio cross-licenses). Now patents have become a tradable and income generating asset, capable of being asserted against competitors in order to generate income and in some cases to stifle competition ("Secondary Patent Market").

This Secondary Patent Market has greatly encouraged the rise of "Patent Assertion Entities" ("PAE"), known as "Patent Trolls", engaged in "Patent Privateering" (i.e. use of Patent Trolls in order to enforce patents against competitors and customers by proxy). Increasingly, licensors are relying on the "Secondary Market" for the licensing of implementers, as a growing number of implementers i.e. notably new entrants into the market, are questioning the value of patent portfolios of incumbent licensing holders and rather make use of technology without compensation to the patent owner irrespective of the risk of litigation and injunction

PAEs tend to focus on cash rich companies and innovative new technologies that generate cash. The easier it is to obtain injunctions and push through an infringement claim in a jurisdiction, the more likely that PAEs will focus on cash rich companies in these particular countries. PAEs are funded either by outside investors, e.g. venture capitalists or partly owned by patent producing companies.

Although they usually scout for available patent portfolios on the open market, quite a few large patent producing companies are also assigning patents to particular PAEs themselves (by either selling patents to these PAEs or using the PAEs as an agent to enforce their licensing rights). In some cases the patent producing company, still retains a share in the patent revenue after disposal of the patents to PAEs. Patent Privateering is a "tool for moving competition from the product market into the court room".

Information on PAE patent portfolio

In general, in the secondary market patents and patent portfolios are acquired primarily (if not exclusively) from practising entities (e.g. manufacturers) and often include SEPs.

In addition thereto, recent cases in Europe have shown that PAEs seem to assert older patents related to widely adopted technologies and assert these previously dormant patents by applying them to fields of technology these patents were not initially aimed at.

Thus, the average quality of PAEs' portfolios is usually considered "low". However, the use of this term requires certain clarifications. PAEs tend to assert patents that are essential to provide ICT products and services within an entire sector.

Information on PAE R&D activity

Although, some PAEs claim to have internal R&D departments, the extent to which the conduct of R&D in-house can be verified is greatly limited. Some studies state that 95 % of telecoms patents held by PAEs were acquired from third parties.

Experience with PAE patent assertion strategies

PAEs often wait until a technology has "matured": i.e. has been widely implemented and is subject to significant investment, before asserting their patent rights.¹⁴¹ These practices are to a large extent facilitated by:

- the threat of injunction;¹⁴²
- the potential for a significant drop in market value in case the assertion initiative becomes public; and
- the potential for a drop in customer confidence once the assertion becomes public.

Although figures are officially not from bilateral licensing negotiations, there is a general consensus that PAEs exponentially increase the cost of technology by:

- asserting their patents against end-users of a technology at the top of the value chain (e.g. MNOs) in order to capture a greater revenue base for calculating damages. The PAE usually allege continuous infringing equipment, rather than a one-time royalty on the equipment sale ("The End User Holdup").
- asserting 10 to 15 year old (previously dormant) patents covering widely adopted technologies by seeking royalty rate well in excess of the implementer's:
 - (potential) licensing fee to implement the technology in the first place;
 - past investments in the technology; and
 - switching cost in order to implement non-infringing technologies or work-arounds ("Sunk-Cost Holdup").
- leveraging litigation costs in order to force a settlement amount "based more on the target company avoiding litigation costs than on the patent's value. A typical non-innovating, non-practicing monetisation entity has only a small volume of materials and witnesses subject to discovery. In contrast, the accused infringer will almost certainly be faced with a larger discovery burden, having in its possession large

¹⁴¹ For instance, in the context of telecom operators significant network investments and standard setting actions took place in the 70s, 80s and 90s.

¹⁴² The threat of injunction is greater in Europe notably Germany as in the US injunctions are subject to the "eBay Test" set out in the case of eBay Inc. v. MercExchange, L.L.C., [547 US 388](#) (2006). The test requires a plaintiff to demonstrate: (1) that it has suffered an irreparable injury; (2) that remedies available at law are inadequate to compensate for that injury; (3) that considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction."

quantities of documents and employee witnesses relevant to its products, sales, customers, etc.” (“Litigation Cost Holdup”).

These effects are particularly more pronounced in the case of mobile network operators (MNOs) as the complexity of networks and size of revenues has made them a prime target for “Patent Trolls” and “Patent Privateering” in Europe. The multiple cost of troll litigation, threat of injunctions and demands of distorted licensing fees (based on operator service revenues) are a direct threat to the affected mobile network operators’ business.

The average costs for defending one patent infringement lawsuit range from €500,000 to €3 million. Usually MNOs and manufacturers are sued on 7 – 10 patents at one time by the same PAE. For example it has been quoted that a practicing firm spent €42 million to invalidate 42 PAE patents. Such figures do not include indirect costs to the mobile network operator’s business such as diversion of resources, delays in new products, and loss of market share.

In addition, the progressive fragmentation of key telecommunications patent portfolios, held by a small number of large practicing entities means that it is almost impossible to identify the current owners of these technologies. Meanwhile, the mere threat of injunctions (on parts of operator networks or services) and inflated damages:

- creates considerable uncertainty for operators regarding the operators ability to provide uninterrupted services to the of public;
- poses a real risk to the creation and (uninterrupted) use of future standards;
- stifles innovation, as new (including start-ups) technologies are not underwritten to the same level by indemnities as technologies offered by established providers (which in turn results in more costly and technically inferior solutions being offered to consumers); and
- is a powerful negotiation tool to extort exponentially higher licensing fees from operators.

Moreover, there is no legislation or legal precedent preventing injunctions on operators. Any statements to the contrary would not be aligned with the European Enforcement Directive. Ironically, recent patent infringement cases in Europe have brought to light that some of the patents being asserted against mobile network operators are based on technology that the mobile network operators have helped develop and implement over the past 20 years. This is a clear signal of PAEs’ bargaining power and of operators’ vulnerability. In light of the above, network operators are especially vulnerable mainly due to:

- the size of the market both in terms of operators and revenue generated;
- the lack of a legal precedent in Europe similar to that of the E-bay case in the US; and
- the lack of both internal resources (the IP departments of even the largest operators are not designed for large scale patent litigation) and external resources (the availability of patent attorneys and patent lawyers is often an issue because of conflicts of interest).

Potential future developments

The new Unified Patent Court in Europe already seems to contribute to an increase in PAEs in Europe, due to the easy prospect of Europe-wide injunctions being granted against alleged patent infringers under its bifurcated patent litigation system. In addition, forum-shopping is likely to be an issue as plaintiffs may choose the division of the UPC where they will bring an action (because an alleged infringement occurs in many member states for instance). In turn, local and regional divisions may compete with each other to attract more litigation cases.

Regarding other developments, the next years will play a crucial role in shaping up the future of the European telecoms market and more specifically the development and implementation of 5G technologies. A number of court cases involving PAEs will set legal precedents and will send clear signals about the potential profitability of assertion in Europe. There is a material risk of more and more PAEs entering the European market (backed by US investors) and new European PAEs emerging as a result of the above.

In the US, Patent Troll suits have doubled from 2009 to 2011 and represent a 400% increase from 2005. It is estimated that last year two major MNOs had around 40 on-going lawsuits from PAEs. However, it seems that PAEs have discovered Europe and “are probing the system”. In Europe PAE activities against MNOs are on the increase. US PAEs seem to test the market in Europe currently.

Impact of PAEs on innovation and other considerations

Impact on innovation and technology transfer

Various studies estimate that a PAE lawsuit can be responsible for up to a 20% reduction in relative R&D spending. Usually, publicly listed firms, upon a lawsuit not being dismissed, reduce their R&D spending significantly in subsequent years. However, the biggest impact is on small start-up firms. PAEs impose barriers to entry for SMEs, as small technology firms cannot raise sufficient funds to defend against PAE attacks, let alone indemnify their customers against PAEs.

Investors are deterred from investing in start-ups amid the threat of assertion from PAEs. The above researchers say that PAE patent assertions effectively impose a significant tax on investment in innovation, stressing that the money spent on the lawsuits is a social loss and not a mere transfer of funds. About a quarter of the litigation cost consisted of legal fees and of the total cost, no more than a quarter could possibly represent a flow to fund innovative activity.

Moreover, the overall cost of licensing and fragmentation in licensing holdings are detrimental to an environment allowing implementers “freedom to operate” without any interference from third party licensing claims. Given the average cost of litigation, patent infringement cases are settled before trial, partly to avoid extensive litigation costs and partly to avoid causing any upset in investors’ and customers’ confidence. Ironically, when cases go to trial, patent trolls seem to win a mere 10 to 20 % at the time of writing.

Issues related to standardisation

Historically, the work in “Standards Setting Organisations” (“SSOs”) used to be far less adversarial where patents were concerned as SSOs were seen as a mere tool to facilitate the creation of new standards. Any exchange of technology to enable a new standard was usually subject to SEP cross-licensing agreements between manufacturing entities. The change in standard setting attitude is largely due to the fact that new players in the market do not possess the ability to cross-licence SEPs associated with established standards

New entrants into the telecommunications markets are increasingly questioning the validity and quality of incumbents’ SEPs, i.e. the fees for portfolio licensing. Meanwhile established licensing holders have continued the practice of inflating the number of patents in their licensing portfolios. Initially, this was seen as a means to match other manufacturers’ portfolios for the purpose of achieving better terms for a cross-licence. However, the lack of quality of patents in some portfolios is meeting stiff resistance from implementers without the ability to cross licence. This seems to impact licensing revenues of companies with large patent portfolios (including SEPs) and has incentivised incumbent patent holders to seek other means of monetisation (e.g. through PAEs).

In light of a diminishing consensus regarding the terms on which to make standards in essential technology available to implementers and the increasingly adversarial nature of associated licensing negotiations, there is a need for greater clarity in standard setting

procedures for licensors and implementers alike. This is particularly important for the future connectivity of products such as home appliances (e.g. fridges) and cars.

Increasingly, essential technology owners are neither willing to participate in the standards setting process nor prepared to commit to any FRAND undertakings. The fragmentation amongst patent holders of SEPs and lucrative secondary market hampers:

- the telecommunications community's efforts to agree on future standards; and
- the availability of FRAND undertakings for essential technologies.

Moreover, within most SSOs, patent landscaping and essentiality tests is not part of the standards setting procedure. Given the prohibitive costs of comprehensive patent risks assessments for third party essential patents in standards setting, there is a real danger that increasing future standards could become hostage to third party holders of essential patents not bound by the FRAND commitments associated with the respective standards.

In order to address some of the above problems, SSOs need to introduce within their standard setting processes, i.e. greater clarity with regards to:

- the identification, selection and validation of the prospective essential technology;
- what constitutes FRAND licensing and how to enforce and calculate the licensing fees;
- provision on what would possibly constitute a "willing licensee";
- any SEP change of ownership¹⁴³ general; and
- what defines a "public interest". Operators providing services to the public should be protected from patent assertions in order to shield consumers from being passed on the costs from extortionate licensing fees as a result of injunctions.

Case Study 9 – US-based international patent brokerage company

Background information

The firm is an international leader in IP transactions. The company was founded in 2008 with the primary purpose of providing brokerage services that help patent owners sell their IP assets. The company receives requests to sell roughly 200 patent portfolios per year and does not receive any revenue from a given deal unless it fully transacts.

General description of PAE business model

Buyers, and especially PAEs, view patent as assets and therefore, they are primarily concerned about the legal value of the asset rather than its technological application. Stand-alone PAEs (that are not affiliated to any large corporations) cannot typically engage in a bidding competition with large corporations when acquiring an asset due to of the differences in resources and purchasing motivations. As an investor, the PAE wants to make a multiple on monies invested. This means buying for as little as possible.

Thus, one of the biggest myths regarding the operations of PAEs is that they acquire their patents in the open market.

Patent privateering

Patent privateering was characterised as a shell game that has become a reality as large companies use PAEs to acquire patents and then engage in litigation against

¹⁴³ For instance, consumers ought to be aware of whether assertions by PAEs, i.e. privateering or the consequences of monetise the patent rights end up inflating the price of a consumers mobile phones.

competitors. More specifically, during patent wars the involved large parties often delegate patents to shell companies to be used in concurrent litigations against the other party.

In theory, during the discovery process a patent's true owner should be identifiable. In practice, however, this is not the case. For instance, if the shell entity resides in Romania and litigation occurs in the US, the US court does not have the authority to force the Romanian entity to disclose its true ownership status. The companies will often set an owner of the Romanian shell in another jurisdiction. The off-shore shell game has been exacerbated during the past 3 years and piercing the corporate veil has become increasingly difficult.

Information on PAE patent portfolio

For a PAE, acquiring a patent is a financial investment, and the price at which the asset can be purchased and the expected returns on the investment constitutes the main driver of the acquisition.

The main drivers of patent values are the following:

- Whether the patent is valid.
- Whether the patent is being infringed.
- The size of the firms infringing (the asset's value is higher the larger the infringers' size) and the revenues associated with the claims.
- The number of infringing firms (the larger the number of infringers the higher the asset's value).
- The size of the potential award that can be achieved in a patent lawsuit.

Some of the above characteristics tend to be correlated with, both, technological sectors and patent age. For example, patents in ICT sectors — and telecom more specifically — are particularly valuable not because investors have a particular interest in their technological applications, but because these patents read on a wide range of products and services and therefore, when infringed, they are likely to be infringed by a large number of large firms. Moreover, these patents can be asserted against large companies given the presence of large operators in the telecom sector.

With regards to patent age, middle-age patents tend to be on average of greater value. This is the case because for an asset to have litigation value it must be ahead of the technology curve, and have enough term remaining to last a 3-5 year litigation. For instance, in order for a 3D printing patent to be of litigation value, it needs to have been filed prior to 2005 when 3D printing technology was at its infant stage.¹⁴⁴ In contrast, university patents are most frequently of little value as, despite their great likelihood of being ahead of the technology curve, they tend not to read on a mature market. This introduces a risk caused by the uncertainty over the patent's eventual marketability, which does not particularly appeal to patent buyers.

Sellers typically represent innovative entities that are not big companies, such as:

- fallen start-ups;
- universities;
- think tanks;
- individual inventors; and
- SMEs.

The absence of large sellers is to a large extent due to the fact that big companies have the necessary resources to scan the patent landscape and identify potential buyers themselves.

¹⁴⁴ It was noted that European 3D patents rarely date further back than 2008 which further explains the general underrepresentation of European patents in this part of the deal flow.

The majority of patents being sold from the aforementioned types of sellers are US patents from Silicon Valley start-ups. As, by definition, such companies are at the very early stages of their development, they are rarely interested in patenting in Europe and do not have the financial resources to file for global patent protection when young in their lifecycle. Instead, they tend to focus on obtaining a considerable market share in the US first, before deciding to expand their operations to Europe. If the company starts to fail, and begins to cut costs, then the non-US patent costs are the first to get cut, leading to even fewer European patents on the sale market. As a result, patents are mainly filed in the US.

It needs to be mentioned, nevertheless, that there are very few European IP sellers. Judging from the patents that reach litigation it is evident that the majority of sellers of European patents are big companies. This is due to the fact that innovation in Europe does not source from start-ups but from big companies. In general, IP is generated either by start-ups, individual inventors, universities, or big companies.

In Europe there exist some big companies that consistently innovate but the start-up landscape is relatively small. For instance, Israel has ten times the amount of start-ups that the UK does. Similarly, Silicon Valley has more start-ups than the rest of the non-US world combined. Within this context, there is a large number of European entrepreneurs in Silicon Valley that consistently complain about the European start-up climate. It would take roughly 10 to 20 years to ameliorate the situation in Europe.

In light of the above, there are very few IP transactions from European start-ups to PAEs in Europe. When PAEs acquire European patents, sellers consist of either American start-ups that had filed patents in Europe in the past, big European companies, and sometimes big American or Asian companies. As a result, the European IP deal flow is considerably low relative to the US.

Information on PAE R&D activity

No information on PAE R&D activity was provided.

Experience with PAE patent assertion strategies

As aforementioned, investors (i.e. PAEs) are mainly interested in the litigation value of acquired patents and, particularly, the type of entity against which the IP asset can be asserted. Within this context, targets that are big companies are vastly preferred due to the potential for significant monetary benefits to be extracted. For instance, recently the firm completed a patent transaction in which the asset was being infringed by 15-20 start-ups and a large practicing firm. As a result, the company experienced difficulties when trying to sell this asset. Similarly, PAEs are primarily interested in asserting their patent rights against large companies. From the latter, Chinese manufacturers and European telecommunications firms are particularly attractive targets for PAEs.

Many of these companies have built a reputation of being eager to pay and agree to commit to a licensing agreement with little resistance once initially approached by PAEs. This attracts more assertions as PAEs realise the potential to earn quickly an adequate return on their IP purchase investment. In contrast, a large practicing firm is considered a more difficult target due to its experienced litigation team and efficient defence tactics.

Potential future developments

The impact of the Unified Patent Court (UPC)

In determining the potential impact of the UPC, one should not underestimate how sophisticated PAEs are. In particular, it will take at least 3-5 years after the establishment of the UPC before PAEs begin to operate intensively in Europe, if they do at all. They are investors, not gamblers, and like to see data and track records before making investments. This need for an adequate track record of litigation outcomes determines whether the court system can be trusted and whether investments make sense.

In theory, despite the potential for Europe-wide invalidity, the advent of the UPC should favour PAEs. Nevertheless, unless some of the very large European patent portfolios start being sold, the supply of IP assets might compromise Europe as a busy patent assertion jurisdiction.

Deal flow characteristics

During the past, very few buyers were interested in European patents. In general it is easier to observe a European patent being sold with its US counterpart than the opposite. Overall, roughly 15-20 % of all US patents being sold have European counterparts. Nevertheless, the situation is beginning to shift as currently about one third of the buyers are interested in European IP assets, particularly the PAEs. However, the reality is that the supply of European patents for sale remains low.

In addition to the small amounts of patents currently being up for sale by European sellers, two additional features contribute to the reduced European deal flow.

First, as aforementioned, buyers are interested in the patent's legal value which is determined by whether or not there is legal infringement. Currently, roughly 5% of entire deal flow consists of European patents with infringement.¹⁴⁵ It is difficult to find a European infringed patent that is currently up for sale. There can be no litigation unless there is infringement and the value of a patent is largely determined by whether it is viable for litigation or cross licensing.

Second, another factor closely related with the above is that, relative to their European counterparts, US start-ups are ahead of the technology adoption curve, which is an important factor in determining asset value. This is also the main reason why US start-ups produce so many litigation grade assets. For instance, in order for a 3D printing patent to be of litigation value, it needs to have been filed prior to 2005 when 3D printing technology was still in its infancy stage. European 3D printing patents rarely date further back than 2008. Overall, if something has litigation value, it needs to be ahead of the technology adoption curve.

Impact of PAEs on innovation and other considerations

Impact on innovation and technology transfer

A patent conveys an exclusive right to use a technology. Therefore, if there is infringement a patent holder has a right to protect his IP rights from free-riding. In the US, the cost of litigation is immense which is why patent holders frequently contact PAEs.

The main issue relates to the reaction of PAEs once approached by patent holders with evidence of infringement. Instead of asserting the patent rights solely against a single infringer, PAEs often attack an entire industry. This exposes all companies who in the industry to the risk of litigation. This can be triggered by a single initial infringer, who is inclined to engage in litigation knowing that their competitors will be affected as well. The crime has thus been offloaded to everyone in the industry, rather than solely by the single infringer.

This behaviour by PAEs is largely driven by the fact that it is more profitable and less risky to assert against multiple infringers rather than a sole company, irrespective of size. This is a systemic problem which could change if assertions against a single definite infringer were to become more profitable than assertions against multiple potential infringers (i.e. definite and hypothetical infringers).

¹⁴⁵ Overall, 20-30% of deal flow involves European patents and 15-20% of deal flow involves solely infringement.

General patent buyer characteristics

The patent market is heavily characterised by very little transparency as patent buyers, the majority of which are big companies, frequently opt to remain anonymous. Buyers' patent selection criteria mainly evolve around the value of the patent. More specifically, the legal value of the patent drives the value of a patent. Thus, the job of a patent broker is to scan the patent landscape and identify those patents under sale that have legal value and are in demand by potential buyers.

As potential buyers are primarily big companies, the above suggest that the legal value of a patent is greatly related to the extent to which the patent reads on one or more of their competitors, and to a lesser extent the company itself. For instance, a great mistake from the perspective of a patent broker would be to try and sell a patent that reads on a practicing firm to the same practicing firm. The most appropriate buyer would be a major competitor or other firms competing with the practicing firm, and in particular those in litigation with the practicing firm.

There are very few European buyers of IP assets. Rather, the vast majority of buyers are American large corporations, followed by Asian corporations. Since 2013, however, things have changed.

More specifically, large US buyers now commonly acquire European patents through their European subsidiaries or other affiliated European entities. In particular, during the past 2 years, a significant trend has become acquisitions of patents by the European affiliations of US-based large corporations. The main reason for such a development is twofold:

- large American corporations do not want to be taxed in the US and so keep the money in European holding countries, and then use this non-taxed money to buy with pre-tax monies; and
- by using subsidiaries and, in particular, affiliated European entities large American corporations can better preserve their anonymity when engaging in IP transactions.

Case Study 10 – EU-based international telecommunications company

Background discussion on the patent system

We are currently experiencing an intrinsically good system which has been overwhelmed by an excessive amount of patents. With a considerable number of them being potentially invalid it is important to ensure a level playing field between implementers of technology and IPR holders.

The first seen case of a PAE occurred in the US and it related to barcode readers.

An early example of a PAE was an individual who had a patent portfolio on call centre technology. He had established a successful licencing programme in the US which related to anyone using this type of technology (hence even outside the ICT sector). The individual followed a strategy of suing one or two companies in high profile cases and then exploiting the ripple effects this would have on other companies due to the increased pressure on them to settle. At that early stage Europe was under-exposed to this kind of behaviour.

The Unitary Patent (UP) system will be hugely attractive for PAEs due to single European-wide action; this would result in increased uncertainty and lack of predictability.

Some aspects of PAEs' activities have been recognised as a challenge and have motivated legal developments. In terms of PAEs activities the situation is considered by many as highly problematic and inefficient.

Assertions against the company

A deciding line must be drawn between interactions with PAEs that resulted in litigation, and other types of interaction (e.g. initial approaches made by PAEs that do not follow through). Information was provided primarily in relation to the former.

A list of PAEs with which the company has litigated in Europe is provided below:

- PAE1: this is the PAE with which the company has litigated most. Lawsuits initiated by PAE1 concerned the distribution and supply of handsets, and the portfolio asserted consisted of SEPs that PAE1 had acquired from an individual inventor. Assertions were mainly related to handsets. PAE1 is a Europe-based PAE backed by US investors.
- PAE2: this is a big PAE which first asserted against the company but failed; they have, however, threatened to come back. This is an example of a PAE with a long US history and billion dollar revenues from its US licencing activities that has been squeezed out of the US into new markets.
- PAE3: this is a subsidiary of a US-based PAE. This PAE initiated a lawsuit against the company.
- PAE4: This is a US-based PAE and initiated action against the company. They had previously initiated action against European telecommunications operators.
- PAE5: PAE5 has acquired multiple other companies in two key areas: print business and electronic TV programming guides. They have R&D activity and have developed some interesting technologies in the past.
- PAE6: this PAE is fully owned by a practicing entity. PAE6's assertion against the company was unsuccessful.
- PAE7: Litigation lasted three years.
- PAE8: This is a small PAE (i.e. a PAE with less than 100 patents in its portfolio). The dispute with company ended with all the PAE's patents being invalidated.
- PAE9: Litigation was unsuccessful.
- PAE10: This is a small PAE which it appears did not get enough funding to support its litigation claims.
- PAE11: This is the only European based (and non US backed) PAE that the company has dealt with. It has a well-diversified portfolio.
- PAE12: this PAE was active in DRM technology, a hugely complex and highly fragmented area. Their patents were found to be invalid.
- PAE13: This PAE is an individual who owned patents related primarily in the field of automated call-centre technology.

Information on patents asserted

The portfolios asserted by PAEs include mostly SEPs. In terms of the technological areas targeted, these can vary greatly depending on the PAEs. In the past, assertion was much more focused on the standard of core radio technology or specific handset features. Nowadays a wider range of technological areas is being targeted. The majority of legal actions concern the technologies that the operators buy from suppliers and for which the operators require suppliers to have licenced already.

Generally speaking the legal validity of patent portfolios asserted by PAEs in the Telecoms business can be expected to be low as evidenced by the high invalidation rate that the company and others have achieved from invalidity counterclaims.

Assertion method and outcome

The specific approach followed in asserting an SEP portfolio can also vary significantly and is becoming more and more sophisticated. For example, the following type of strategy has been used in Germany:

PAEs present the standard in question, how the technology infringes the standard and then the relief sought from the alleged infringements. However, no specific information is provided: neither which kind of devices, nor which supplier's devices are alleged to infringe. This prevents the entities concerned (i.e. operators, standard implementers, and PAEs) from entering in good faith negotiations. In order to get more information on the alleged infringement, for example to identify specific devices and suppliers, operators need to sign confidentiality agreements. The agreements prevent the operator from communicating with the suppliers to identify whether the protected technology is used in the supplier specific implementation or not.

Furthermore, the way in which German courts assess standards can also play at PAEs' advantage. There is a perception in German courts that a standard must be implemented identically across different stakeholders who might not necessarily be using the technology in the same manner. Despite the fact that some features might not be necessary for some implementers, the onus would still be on them to prove that. This happens even though operators are not always in a position to know when and how exactly they are using the standard or if they are using it in the same way as the court has assessed it (in the case of operators).

The increase in sophistication is also due to PAEs ability to learn from each-other. If one PAE develops a successful means to enforce its patents, others will follow this path.

Telecom operators appear to be favourite target in the supply chain. PAEs claim that they are bringing actions against large operators as it is difficult to bring action against so many manufacturers. However in reality this choice is likely to be driven by the fact that operators are considered as the "soft underbelly" of the supply chain (due to the size of the markets that they have access to, and to the severe consequence of a risk of injunction may bring). This is for two reasons. Firstly, a supplier may be able to withdraw for a certain time from one national market, *i.e.* instead of selling their devices in Italy they transfer them to Spain, France, UK and Germany. An operator cannot move its business from one country to another. It is bound to the local market it operates in. Secondly, if action is brought against operators who provide standard compliant services, the consequence to an operating stopping its business would be very damaging. An injunction on one function of one of the components used in a device in the network by an operator can result in switching off the entire network. No customer would accept having no access to Telecommunication Services for a longer period.

Based on the company's experience, the following assertion trends have been observed:

- Over the recent years, disputes emerged with a growing number of entities, reaching a point where all of the claims were made by entities that do not have any practicing business.
- Not all US-based PAEs engage in full-fledge litigation. Some seem to just test the waters and to see how companies react to their first approach without however following through.

US-based PAEs are definitively becoming more sophisticated in their assertion strategy. Initially, they made several mistakes in approaching European targets; they are, however, learning fast and do not repeat the same mistakes in subsequent interactions.

Now these very same companies engage in forum shopping and exploit the bifurcation system to initiate injunction proceedings separate from invalidity hearings.

As a matter of fact the company has so far been extremely successful in defending against PAEs, and has in fact been able to invalidate a large amount of the patents asserted. This is primarily due to the fact that, whilst some entities do very strong prior art research, and conduct stringent validity tests, many others make assertion claims on very low quality portfolios, that, if challenged can be easily invalidated. It should be noted that prior art searching comes at a cost to a business.

However, PAEs are not giving up and they keep exploding new strategies. Some target large companies in large market first and then, if unsuccessful target small operators in smaller markets, Other start targeting small operators hoping to create a precedent and then leverage on this by going after the big boys.

Impact on freedom to operate on innovation

In order to understand the impact that PAEs have on innovation and freedom to operate it is useful to provide some context to the development of the patenting landscape in the last decades.

History of telecom

The success of mobile telecommunications in terms of its ubiquitous use lies in factors such as standardisation and interoperability. During the 2G era there were four main patent holders who agreed to licence in FRAND terms. The historical model was based on the principle that licence fees for SEPs would be allocated to device manufacturers. Operators would buy equipment from the manufacturers expecting them to have dealt with the required licences. Reliance on those licences was crucial and indemnities arose if the manufacturers had failed to acquire the necessary licences. Cross-licencing facilitated growth and innovation.

There was a couple of relevant legal cases during that time; as an example, a small UK manufacturer complained to the courts about the fact that they had to pay too much to the original four IPR holders and how this was preventing them from competing effectively. The European Commission stance held at the time was that innovators ought to be rewarded for their efforts and the complaints from the manufacturer were dismissed.

Entering the 3G era, around 130 patent holders were involved holding a considerably higher number of patents. An initial attempt to manage this issue was through the formation of a pool which eventually failed; primarily due to stakeholders' disagreement regarding licencing fees (e.g. some stakeholder believed that while in possession of smaller portfolios, they held higher quality patents, when other stakeholders relied primarily on leveraging their portfolio size).

The number of patent holders involved in the process increased both because companies became more aware of the value of IPR as an asset but also because 3G was a more complex technology requiring more expertise. Nowadays, there exist companies that solely focus their business models on creating standardisation related technology.

The role of licencing

In the past licencing had been taking place at the manufacturing level. The significance of licencing had been continuously escalating as technology also needs to be backward compatible (e.g. handsets using 3G technology also need to operate on 2G networks). Moreover, additional technology is continuously added on products (cameras, touch-

screen etc.) thereby increasing the number of patents associated with any given individual product.

Those investing in technology traditionally recouped most of their R&D costs through cross-licencing. More recently, we are observing a divestiture of SEPs to PAEs with different business models. These entities do not have the cross-licencing incentives that prevailed in the early stages of the industry as they are not involved in practicing the patented technologies. The market, in its earlier stages was not prohibitive; it supported and motivated investments in R&D facilitated new entry in it.

The market dynamics were changed when some companies holding huge patent portfolios went below the breakeven point. This is where the majority of US PAEs' patents come from; they rarely came from individual inventors.

The system was working well for the industry; IPR licencing was motivating innovation. The challenge arose when the industry's critical mass became too large to handle with companies divesting or even leaving the industry altogether. IPR licencing involving PAEs is mainly about realising as much value as possible without necessarily being interested in the future of the industry. PAEs are not interested in viewing licencing costs parallel to other considerations such as manufacturing costs as they are not involved in the supply chain and they are not subject to any cross-licencing incentives.

Divestments and court cases made acquiring IPR and extracting licensing fees a legitimate business model. The US was particularly conducive for such activity back then in contrast to the EU (which still is not). Steps have been taken since in the US, however, and it is now almost impossible to get injunction against SEPs. The strict rules of the IEEE require further investigation.

There has been a change in the mind set of patent owners; in the past they wanted a fair return from people who did not contribute to R&D or standardisation. They did not try to squeeze them out of the market nor did they take prohibitive action; they wanted a healthy business not over-burdened by licencing fees.

[The role of standardisation](#)

This relates to the legal background of standardisation in Europe which was established based on a competition backdrop; the creation of efficiencies and the support of consumer welfare were paramount. An environment where patents are acquired outside this ecosystem of consumer welfare would distort the initial justification of coming together for the greater good. The behaviour of PAEs was not foreseen in principle when SEP processes were first established.

ETSI rules now enforce an obligation to licence in FRAND terms which applies even when a patent is acquired by a different party than the one initially involved in the standard setting process.

The original terms of standardisation were drafted in good faith in order to ensure that licencing enhanced consumer welfare. At present, these principles are very vague and open to legal interpretation.

Even if rules were more specific, loopholes to rules are often identified and rules end up being circumvented. Unless an entity is actively engaged in the industry it does not have incentives to act in a proportionate manner having regard to the commercial sustainability of its position. Even if FRAND is maintained the business drivers of those that are not active in the industry are very different, leading to different interpretations of FRAND. There is no clarity in what FRAND means; courts are shying away from this

very complex task. Currently there is only one substantive judgment in Europe on this issue. There is soon to be a second though.

Many argue that hold-out and hold-up are the most important problems as opposed to royalty stacking. This was not the interviewee's opinion however. The volume of patents relevant to a standard has to be taken into consideration. The dependence of a device on its various components needs to be determined, while at the same time keeping viability in mind.

It is difficult to assess the relevance of patents to a standard, a standard's relevance to the device, a device's relevance to the technology and the technology's relevance to the service offered to customers. Aggregating miss-specified royalties in this context can become excessive. The more IPRs involved, the more the stakeholders, the higher the uncertainty and consequently the higher the litigation prospects.

There is a huge probability that patents are invalid and this does not constitute a criticism of patenting authority. A patent office can only work with materials available to it at the time and within a given time frame. When a company is being sued they put a lot more effort in identifying prior art and are thus able to argue for invalidation. A licencing fee should not be sought in relation to the proportion of the patents which are invalid.

Disputes are now also about getting to the appropriate licence level rather than invalidating some of the underlying patents (known as trimming the portfolio). As companies aggregate portfolios it becomes more complex to understand what is actually being bought.

A plaintiff may be motivated to start a lawsuit even if the underlying patent is not promising. There is a different litigation mind set between an operator and a PAE. Usually PAEs have promised max revenue to their funders and they have no intrinsic interest in the technological branch they operate in or the national economy (as their income is not correlated).

Plaintiffs may proceed where validity is questionable as there are strategies to circumvent paying loser costs once litigation is concluded. The fact that a patent may not be crucial for their business allows them to proceed with such suits without being impacted significantly by the high chance of invalidation. Even if they fail in the high profile cases, they can then target smaller operators with no internal in-house support (the "collector's tour").

[Potential future developments in relation to PAEs activity in Europe](#)

Europe versus US

Due to the fragmentation of legal systems across national boundaries, the European market has traditionally not been as attractive as the US for PAEs. While the amount of patents filed in Europe is disproportionately larger compared to the US, it is currently more difficult to get any return on patent assertion in Europe due to legal fragmentation. However, the aggregation of patent portfolios with the purpose of assertion and monetisation is becoming more common also in Europe and if sufficient leverage is obtained in major European markets (i.e. Germany) it can facilitate negotiations in all of Europe (and possibly beyond).

In the US, a company that is subject to a patent law suit is aware that the defence costs will be at least 500.000 \$US per case (and most likely approximately 1m \$US per case). This is irrespective of whether or not the case has any merit. Therefore, it is often reasonable for a defendant to settle, even if the case can be won easily, if the settlement

would incur lower costs. The technical term for the price of a licence that reflects that is "nuisance value". In Europe, the prevailing party gets indemnified for at least part of its costs. As a consequence, a settlement in Europe, whether or not validity has been established, is therefore more attractive.

This has the knock on effect of increasing settlements with other defendants across Europe. For example if a large telecoms company settles in Germany, it is likely that small local operator in Belgium, Austria or the Czech Republic in the same or a similar case would consider settling as well.

That being said, many private deals between an operator and a PAE are done on a confidential basis, thus limiting the availability of public data. Some senators in the US have raised issues whether this behaviour by PAEs constitutes racketeering; this is supported by the very high levels of legal costs in the US and the fact that companies in the US do not recover their litigation costs even if they win.

The amount of money awarded in US cases is going to change. There are currently 14 initiatives in Congress, one of which is enabling the identification of the original patent holder behind the current suitor is. There is also a consideration of introducing a sharing of legal costs.

The process of opposition proceedings in Europe has served as an example for the US. These proceedings are now decreasing in Europe as there are too many patents. Companies wait until they are outside the opposition period so that they are not exposed before they start litigation.

Business is getting more difficult for US PAEs with huge portfolios, teams and funds. At the same time, however, the UPC is being set up and it is expected to allow for exploitation of the system.

The UPC

The following are the key points concerning the development of the UPC:

- Injunctions and the circumstances under which they are granted are very important.
- It is crucial to be able to judge and dispute validity (otherwise, licencing is fine if valid).
- It is no coincidence that the majority of cases occurs in Germany where the threat of injunction is realistic.

The interviewee would be very concerned if the UPC were bifurcated. They would then rely on the goodwill of the judges in trying to schedule invalidity hearings as closely as possible to injunction hearings. Proceedings for infringement are much faster than proceedings for invalidity. Therefore, delays between decisions are going to be inevitable even if proceedings are commenced in parallel. The general expectation of the interviewee is that vulnerable due to the Europe-wide coverage of the UPC and that forum shopping would become an issue.

The UPC is only empowered to address questions of infringement and validity and it is uncertain whether they would consider FRAND defences.

The ability to enforce injunctions should be stayed the case on validity has been decided. If not there is a risk that cases without merit may be enforced successfully

Injunctions are the most important issue, especially against SEPs. The threat of injunction against SEPs is disproportionate. Brokers look at countries where injunction can be reasonably expected to be brought forward and they deem patents in these jurisdictions as "gold".

Invalidation

Invalidating patents is an expensive exercise against small individual filings of patent who are likely to subsequently receive funding to support their litigation activity. Predominantly, the interviewee has had huge success in invalidating asserted patents, even though this process is very expensive and the associated costs are ultimately passed onto consumers.

PAE activity

Impacts on innovation will be strongly dependent on the observed PAE activity levels. The interviewee mentioned some observed indicators as to PAE activity:

- **How can one see an increased threat?** PAEs buying huge patent portfolios in an era when Europe was not conducive for PAE activity used to throw away a lot of EP patents in order to save the annuity fees. Even if some of the patents were invalid, they could still have nuisance value in the US. As soon as Europe was discovered as a potential field of PAE activity, however, an increasing number of EPs has been kept alive after patent portfolios have been transferred. The Max Planck Institute did a similar type of research showing a significant increase from 2011 onwards. A more than 500 % increase in the percentage of EP families that were upheld was observed since 2013.
- Level of attention given to PAEs in important meetings and conference agendas.

Case Study 11 – EU-based data networking and telecommunications equipment company

Background Information

The interviewee is senior IPR licensing counsel at a European practicing firm, hired in 2010 to help start a patent licensing programme; currently he is also responsible for patent policy issues.

The company's headquarters are located in Europe; the company is present in several countries around the world and employs over 50,000 people with a relatively stronger presence in the EU, relative to the US. The company has invested more than €1 billion in R&D in 2014 and had an annual turnover of more than €10 billion.

Information on your patent portfolio

The company holds over 3,500 patent families. The vast majority of patents correspond to ICT-related sectors and, particularly, mobile networks. Europe is given priority in terms of filing status. The firm files over 400 new patent applications per year.

Revenues generated through patent-related activities

The current patent licensing landscape was portrayed as particularly challenging with regards to revenue generation. Moreover, the challenging licensing landscape may call for litigation which is a highly costly scenario (an indicative cost of \$100 million was mentioned for a litigation campaign). This may make selling patents to PAEs attractive as PAEs have the necessary financing for litigation.

Since 2011 there has been pressure by regulators through speeches and Standard Setting Organizations (SSOs) to change the licensing regime so that it is more difficult to get injunctions for SEPs. The increased difficulty in obtaining injunctions limits the incentives for infringers to accept FRAND licenses. As a consequence, patent holders may turn to PAEs which have greater expertise and financing to secure FRAND license agreements.

In particular, patent holdout was portrayed as a significant problem being faced by market participants, depressing licensing revenues. In turn, depressed licensing revenues may lead to fewer incentives for firms to participate in standardisation.

It was noted that a limited amount of companies make the lion's share of contributions to the mobile wireless standards. For instance, in 2014, 5 companies accounted for more than 70% of all contributions to the ETSI standards.¹⁴⁶ In contrast, the contributions of major mobile manufacturers were very limited.

It was noted that participation in standardisation presents unique business challenges to the developers of mobile infrastructure. By participating in standards, these companies publish their best R&D to the public. In the absence of a patent license, the fruit of this R&D is used by implementers for free. Moreover, by building their products to standards, mobile infrastructure suppliers commoditise their products. This occurs because their products, by dint of standardisation, become interchangeable with that of their competitors. The result is depressed margins. This magnifies the importance for mobile infrastructure developers of receiving FRAND royalties in a timely and efficient manner.

Overall, the above further increases the reliance on intellectual property revenue (IPR) which needs to be a meaningful fraction of R&D expenditure so as to allow innovation-intensive firms to recoup their R&D investments. For instance, in the absence of IPR licensing revenue, publicly available data indicates that a large European practicing company would not be profitable. IPR is a vital part of the firm's R&D-intensive business model as well as the company invests approximately \$2 billion a year in R&D.

The firm does not monetise patents on behalf of third parties. Occasionally, the firm engages in cross-licensing and other arrangements with competitors.

Nevertheless, it was suggested that things may move in an improved direction. In particular, some judges have indicated a willingness to render decisions for an entire portfolio of patents which lessens the need for injunctions. The portfolio's licensing fee may be determined by factors such as:

- its quality;
- the nature of the infringer's product (i.e. how important is the portfolio to the product); and
- the number of patents it includes.

Information on patent acquisition

The vast majority of patents are developed in-house. Practically, the only time patents are acquired is when entire businesses are acquired.

Patent assertion information

The firm creates claim charts that map its patents to relevant standards. . These are then shown to potential licensees¹⁴⁷ First, an introductory meeting takes place followed by technical discussions. Overall, multiple meetings occur in which patents are explained and portfolio information is shared. In some instances potential infringers have patents of their own along with claim charts which result in further discussions and potential disagreements.

Nevertheless, despite the inherent disagreements, in the past an agreement would have been reached mainly due to a common sense of risk that sourced from the fact that both parties' experts have been familiarised with the strengths and weaknesses of the patents. At present, however, there is almost never agreement due to the aforementioned significant changes in the patent landscape and mainly due to the

¹⁴⁶ Alphabetically, Alcatel-Lucent, Ericsson, Huawei, Nokia and Qualcomm.

¹⁴⁷ An indicative number of 10 to 20 charts was mentioned.

unavailability of injunctions. Ultimately this results to the observed increased litigation activity.

During its litigation against Samsung in California, Apple valued each of Samsung's utility patents at 2-8 dollars, per patent, per device. On the other hand, Apple has suggested that Samsung's SEPs are worth less than half a penny a piece per device.

PAEs have the necessary financing capabilities to invest in litigation and monetise. Their increased financial capability also enables them to obtain, either through acquisition or through assignment, patents from multiple patent holders (mostly operating companies) and build their own patent portfolios.

Geographic areas of operation

Three major jurisdictions for patent monetisation were mentioned. Historically the US offered the most effective monetisation landscape due to large jury awards. Europe has become attractive due to the speed and cost of litigation. At the moment, China offers limited monetisation opportunities.

Nevertheless, in the US it is becoming more difficult to monetise patents due to the substantial litigation costs and the increase in patent holdout caused by the increasing difficulties in obtaining injunctions.

On the other hand, Europe has become a much more attractive location as courts in Germany are regarded as very competent and fair, involve lower costs of litigation and faster proceedings. Moreover German Judges have a lot of technical experience in contrast to their US District Court counterparts. Therefore, it is easier to seek larger damages in the US, whereas it is easier to get an injunction in Europe.

The impact of the UPC

Noticeably, it was suggested that the advent of the UPC is likely to make Europe a preferred venue for patent monetisation as European wide injunctions will become possible. This is likely to improve IPR enforcement as the threat of injunction motivates potential infringers to commit to a licensing agreement.

In light of the above, the UPC is also likely to attract more PAEs. The UPC may also increase forum shopping which would be a negative development.

The standardisation process

There are strong signs that there is no consensus between those who want to lower the importance (and hence the relevant licensing fees) of SEPs and those who depend on generating licensing revenues from them. Consensus is a requirement of the decision making process in SSOs. Impact on innovation and technology transfer and the functioning of ICT markets

Overall, PAEs are a hot topic in light of patent reforms in the US and the EU. It is clear that there are companies who want to eliminate PAEs because they are effective in monetising patents. Nevertheless, for companies unable to license their IP, Regarding the impact of their operations, it was suggested that it is more important to focus on the entity's behaviour, rather than the nature of its operations. In particular:

- whether it asserts a good patent or not;
- whether it is requesting reasonable royalties or seeking to extort; and
- whether it gives the infringer the opportunity to license, or engages directly in litigation.

Bargaining power asymmetries are inherent in PAEs' operations; they cannot be sued for infringement and discovery costs tend to be asymmetrical.

Overall, we see both sides of PAEs but due to the increasingly challenging patent licensing environment, practicing firms may choose to rely on PAEs to generate sufficient

IPR revenues for SEPs, particularly since 2012. Lastly, it should be mentioned that the interviewee was not in capacity to talk about incoming assertions.

Case Study 12 – Central European semiconductor manufacturer

Background Information on the company

The firm is a semiconductor company headquartered in Central Europe.

In contrast to other sectors (e.g. pharmaceuticals), there is limited variation in the jurisdictions of patent filings. These jurisdictions consist of mainly three countries (Germany, US, China/Korea/Japan depending on the patent). Such limited spread is considered typical for a semiconductor manufacturer.

The company is extremely US-focused in its patent filings. In the semiconductor industry nearly all litigations occur in the US.

General Description of PAEs' business model

Three PAE business models can be identified:

- The first typology relates to companies that initially appeared in the mid-90s. These companies conducted R&D and developed IP without practicing it but rather enforcing it. In their original form, these entities may not adhere to the aggressive PAE type because they did their own R&D and tried to monetise it through licensing. This is similar to what Thomas Edison did 120 years ago and constitutes a proper business model. Only later they joined the "privateering" model in acquiring other portfolios.
- The second typology emerged in the mid-2000s. These were profit-oriented non-practicing companies, which did not conduct R&D, but rather bought and asserted patents, while their employees consisted mostly of lawyers.

In particular, since 2009 the majority of litigation and licensing deals involved this type of NPEs. This is primarily a US issue as there are roughly 500 PAEs of this type in this jurisdiction. In contrast, in Europe there exist roughly 5.

- The third typology relates to patent privateering. There is some degree of overlap in business model characteristics between this typology and the second one.

The firm has had experience with infringement over its IPRs in the past but never relied on the services of PAEs to address the issue. The firm has sold patents to PAEs in the past but not with the plan to attack someone else but rather to get rid of patent portfolios or as currency in settlements with PAEs. There exist companies that have engaged in such activities.

Information on patent portfolio

Overall, a high percentage of patents held by PAEs can be invalidated. Although speculative, one can expect higher invalidity rates for patents held by PAEs.

In the US, PAEs emerged from the high tech and Dot-com bubble, which bankrupted many companies and start-ups. As a result, the patents obtained applied mostly to computer, semiconductors and IT. Telecommunications giants were among the first targets. Nowadays, the car industry is targeted more and more often.

In Europe, most PAEs are likely to be active within certain ICT sectors. However, such an assertion is not straightforward as the frequency and visibility of cases in Europe is much lower. In contrast to the US, court information in Europe is not publically available. Should one want gather information in Germany, for instance, he would have to run from court to court and examine the courts' agendas.

Information on R&D activity

The PAE with which the firm interacted in Europe did not conduct any R&D activity.

Patent assertion strategy

In this section, the interviewee has shared his views with regards to assertions involving solely semiconductor patents, or patents related to semiconductor applications.

A PAE acts differently, relative to a practicing firm, when asserting its patent rights. More specifically, a PAE will buy a semiconductor patent or a patent that relates to semiconductor applications (e.g. microcontroller patents). The PAE will act in mature markets. Preferably, the PAE will not assert against the manufacturer, but rather down the supply chain.

The reason for doing so is the greater uncertainty caused to the targeted entity as it has to a) engage his supplier to evaluate the merits of the claims and b) trust his supplier while keeping his own management informed and satisfied. The supplier, in turn, may not be in the position to accurately provide an assessment about the exposure of the case because there is an uncertainty as to which level a court would define the royalty base (level of the suppliers product, level of the customer product, somewhat in between).

For instance, there has been one famous case in the US where a PAE asserted microcontroller patents against several companies and collected roughly \$300 million. In its initial approach to e.g. a car manufacturer, the PAE demanded \$5 billion in total for the roughly 20 microcontrollers existing in each car. The car manufacturer, in turn, was not in a position to evaluate these claims and settled for roughly \$20 million.

In such strategies, PAEs try to leverage on the high tension created in the company being asserted. In the car manufacturer example, the targeted firm can ask for an expert opinion to alleviate such concerns. This however entails severe searching costs as the manufacturer has to go down twice the value chain until an expert that knows the technical specificities of microcontrollers is identified. Moreover, there is also an element of uncertainty as the manufacturer has to trust the third party providing the assessment.

Another common strategy of US PAEs is to assert patents and go for the discovery cost of US trials. Discovery is part of every US trial in which each party has to hand over all information relevant to the claims to the other party. The costs for a bigger manufacturer are in the order of USD 500,000 to USD 5 million. For the small PAE, discovery costs are minimal. The strategy is to demand USD 3-5 million and settle for USD 500k knowing that the big practicing company have to compare the USD 500,000 settlement costs with USD 3-5 million in discovery costs.

With regards to the likelihood of PAEs engaging in fully-fledged litigation, it is likely that roughly 4 out of 5 assertion cases do not involve litigations and are settled beforehand entailing expensive licensing agreements. This is the main goal of PAEs, which themselves try to settle, irrespective of whether or not infringement has actually occurred. For instance, irrespective of litigation outcome, targeted firms would rather settle and strike a licensing agreement than litigate and bear costs that could be 10 times greater.¹⁴⁸

A US-based PAE has also asserted patents against the company. As a result, a settlement was reached, leading to a defensive licensing agreement.

Potential future developments

There is a lot of uncertainty over the advent of the UPC and the interviewee was not in a position to give a clear-cut view of its effects.

¹⁴⁸ Indicative figures of \$500,000 and \$5 million were provided.

Ultimately, these will depend on the relation between the final form of the UPC and the factors currently limiting PAE presence in Europe, namely:

- the substantial and highly technical evidence of infringement that needs to be provided prior to the commencement of a trial;
- the loser pays system;
- the technical expertise of judges; and
- the materiality of the possibility to engage in forum-shopping.

The last two points are highly interconnected as what is mostly feared by practicing firms at the moment is the fact that with the introduction of the UPC there will be regional and local courts lacking technical expertise (differently from courts – e.g. in DE, FR, UK with a long-standing patent expertise) and which could potentially gain a reputation for being excessively patent-friendly, This would incentivise forum-shopping behaviours. If these risks materialise there is substantial threat for an “Eastern District of Texas effect” to occur in Europe.

However, the advent of the UPC may also be of limited importance for certain technological fields. For example, an injunction is granted in Germany in relation to semiconductors patents, has an impact that goes well beyond the domestic market. This is due to the fact that if one succeeds in blocking the biggest market in Europe, the entire European market is effectively blocked.

In contrast, there is limited benefit with regards to the introduction of the UP. This is mainly due to the high maintenance costs (i.e. renewal fees) of the UP, which are greater than those for German patents and can be roughly 2.5 times more expensive, relative to those for US patents. In this sense, the UP is not competitive to the US or the China patent.

[Impact on innovation and other considerations](#)

[Impact on innovation and technology transfer](#)

PAEs were suggested to have no impact on technology transfer. This is primarily due to the fact that patents asserted by PAEs tend to be old patents for which technology transfer is likely to have already occurred. However they have an impact on innovation. On the one hand targeted companies must reserve funds either to litigate or to settle and, therefore, PAE assertions are binding resources that could be used for R&D. On the other hand, the idea that PAEs’ activities provide inventors with financial rewards is a profound myth. In particular, studies in the US have illustrated that the inventors behind the patents asserted by PAEs receive minimal monetary benefits. This is due to the fact that these PAEs tend to acquire patents at the lowest price possible (e.g. from bankrupt companies or from inventors that cannot afford the maintenance fees anymore).

Moreover, the actual opportunity cost that practicing firms bear as a result of PAE assertion (i.e. the cost associated to a stall of product developments) is much greater than the direct costs (i.e. settlement or litigation costs).

[Europe vs US](#)

The most critical factor contributing to the limited presence of PAEs in Europe is the loser pays system in place. The loser of the trial has to pay all the fees of the other party. Baring the risk of losing the case and carrying the costs of the winning party is not part of the PAE business model. Moreover, US courts are particularly patent owner-friendly, as indicated by the much lower invalidation rates in the US, relative to Europe. In addition, invalidity procedures in the US are highly expensive. For instance, discovery alone costs \$1-5 million in the US for a typical claim. In contrast, there is no discovery charge in Germany. There exists a discovery charge in France and the UK but it is very limited.

German patent courts are also extremely strict in assessing validity criteria. In Germany 50% of patents asserted (by an average entity, i.e. not exclusively PAEs) are completely

revoked based on invalidity, 25% limited and only 25% survive. It could be speculated that invalidity rates for patents held by PAEs are likely to be higher. Moreover, in Germany, a claimant must have a detailed document with evidence of infringement before going to court. Thus, the burden of proof is on the entity that is asserting. In contrast, in the US less than 25% of all claims are invalidated.

Lastly, despite recent institutional changes in the US, the number of PAE lawsuits has recovered to its level of 2 years ago, before the shock of the introduction of this new legislation. Moreover, the number of PAEs in the US litigation system has not dropped. It can be inferred, therefore, that the American Innovators Act had no real influence on PAE assertion frequency in the US. Up to now, the major difference, relative to the past, has been the possibility to file opposition-like procedures at the USPTO to challenge the validity of a patent. This tool can be used in all litigation strategies, not only in PAE cases. Rather, the main influence is the one exerted by the Supreme Court. The latter has issued major rulings that limit the range of assertion options. For instance, the Alice ruling has been used by US courts to invalidate a lot of business methods patents in the last year.

Integration in semiconductors

Another assertion-related issue, which however adheres solely to assertions of practicing firms and not PAEs up to now, is that of the increasing extent of integration characterising the semiconductor field.

Semiconductor patents can be divided in two big groups. One group concerns the production of semiconductors, e.g. treatments of the wafer or the packaging of the dies. The other group is constituted from patents that cover the circuits and the electrical methods that these circuits perform either within one integrated circuit (IC) on a semiconductor device or between different ICs or discrete semiconductor devices. Therefore, there can be a lot of functionality integrated in a semiconductor. For instance, ICs apply to both hardware and software, leading to a change in common perception regarding the applications of semiconductors.

The integration of semiconductors, gives rise to an opportunity to exploit royalty stacking. In the past, a system would need 10 semiconductor pieces to operate. Therefore, one would have to develop and be granted a patent specifying how these 10 pieces work together. As time and technology evolve, however, one semiconductor device can do all the actions of the 10 pieces. In this sense, by building this 10-in-1 piece, the supplier (e.g. semiconductor manufacturer) is infringing the 1-piece patent that could be developed by the customer perhaps 10 years ago. As a result, customers assert their patents against their suppliers. However, this problem is of much lower magnitude, relative to the operations of PAEs.

For instance, in the year 2000 a typical handset had at least 10 different ICs, whose function was to enable making a phone call or sending an SMS. Nowadays, 2 ICs can fulfil the same functions. During the past, the manufacturer of the handset would own the IP and insert the ICs in the handset himself. Nowadays, there is high integration down the value chain, resulting in IP that applied solely to the operations of the customer, now applying within the IC level and therefore within the semiconductor industry.

The integration is such that it has changed the landscape, resulting in the semiconductor industry now being exposed to assertions from customers. Therefore, a new trend is observed in which customers exploit their IP and go after the supplier. Customers take advantage of integration speed and try to monetise patents against semiconductor manufacturers.

APPENDIX 4: BUSINESS MODEL ANALYSIS

Introduction

The aim of this section is to provide a mapping of the PAE landscape in Europe. The approach followed to conduct this exercise consists of the following steps:

- first, we have relied on the main findings of the literature review and the high-level interviews in order to develop business model classifications that cover the full spectrum of activities related to PAEs; and
- second, we have conducted desk-based research aimed at identifying PAEs operating in Europe and classifying them within the developed business model categories.

It is important to stress that, relying on desk-based research, the result of this mapping exercise is intrinsically tentative in nature. More specifically:

- the information we have gathered on PAEs is not homogenous across all the relevant characteristics of a developed business model; and
- some additional characteristics that may be of particular importance in describing PAEs' activities may not have been included due to lack of available information.

In light of the above, a thorough understanding of PAEs' features and conducts is expected to be achieved through interviews. Nevertheless, the literature review and high-level interviews have illustrated a plurality of business models that can be associated with PAEs as a result of the substantial observed heterogeneity in their activities. Faced with this, the main dimension taken into consideration in the development of our proposed categorisations consisted of the method/nature of assertion strategy. Accordingly, the proposed business model classifications include the following:

- focused assertion entities;
- serial assertion entities;
- strategic assertion entities;
- patent monetisation entities;
- license facilitating entities; and
- defensive patent aggregators.

In what follows, we provide the descriptions and main characteristics of each identified typology. Subsequently, we attempt to classify our identified PAEs operating in Europe within the developed business model categories. It is important to stress that an identified PAE may not adhere to solely one of the aforementioned categories. Rather, the classification aims at providing flexibility, thus allowing PAEs to be non-exclusively related to multiple typologies.

Focused assertion entities

Firms that fall under this category consist of companies targeting practicing firms that operate within a well-defined technological field. The patents asserted by these entities are likely to be key to practicing a technology and are typically acquired from practicing firms that are still active or used to be active in ICT sectors. More specifically, practicing firms that sell such patents to PAEs may do so for a number of reasons:

- they may no longer practice the technology in question or may no longer exist;
- they may have decided to reduce the size of their patent portfolios (e.g. by liquidating some of their non-core patents);
- they may perceive PAEs as a more effective medium of monetisation of their IP assets; and

- they might not want to be perceived as asserting entities by other practicing market players and therefore outsource this activity to PAEs.

The primary method of patent monetisation for this typology of PAEs is maximisation of licensing revenues. This is likely to be achieved through stick-licensing practices. Therefore, licensing programmes are less likely to be set-up as is any action which facilitates knowledge transfer. Moreover, escalation to court is unlikely to occur (though cannot be excluded in principle) for a number of reasons:

- targeted companies are likely to already have made irreversible investments and are not willing to face the risk of injunction — and the associated economic costs;¹⁴⁹ and
- the patents asserted are likely be of high value and therefore the chance of invalidation may be slim.

It should be noted, however, that there is a number of dimensions along which PAEs adhering to this business model may differ. Such dimensions relate to:

- the extent to which R&D activity is present, ultimately resulting in PAEs filing own patents as opposed to acquiring them from third parties;
- the extent to which PAEs are, or have been in the past practicing firms themselves; and
- the precise licensing revenue maximisation strategies.¹⁵⁰

Serial assertion entities

Firms that fall under this business model are mainly characterised by their tendency to assert their patent rights simultaneously against multiple companies within an ICT industry (i.e. “blanket suits”). As a result, targeted firms often include SMEs or firms that do not practice a technology but may be using devices that include the technology (i.e. end-users).

Such assertion strategies are typically initiated by sending “cease and desist” letters to potential infringers. Occasionally, such letters may be accompanied by a notification of an initiated patent infringement lawsuit. Noticeably, it is typical that no specific evidence of infringement is provided as such assertion practices mainly relate to portfolios consisting of several patents, which hinders targets’ attempts to defend the alleged accusations.

Another important characteristic facilitating such assertion behaviour relates to the specific traits of the patents asserted. These are often trivial patents with broad functional claims. Nevertheless, such patents may still be enforced using the threat of litigation and the pressure of injunction. Within this context, potential licensees or infringers are in most cases not aware of the nature or the quality of the patents they are allegedly infringing, or are simply not able to face litigation due to constrained resources.

As a result of the above, settlements are most often reached involving the commitment of the targeted firms to a licensing scheme or submission of royalties. Thus, in contrast to focused assertion entities that aim at extracting high licensing fees from targeted practicing firms, the monetisation approach pursued by serial asserters aims at achieving small settlements from a large number of companies often targeted indiscriminately.

¹⁴⁹ Such costs are particularly likely to increase for target companies operating in the hardware sector because the presence of irreversible investment in production facilities.

¹⁵⁰ For instance, it is possible that PAEs may engage in concealing their controlled patent rights in order to both leverage on potential infringers’ irreversible investments and enable assertion over multiple stages of the value chain (i.e. “double-dip” assertions). Alternatively, PAEs may engage in holdup practices.

Nevertheless, as in the case of focused assertion entities, it should be noted that there is a number of dimensions along which PAEs adhering to this business model may differ. Such dimensions relate to:

- the source of obtainment of the ownership rights to the patent (i.e. acquisition from third parties vs in-house development through R&D); and
- the extent to which PAEs are, or have been in the past practicing firms themselves.

Strategic assertion entities

Firms falling under this category consist of practicing firms, primarily in the ICT sector, that implement the patented technology derived from their R&D activities in order to develop new products or services. Such firms may also acquire patent rights from third parties but, nevertheless, the conduct of R&D and the intent to practice the associated technologies constitute their two most prominent features.

Companies falling under this business model assert their patents aiming at blocking competitors and defending their market shares. Therefore, in contrast to the two previous PAE business models, assertion is not conducted with the primary purpose of monetising patents but with the aim of limiting competitors' freedom to operate. This goal is often achieved by filing a large number of non-core patents around a key technology in order to prevent competitors from developing new technologies that might endanger their market power in the future.

Patent monetisation entities

Entities falling under this category are characterised by their tendency to assert patents primarily on behalf of (and typically exclusively for) firms practicing an ICT technology. This may be achieved through two distinct channels:

- The entity obtains patent commercialisation rights from a practicing firm, which retains full ownership of its patents. The entity is then responsible for monetising the patent and managing assertion activity on behalf of the patent holder.
- A practicing firm assigns patent ownership rights to the entity with a commitment for the latter to share a portion of the revenues generated from the monetisation of the patent.

The emergence of this business model can be justified by the two following factors:

- practicing firms may not want to risk the reputational exposure of being perceived as licensors and, thus, outsource this activity; and
- PAEs may be more effective in generating licensing revenues than practicing firms.

The main purpose of the assertion activity conducted by these entities can vary. Specifically, they may have a mandate to maximise licensing revenues on behalf of the practicing firm (e.g. through stick-licensing strategies) or they may assert patents aiming at blocking the competitors of the practicing firm on behalf of which they operate. Therefore, the assertion strategies of these entities can be characterised as being very similar to those of focused, serial or strategic assertion entities, yet their distinctive feature relies on the fact that they act as a shell company instructed to act in a specific manner by a practicing firm. Within this context, the recent emergence of patent-privateering may also be perceived as a manifestation of this PAE typology.

License facilitating entities

The distinctive feature of firms belonging to this business model is that they are primarily interested in facilitating technology transfer by engaging in licensing arrangements with practicing firms. In so doing, they promote their licensing

programmes to firms that may benefit from such arrangements by using the associated technology. There are at least two separate categories of entities that fall under this definition:

- Firms that engage in significant R&D and patenting activity but lack the production capability to commercialise innovative products. These entities generate revenues primarily from licensing their IP assets to practicing firms and may also provide consulting services in order to help them integrate the licensed patents into their products. Knowledge transfer offices, universities and research institutes may also operate in a similar fashion.
- Patent pool administrators. These entities operate primarily in ICT sectors where standards and interoperability between technologies are essential and the presence of patent thickets may impede the development and diffusion of new technologies. Its purest form patent pools' business model relies on:
 - identifying all the SEPs and other key patents that are required to practice a given technology standard;
 - engaging with the owners of these patents in order to obtain licensing agreements; and
 - offering a joint license for the pool of patents to all its members.

Typically, patent pools do not have ownership rights over the patents they license (even though sometimes they may also acquire ownership rights of key patents from third parties) and their primary source of revenues consists of fees charged to their members for the patent management services they provide. Whilst such entities tend not to pursue aggressive assertion strategies, this can occasionally occur (e.g. in case firms do not commit to a licensing scheme, refuse to pay royalties, or engage in patent holdout).

Defensive patent aggregators

The primary purpose of defensive patent aggregators is to protect the freedom to operate of their clients. The latter consist primarily of practicing firms that operate in ICT sectors where the risk of being targeted by aggressive assertion entities is particularly high.

Defensive patent aggregators engage in the acquisition of patents (often problematic patents with vague claims that can be easily asserted against practicing firms that operate in a specific technological field) and then license the entire portfolio to their members in order to mitigate the risk of being accused for patent infringement by competitors or other non-practicing entities.

Defensive patent aggregators are usually formed as patent pools by several large companies that join their efforts and finances. Members usually contribute to the operating expenses of the entity and may hold funds in escrow for the purchase of patents. Moreover, each member's escrow funds may be used for the purchase of only those patents that they are interested in, which are subsequently licensed to them. Alternatively, an annual membership fee allows to spread the patent acquisition costs across members, whereas licensing fees for specific patent portfolios may also constitute another source of income.

In order to alleviate potential free-riding problems by non-members, defensive patent aggregators may engage in a "catch-and-release" strategy. Under this approach, the entity acquires a patent, grants its subscribers a license, and then resells the patent on the open market (preferably to a non-practicing entity). As a result, non-subscribers remain exposed to litigation risk and are incentivised to become members.

Although the acquisition of patents primarily aims at protecting the members' freedom to operate, such entities may use their patent portfolio to counter-attack against third-parties that sue their members for infringement. Alternatively, and more noticeably,

entities of this type may not engage in litigation at all, resulting solely in consulting activities in case of assertion against their members or by providing access to analytic data on litigations.

Classification of identified PAEs

In this section, we present the classification of our identified PAEs across our developed typologies. It should be noted that our desk-based research did not indicate the presence of serial assertion entities in Europe. In contrast, evidence from the US suggests that this business model thrives within this jurisdiction. Their reduced activity in Europe is consistent with our findings from the literature review and high-level interviews, which confirm their minimal presence.

Nevertheless, it should be noted that conducting this exercise relied heavily on publicly available information. Consequently, as this business model is based on the achievement of settlements with multiple firms prior to full escalation to court, for which information is scarce, our results should be regarded as particularly tentative in nature. In what follows, we present the classification of our identified PAEs across the remaining business model typologies.

- US-based **InterDigital** develops wireless technologies for mobile devices and networks, while also engaging in licensing activities with major firms operating in the wireless communications sector. The company's business model is focused on licensing their patents. This has occasionally resulted in conflicts with major equipment vendors, such as the 2003 patent infringement lawsuit against Ericsson which was eventually settled.¹⁵¹

Classification: focused assertion entity

- US-based **Intellectual Ventures** develops patent portfolios through own R&D activities as well as through acquisitions from third parties, aiming at licensing them to a number of companies. Collaborative research with universities and research institutes also occurs. The company has also engaged in litigation on the basis of patent infringement, namely against large technology firms.¹⁵²

Classification: focused assertion entity

- **IPCom** is a German patent license management company that possesses a patent portfolio encompassing about 160 patent families in the field of mobile communications and more than 1000 patents registered in Europe, the US and Asia. IPCom has sued several companies, including Nokia, HTC Corp., T-Mobile GmbH and Apple (seeking US \$2 billion in damages) for patent infringement in the District Court of Mannheim, Germany.¹⁵³

Classification: focused assertion entity

- US-based **IP Holdings** constitutes another case of focused assertion entity. The company engages in patent development and monetisation activities while also incubating acquired patents in order to increase their value. In so doing, the firm aggregates patents from companies in the

¹⁵¹ IT World (2003) "Ericsson, InterDigital settle patent dispute" available at: <http://www.itworld.com/article/2805460/mobile/ericsson--interdigital-settle-patent-dispute.html>.

¹⁵² Yanagisawa, T. and Guellec, D. (2009), "The Emerging Patent Marketplace", OECD Science, Technology and Industry Working Papers, 2009/09, OECD Publishing.

¹⁵³ Fortune (2014) "Patent troll hits Apple with \$2 billion suit. Trial starts next week" available at: <http://fortune.com/2014/02/05/patent-troll-hits-apple-with-2-billion-suit-trial-starts-next-week/>.

US, Europe and Asia and monetises them by actively asserting their patent rights against practicing firms.¹⁵⁴

Classification: focused assertion entity

- US-based **Vringo** is engaged in the development and monetisation of intellectual property and mobile technologies. In so doing, licensing activities constitute the primary income stream for the firm. The company has also engaged in litigation on the basis of patent infringement against large tech firms, such as ZTE in Germany.¹⁵⁵

Classification: focused assertion entity

- US-based **Acacia** acquires licenses and enforces its patent rights acquired and assigned to from third parties, while also frequently engaging in patent-related lawsuits.¹⁵⁶ In so doing, the company has created a wide network of subsidiary firms that are created for each set of the enforced patents. As a result of the above, the company has built a leadership position in patent licensing, having generated over \$1.2 billion in revenues.¹⁵⁷

Classification: focused assertion entity, patent monetisation entity

- US-based **IPNav** controls patents that are either assigned to the entity by third parties or acquired by third parties. The company contacts potential infringers through assertion letters proposing reaching licensing agreements with the alternative option of facing litigation.¹⁵⁸

Classification: focused assertion entity, patent monetisation entity

- US-based **Alliacense** is a company focused on building value in IP assets and then capturing that value. The firm seeks licenses by industry field and offers incentives to companies who take a license early, thus effectively penalizing those that wait before requesting a license. Specifically, Alliacense proposes multi-tier royalty rates with steep discounts to early licensees and progressively higher rates to follow. Royalty rates are further based on average company sales over the entire life of the portfolio. Nevertheless, critics argue that the company negotiates aggressively once a potential licensee has agreed to meet, particularly by offering little time to respond to an offer.¹⁵⁹

Classification: focused assertion entity

- **France Brevets** is an intellectual property investment fund that was established with the participation of the French State. The company deploys its financial capabilities in order to build strong patent portfolios and monetise them, while frequently engaging in litigation on the basis

¹⁵⁴ Ruther, F. (2013) Patent aggregating companies, Springer Gabler, Berlin, Germany.

¹⁵⁵ Yahoo Finance (2013) "Court in Germany issues injunction against ZTE for infringement of Vringo patent" available at: <http://finance.yahoo.com/news/court-germany-issues-injunction-against-115503433.html>.

¹⁵⁶ IAM (2014) "Acacia revealed as most litigious NPE of 2013" available at: <http://www.iam-media.com/blog/Detail.aspx?q=e4c16239-a489-4e09-ab03-5b5d1eba140f>.

¹⁵⁷ Source: <http://acaciaresearch.com/about-us/>.

¹⁵⁸ The New York Times (2013) "Has patent, will sue: An alert to corporate America" available at: <http://www.nytimes.com/2013/07/14/business/has-patent-will-sue-an-alert-to-corporate-america.html?smid=pl-share>.

¹⁵⁹ Pohlmann, T. and Optiz, M. (2013) "Typology of the patent troll business" R&D Management, Vol 43, No 2, p.103.

of patent infringement.¹⁶⁰ Licensing revenues are subsequently shared between the inventor and France Brevets on a fair basis. The company works in close partnerships with companies in specific technological fields as well as universities in order to build strong patent portfolios.¹⁶¹

- France Brevets also engages in defensive strategies as, beyond licensing campaigns, the company may acquire patents in order to reinforce an existing portfolio and mitigate potential threats. Litigations are contemplated only as a last resort and, if needed, France Brevets may build a team of experts to reinforce patent claims while bearing the entire cost of enforcement. Out of the generated profits, a significant part is fuelled back to the inventor.

Classification: focused assertion entity, patent monetisation entity, defensive patent aggregator

- Germany-based **Papst Licensing** uses own resources to fully finance patent acquisition from third parties and monetisation on behalf of third parties. Specifically, the company acquired from dissolved Papst Motoren about 600 patents and patent applications and started commercialising them. As a result of its experience, Papst Licensing also started to acquire patents from different technological areas and monetise third-party patents. In so doing, the firm uses own resources to fully finance patent acquisition and monetisation activities. Therefore, Papst Licensing is able to pursue long-term patent monetisation projects without having pressure from outside investors. In general, Papst licensing does not actively search for infringed patents. Instead, patent owners that find their patents to be infringed themselves approach Papst Licensing in order to enforce their patent rights.
- In so doing, the company employs a risk sharing model as it provides part of the generated compensation to the original patent owners and then encourages them to participate in the success of the monetisation project by giving a percentage of future licensing revenues. The company argues not to be a “sue first and then talk” type of firm and that engaging in litigation occurs when infringers refuse to negotiate or file a declaratory judgement action, thus effectively initiating a litigation process.¹⁶²

Classification: focused assertion entity, patent monetisation entity

- Italy-based **Sisvel** is a patent management company that was founded by an agreement among Italian television manufacturers in order to facilitate the utilisation of patents they owned. Its current business focuses on forming and administering patent pools, which include essential patents for certain standard technologies. **Sisvel** manages own patents and patents assigned by third parties by negotiating with them licensing terms, fees and dividends of profit., which are subsequently jointly licensed to potential customers.¹⁶³ The company has also been involved in litigation on the basis of patent infringement primarily

¹⁶⁰ Iam magazine (2015) “France Brevets success in Germany shows how wrong Bessen and Meurer are” available at: <http://www.iam-media.com/blog/detail.aspx?g=bcf19422-6ee9-45d4-965b-b2e3979bc4e6>.

¹⁶¹ Source: <http://www.francebrevets.com/en>.

¹⁶² Galiakhmetov, R., Giuri, P. and Munari, F. (2014) “How to enhance patent commercialisation? An analysis of patent aggregators in Europe” University of Bologna, Department of Management Working Paper.

¹⁶³ Forbes (2012) “Sisvel: The patent troll we actually like” available at: <http://www.forbes.com/sites/timworstall/2012/01/16/sisvel-the-patent-troll-we-actually-like/>.

against large practicing firms.¹⁶⁴ This has resulted in criticism with regards to the length the firm is willing to go to push its infringement accusations.¹⁶⁵

Classification: license facilitating entity, focused assertion entity, patent monetisation entity

- Luxembourg-based **Inpro Licensing** owns and manages portfolios of intellectual property worldwide, acquires interests in other technologies developed by third parties and works with corporate partners in realizing the value of IP. While Inpro is willing to engage vigorously in legal proceedings, it does not invest in third party IP simply with a view to litigation but rather for licensing purposes (e.g. current licensees include US-based HP, Japan-based Hitachi and EU-based Nokia and Philips). Nevertheless, Inpro has a significant track record in large, complex combinations of IP prosecution, litigation and licensing strategies.¹⁶⁶

Classification: focused assertion entity, patent monetisation entity

- Netherlands-based **Nonend inventions** develops and holds a worldwide portfolio of patents in the field of peer-to-peer networks. The company focuses on licensing activities and has frequently engaged in litigation on the basis of patent infringement against large technology firms such as Apple and Spotify.¹⁶⁷

Classification: focused assertion entity

- Netherlands-based **ItoM** is an applied research lab which focuses on licensing its IPR on information communication and system developments for wireless communications. The company engages in licensing activities primarily towards well-known semiconductor manufacturers with large turnover in integrated circuits. The firm also engages occasionally in litigation on the basis of patent infringement against large tech firms, such as Qualcomm, Apple and HTC.¹⁶⁸

Classification: focused assertion entity

- US-based **Unwired Planet** focuses exclusively on multi-pronged IP strategy that includes licensing and, if necessary, enforcement in order to protect its patent portfolio.¹⁶⁹ The company was formed after the switch of business direction of Openwave. Openwave is historically significant in its introduction of the Mobile Internet and its expansion into a large successful mobile software supplier in the mobile telecommunications sector.

¹⁶⁴ Yanagisawa, T. and Guellec, D. (2009), "The Emerging Patent Marketplace", OECD Science, Technology and Industry Working Papers, 2009/09, OECD Publishing.

¹⁶⁵ The Huffington Post (2013) "Consumer costs of patent trolls" available at: http://www.huffingtonpost.com/steve-pociask/patent-trolls_b_4311858.html.

¹⁶⁶ Source: www.inprolicensing.com.

¹⁶⁷ Bloomberg (2012) "Google, Oracle, Spotify, Apple: Intellectual Property" available at: <http://www.bloomberg.com/news/articles/2012-08-20/oracle-spotify-heinz-coldwell-banker-intellectual-property>.

¹⁶⁸ Yahoo Finance (2012) "ItoM successfully concludes patent litigation with Qualcomm, Broadcom and others" available at: <https://uk.finance.yahoo.com/news/itom-successfully-concludes-patent-litigation-070100786.html>.

¹⁶⁹ Business Wire (2012) "Unwired Planet (Formerly Openwave Systems Inc.) Closes Product Businesses Sale to Marlin Equity Partners" available at: <http://www.businesswire.com/news/home/20120501005901/en/Unwired-Planet-Openwave-Systems-Closes-Product-Businesses#.VefulmTBzGc>.

Classification: focused assertion entity

- US-based **Visto** (known as Good Inc. since March 2009) is another example of a focused assertion entity active in Europe. Specifically, Visto is a software company that, in addition to patent licensing, also conducts R&D activities and sells products incorporating the developed technology. It is mostly famous for the creation of push email services for mobile devices and a browser-based application suite. In addition, Visto has frequently engaged in litigation activities against large tech firms, such as RIM and Microsoft, in the UK.¹⁷⁰

Classification: focused assertion entity, strategic assertion entity

- Despite being active in the telecommunications and information technology industry, Finland-based **Nokia** is undergoing a process to shift its main business model by transforming itself into a licensor of owned designs and patents. As a result, it has been engaged in patent licensing activities regarding its patent portfolio on mobile communications and has frequently participated in litigation against large technology firms, such as Apple, LG and HTC. This has been facilitated by the recent acquisition of Alcatel-Lucent, which has received regulatory clearance in the US and Europe and is expected to close in the first half of 2016.

Classification: focused assertion entity, strategic assertion entity

- **Hakan Lans** is a Swedish inventor may also be perceived as a focused assertion entity.¹⁷¹ The inventor has regularly been involved in legal disputes on the basis of patent infringement with large technology firms, while also accusing them of not paying royalties.

Classification: focused assertion entity

- US-based **Document Security Systems** (DSS). DSS provides anti-counterfeiting and authentication solutions while also developing and marketing security technologies. The company frequently engages in licensing activities and, when necessary, litigation as evidence suggests its involvement in high profile cases.¹⁷² Noticeably, DSS has engaged in a patent infringement lawsuit against the European Central Bank in the Netherlands claiming unauthorised use of anti-counterfeiting technology on euro bank notes.¹⁷³

Classification: focused assertion entity, strategic assertion entity

- Sweden-based **Ericsson**. The company has been actively engaging in licensing activities regarding its controlled patents and has also been involved in various litigation cases against large companies on the basis of infringement of patent rights. The most prominent target firm consists

¹⁷⁰ Helmers, C. and McDonough, L. (2012) "Trolls at the High Court?" LSE Law, Society and Economy Working Papers 13/2012.

¹⁷¹ Fusco, S. (2014) "Markets and patent enforcement: A comparative investigation of non-practicing entities in the United States and Europe" Michigan Telecommunications and Technology Law Review, Vol 20, No 2.

¹⁷² Forbes (2012) "The patent millionaires: Striking it rich with high stakes litigation" available at: <http://www.forbes.com/sites/richardfingar/2012/10/22/the-patent-millionaires-striking-it-rich-with-high-stakes-litigation/>.

¹⁷³ PC Magazine (2010) "European Central Bank sued for patent infringement" available at: <http://www.pcmag.com/article2/0,2817,2360071,00.asp>.

of Apple, which has accused Ericsson of “acting like a patent troll” and engaging in “abusive licensing” practices.¹⁷⁴

Classification: strategic assertion entity

- **Affymetrix** is a UK-based DNA microarray manufacturer, which frequently engages in licensing activities as well as litigation over patent infringement against various competing biotechnology firms.¹⁷⁵

Classification: strategic assertion entity

- Luxembourg-based **ArrivalStar** is a company in charge of licensing patents assigned by third parties. Once assigned the patents, the company targets potential infringers offering settlement terms which depend on the area of activity of the target and on whether it is a practicing entity. Criticising ArrivalStar’s operations, the Electronic Frontier Foundation, an international organization that promotes public advocacy for rational proprietary policies in the digital era, warned that: “If left unchallenged, the broad language in ArrivalStar’s patent could potentially cover any system or technology that tracks a vehicle along a predetermined route and then notifies a potential passenger or package recipient of the vehicle’s status”.¹⁷⁶

Classification: patent monetisation entity

- Germany-based **Munich Innovation Group** offers IP licensing management, patent transactions and IP advisory services. Clients include publicly listed high-tech corporations, privately held companies, independent inventors, academic institutions and investors. The company claims to have no bias for litigation. However, in certain cases it may be necessary to defend a patent owner's intellectual property by pursuing legal action.¹⁷⁷

Classification: patent monetisation entity

- Canada-based **Conversant** is an IP licensing firm aiming at providing licensees with legal access to patented discoveries that may be used to improve their products. In so doing the company offers a wide variety of services including licensing, prosecution and infringement litigation management services. Despite claiming not to rely on abusive litigation tactics, observers appear to criticise the company’s sole objective towards the exploitation of patent rights.¹⁷⁸

Classification: patent monetisation entity

- US-based **One-Red** is a company formed by Philips, LG, Pioneer and Sony that offers patent licensing programmes for DVD, CD and Blu-Ray

¹⁷⁴ Bloomberg (2015) “Ericsson sues to block Apple iPhone in US amid patent spat” available at: <https://www.bloomberg.com/news/articles/2015-02-27/ericsson-sues-to-block-apple-iphone-in-u-s-amid-licensing-spat>.

¹⁷⁵ Love, B, Helmers, C. and McDonough, L. (2014) “Is there a patent troll problem in the UK?” Fordham Intellectual Property, Media & Entertainment Law Journal, Vol. 24, p. 509-543.

¹⁷⁶ Sources: MCAM (2012) “Intellectual property analysis of ArrivalStar S.A. et al v. Garmin International, Inc.” and Electronic Frontier Foundation (2015) “Patent troll ArrivalStar is back, extorting money by hiding facts and operating in the shadows” available at: <https://www.eff.org/en-gb/deeplinks/2015/03/patent-troll-arrivalstar-back-extorting-money-hiding-facts-and-operating-shadows>.

¹⁷⁷ IPWatchdog (2013) “Patent Business: Deals, Settlements, Licenses for February 2013” available at: <http://www.ipwatchdog.com/2013/03/01/patent-business-deals-settlements-licenses-for-february-2013/id=34646/> and <http://www.munich-innovation.com/patent-troll/>.

¹⁷⁸ Patent Progress (2014) “Dear IV: You’re not a better kind of patent troll” available at: <http://www.patentprogress.org/2014/01/13/dear-iv-youre-better-kind-patent-troll/>.

products and software, including essential patents on these technologies. The company claims to have an excellent track record in obtaining the cooperation of distribution channels without litigation, or threat of litigation.¹⁷⁹

Classification: license facilitating entity

- **ARM** is a British multinational semiconductor and software design company. Unlike most traditional microprocessor suppliers, such as Intel, ARM only creates and licenses its technology as intellectual property (IP), rather than manufacturing and selling its own physical CPUs, GPUs, SoCs or microcontrollers. In addition, the company also offers licensees supplying tooling and various design and support services. . Within this context, **Imagination Technologies** is another UK-based firm engaging in similar activities.¹⁸⁰

Classification: license facilitating entity

- US-based **Global OLED Technology** administers and licenses intellectual property. Its patent portfolio comprises close to 2200 patents arising from Kodak's research into organic light emitting diodes, including key patents for this technology.¹⁸¹ The company focuses on licensing their controlled patent rights but also engages in litigation with the most prominent example consisting of its victory in successfully defending oppositions by Merck KGaA in Germany.¹⁸²

Classification: license facilitating entity

- US-based **Allied Security Trust** is a member-based patent-holding company, which does not litigate, but instead helps protect members from patent infringement lawsuits by non-practicing entities. Specifically, members contribute to the operating expenses of the trust, and hold funds in escrow for the purchase of patents. Each member's escrow funds are used for the purchase of only those patents that they are interested in, which are subsequently licensed to them. Licenses, once granted, are fully vested and remain with the licensee even if they leave Allied Security Trust.¹⁸³

Classification: defensive patent aggregators

- US-based **RPX** is a worldwide provider of patent risk management services, offering defensive buying, acquisition syndication, patent intelligence and advisory services. Specifically, RPX identifies and purchases patent assets that could be used offensively against members of its client network. Depending on the situation, RPX may acquire assets from a third party or directly from a non-practicing firm. When necessary and possible, RPX will buy patent rights out of an active litigation.

Classification: defensive patent aggregator

- US-based **Open Invention Network** acquires patents and does not seek revenue through their enforcement but, instead, licenses them royalty

¹⁷⁹ Sources: <http://www.one-red.com/en/about-us/overview> and <http://www.iam-media.com/reports/Detail.aspx?q=d811f1c1-b020-4527-92b5-41c0ed6aa2dd>.

¹⁸⁰ Ferriani, S., Garnsey, E., Lorenzoni, G. and Massa, L. (2015) "The intellectual property business model" Centre for Technology Management working paper series.

¹⁸¹ Jung, M. J. (2014) "An Analysis of Patent System and Antitrust Law Issues in OLED Display Industry: Focusing on the Patent Strategy for Securing Technologies and Materials" Indiana University Maurer School of Law Paper 7.

¹⁸² Source: <http://www.globaloledtech.com/press-releases.html>.

¹⁸³ Sources: <http://www.alliedsecuritytrust.com/>.

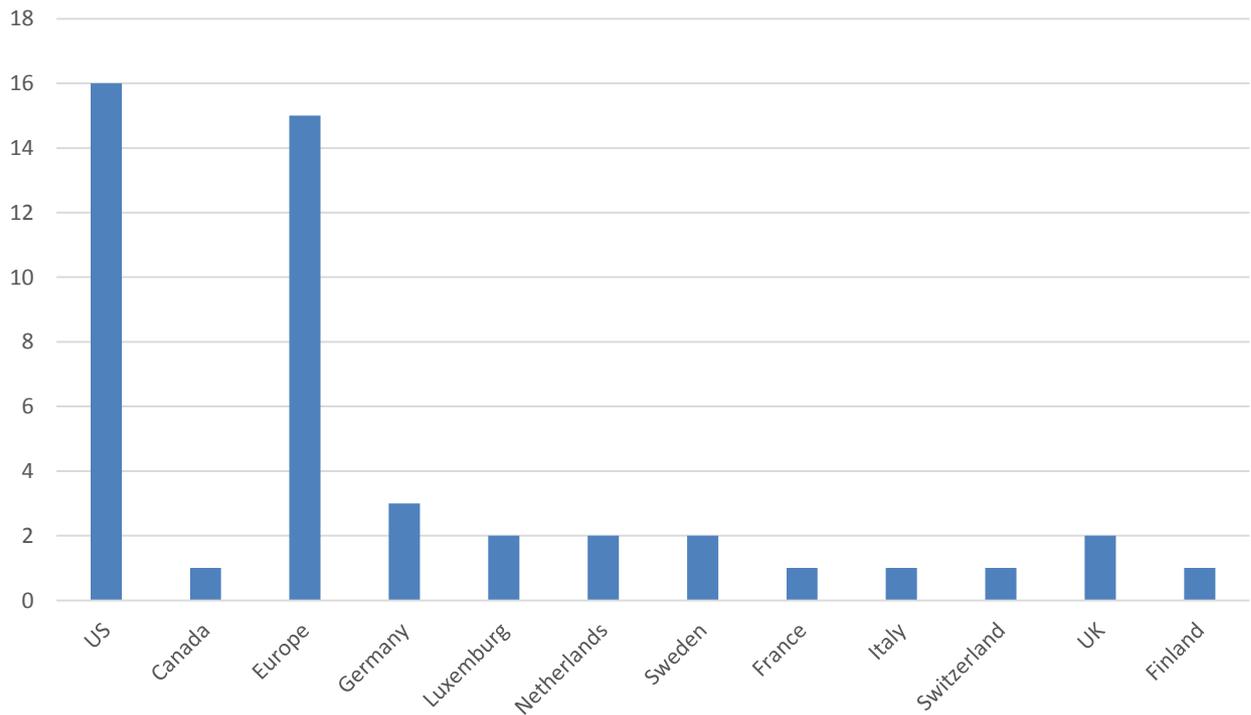
free to firms which, in turn, agree not to assert their own patents against Linux and Linux-related systems and applications. Therefore, the firm may be perceived as securing members from Linux-related patent assertions from other members. The company has more than 850 US and international patents and patent applications which cover several fundamentals of current business-to-business e-commerce practice. This enables companies to make significant corporate and capital expenditure investments in Linux operating systems.¹⁸⁴

Classification: defensive patent aggregator

Market analysis of the identified PAEs

Our qualitative analysis indicates the presence of 32 firms actively engaging in the assertion of patent rights in Europe. Our identification process relies on the adequate availability of information from various sources including company websites, news reports, academic papers and other research studies. The majority of entities appear to be based in the US (16 entities); nevertheless, European entities also exhibit a substantial presence accounting for roughly 47 % of identified firms (see Figure 3). More specifically, relative to the remaining European countries, Germany appears to have the most identified PAEs based within its jurisdiction (accounting for 20 % of European PAEs), whereas the UK, Netherlands, Luxembourg and Sweden each account for roughly 13 % of Europe-based identified PAEs, respectively.

Figure 3: Distribution of identified entities by country



Source: EE research.

One key feature in the analysis of identified PAEs consists of the substantial heterogeneity in the construction of patent portfolios. Specifically, evidence suggests that the latter is likely to emerge from acquisitions of patent rights from third parties,

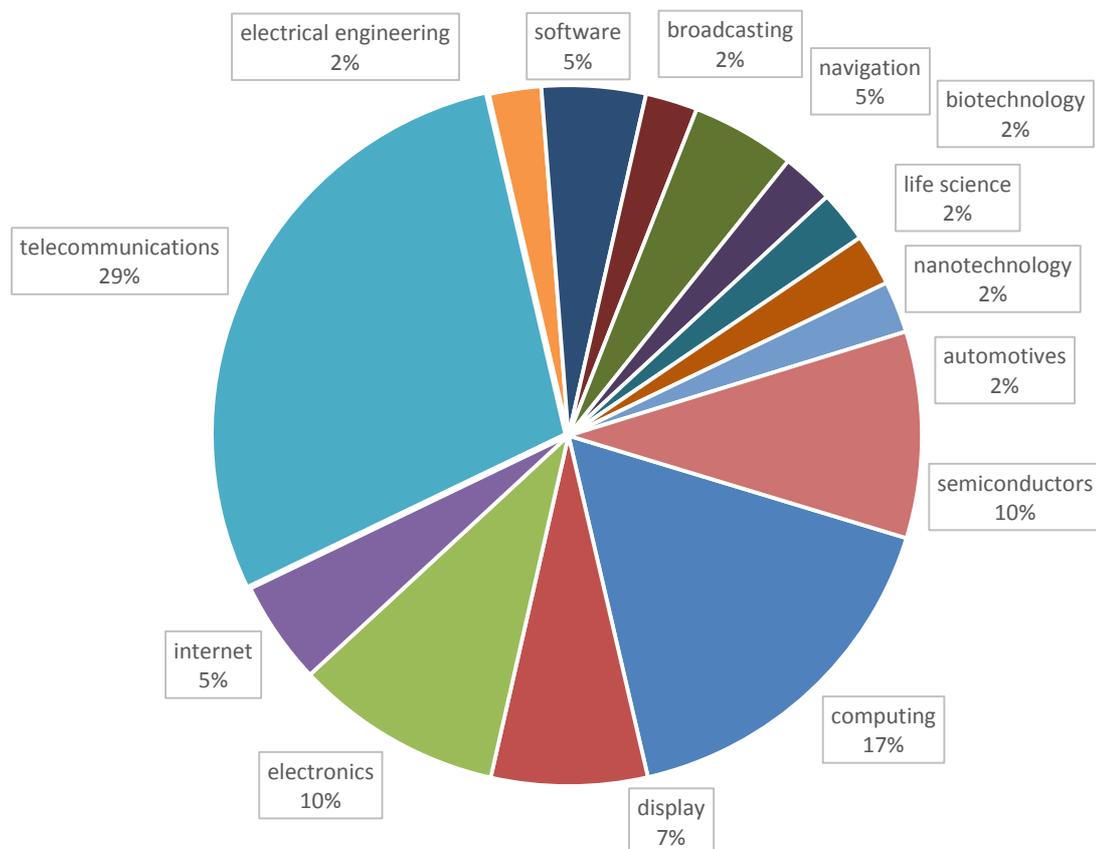
¹⁸⁴ Nicholson, D. (2012) "Open Invention Network: A Defensive Patent Pool for Open Source Projects and Businesses" Technology Innovation Management Review, Vol 2, No1, p.12-17.

either for pure monetisation purposes or for defensive purposes in order to protect the associated firms' freedom to operate. Alternatively, patent rights may also be assigned to PAEs for monetisation purposes. In addition, PAEs may construct patent portfolios by allocating significant resources towards R&D, or towards collaborations with universities, aiming at identifying and developing the kind of technologies that will be needed in the future, with the ultimate objective of monetising them.

Lastly, PAEs active in Europe may also consist of practicing firms that used to actively operate in the product market, before shifting their business operations towards the monetisation of their patent portfolios, or of practicing firms that seek to actively monetise their own patents in parallel to their main business operations. Noticeably, PAEs often engage in combinations of the above methods as entities that rely solely on one method are rather infrequent.

In contrast to patent portfolio construction strategies, a key common characteristic of most patent portfolios held by various types of PAEs is their technological field. Specifically, the vast majority of identified firms (92 %) are active in fields closely related to the ICT sphere. Specifically, the patent portfolios of identified companies primarily relate to computing, display, electronics, telecommunications, electrical engineering, internet applications, software, broadcasting, semiconductors and navigation. From the latter, telecommunications, computing, electronics and semiconductors constitute the most prominent types (accounting for 66 %). Nevertheless, patents related to non-ICT sectors such as biotechnology, life science, nanotechnology and automotive are also observed (accounting for 8 %), as illustrated in the figure below.

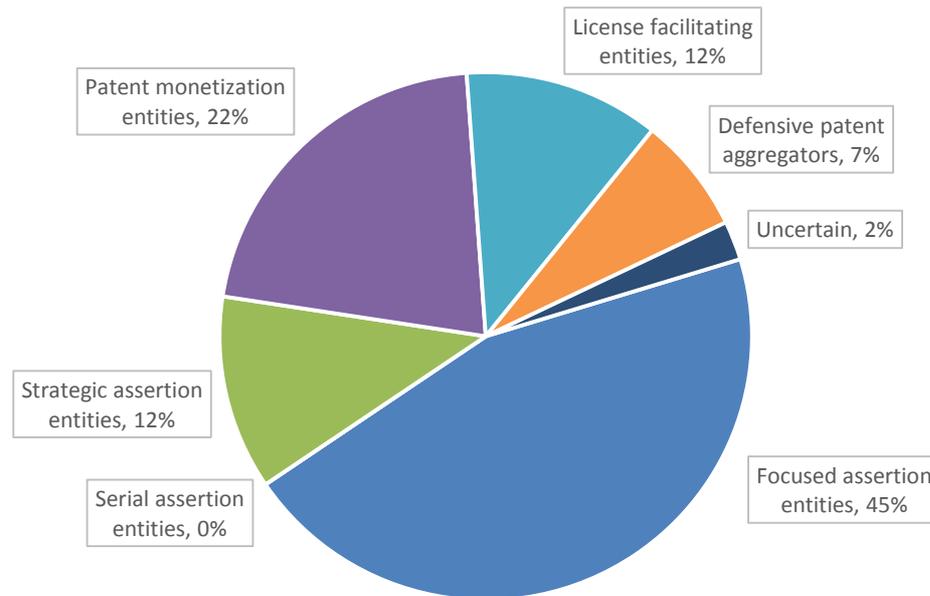
Figure 4: Distribution of patents held by type



Source: EE research.

Moreover, as can be seen in the figure below, the majority of identified PAEs adhere to the focused assertion entity business model (accounting for 45 % of identified firms), followed by patent monetisation entities (accounting for 22 percent of identified firms). Strategic assertion entities occupy the third place (accounting for 12 %), followed by license facilitating entities and defensive patent aggregators (accounting for 12 and 7 % of identified firms, respectively). Moreover, our desk-based research did not indicate the presence of any PAEs active in Europe that abide to the serial assertion entity typology. Lastly, one firm (MONEC Holding) exhibited insufficient available information and its classification was deemed uncertain.

Figure 5: Distribution of identified PAE typologies



However, as aforementioned, it should be noted that the classification process relied primarily on publicly available information and may therefore be exposed to biases as a result of informational inadequacy or reporting predispositions. Moreover, limited information on litigation activity, particularly for those cases that end in settlements and therefore do not reach the public surface, obstructs the accurate identification and, hence, classification of firms engaging in the assertion of patent rights. This issue becomes particularly pronounced in the case of serial assertion entities whose business model heavily relies on the achievement of settlements prior to full escalation to court. Lastly, potential secrecy regarding the monetisation strategies of PAEs, particularly during the licensing negotiation process is also likely to hinder classification attempts.

Nevertheless, certain common aspects in terms of PAEs' activities become apparent. Arguably, the most prominent feature relates to the limited presence of serial assertion entities, whose aggressive monetisation practices have been heavily criticised by market participants and observers. This is consistent with existing studies on the activities of PAEs, as well as with information made available to us during our high-level interviews, illustrating their limited presence in Europe, relative to the US.

Moreover, an interesting feature of firms engaging in the assertion of patent rights in Europe consists of their increased R&D activity, thus illustrating the potential role of the assertion of patent rights as a means of securing a return for the firm's investment in the development of patents. In the following table, we summarise the information gathered on the identified PAEs and present their final classification outcome.

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