Lisbon School of Economics & Management
Universidade de Lisboa

# MASTER

## ECONOMIA E GESTÃO DE CIÊNCIA TECNOLOGIA E INOVAÇÃO

## MASTER´S FINAL WORK

DISSERTATION

# NON-PRACTICING ENTITY'S IMPACT ON CHINA'S PATENT MARKET AND INNOVATION ACTIVITIES

YU QINGFANG

OCTOBER- 2022

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**SUPERVISION:**
MANUEL MIRA GODINHO

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*The patent system added the fuel of interest to the fire of genius.*

*--Abraham Lincoln*

## GLOSSARY

DOJ – Department of Justice

EPO – European Patent Office

FTO – Freedom to Operate

IEEE – Institute of Electrical and Electronics Engineers

ID – Intellectual Discovery

IP – Intellectual Property

IPR – Intellectual Property Right

ISF – Invention Science Fund

IV – Intellectual Ventures

NIST – National Institute of Standards and Technology

NPE – Non-Practicing Entity

OTL – Office of Technology Licensing

PAE – Patent Assertion Entity

PME – Patent Monetization Entity

R&D – Research & Development

SMEs – Small and medium-sized enterprises

S&T – Science& Technology

USPTO –United States Patent and Trademark Office

WIPO – World Intellectual Property Organization

ABSTRACT, KEYWORDS AND JEL CODES

This dissertation provides a Possible analysis of the impact of the shift of the focus of NPE activities to China on the Chinese patent market as well as innovation activities from the enterprises and social levels. In this dissertation, we classify NPEs into three types: research-oriented, litigation-oriented and defensive-oriented, and analyse them through the trends and causes of NPE activities and the profit logic of NPE business models, combined with real-life cases. We learn that all types of NPEs assume the role of patent operation and generally have the beneficial effect of promoting technology flow and improving innovation performance. Research-oriented NPEs are mainly engaged in technology research and development and aim at innovation, which is generally beneficial to innovation; the speculative attributes of litigation-oriented NPEs lead to high overall costs to society when they realize the benefits of patent operations, which are more detrimental than beneficial to innovation; defensive-oriented NPEs, as a response to litigation-based NPEs, can provide protection to relevant enterprises to focus more on innovation activities.

In addition, this dissertation proposes ways to deal with the adverse effects of NPEs from the perspectives of national legislation and administration and enterprise prevention, taking into account the experiences of Europe, the United States, Japan and South Korea; and proposes inspirations and directions for the utilization of NPEs in China in view of their advantages.

KEYWORDS: Non-practicing entity; NPE; Intellectual property; Patent; Chinese innovation activities

JEL CODES: O31; O34; O38; L10

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# TEMPLATE FOR MFW AT ISEG

By YU QINGFANG

This dissertation provides a possible analysis of the impact of the shift of the focus of NPE activities to China on the Chinese patent market as well as innovation activities from the enterprises and social levels. We learn that all types of NPEs assume the role of patent operation and generally have the beneficial effect of promoting technology flow and improving innovation performance. Research-oriented NPEs are mainly engaged in technology research and development and aim at innovation, which is generally beneficial to innovation; the speculative attributes of litigation-oriented NPEs lead to high overall costs to society when they realize the benefits of patent operations, which are more detrimental than beneficial to innovation; defensive-oriented NPEs, as a response to litigation-based NPEs, can provide protection to relevant enterprises let them focus more on innovation activities.

## 1. INTRODUCTION

According to the IP Asia 2020 report released by Clarivate Analytics, the number of patent litigations involving NPEs (“non-practicing entity”) in China has shown a significant growth trend since 2010. During the same period, the number of NPE patent litigation cases in the United States declined. After 2013, the United States began to take administrative, legislative, and judicial measures to combat patent trolls, and there has been a downward trend in the number of lawsuits filed by NPEs. The report is based on the Darts-IP patent case database's study of case data in the range 2010-2019. Since 2014, NPEs have been actively filing lawsuits in mainland China. In 2019, the number of cases increased dramatically. Some media even speculated based on this report that "China will soon become the best place in the world for patent licensing and litigation."

Therefore, in recent years, the hot topic about NPE has extended from western countries to mainland China. Before this, someone heard a little about NPE mostly because Huawei, ZTE, Xiaomi, OPPO, Haier and other Chinese companies had to face NPE lawsuits in foreign markets. Now, NPE litigation has begun to target the Chinese market and shifted the battlefield to China. In 2019, Global Innovation Aggregators, a subsidiary of NPE iPEL, sued San Jose-based U.S. companies Netgear and OPPO in China to counter NPE Sisivel, the following year, another company, Extreme Networks, announced that it had reached a settlement with iPEL and a patent license agreement, ending their litigation in Shenzhen.

In this context, it is relevant to explore the impact of this relatively new NPE business model on China's patent market and innovation activities. That is, the research question of this dissertation: What is the current situation of NPE in China and how will they affect China's patent sector in the future?

As one of the important indicators of innovation performance, patents are also the core assets of NPE, and NPE's essence is to profit from the operation of patent rights. In the context of the foregoing, the shift of NPE's target to China may have a certain impact on China's patent market and innovation activities. This dissertation will discuss the topic of the Non-Practicing Entity's impact on China's patent market and innovation activities.

This dissertation mainly uses the literature research method, case study, and re-integration of existing data of the annual report. Mainly with the aid of news, cases from China judgments online, and the annual report of NPE trend analysis of the patent database darts-ip, Standford university OTL annual report (2001-2021), and annual reports published by China National Intellectual Property Administrator. Some insights also are given by discussing this topic with lawyers practicing patent applications

Research related to NPE mostly discusses the level of laws and regulations, and the relationship between NPE and innovation activities, they also focus on the phenomenon and impact that have occurred. This dissertation hopes to explore the possibility of NPE prevalence in China, its impact on innovation activities, and the possible contribution and promotion of NPE as a business model to innovation, taking into account the global trend of NPE activities and the current Chinese laws and regulations, with reference to the experiences of countries and regions where NPE emerged earlier and activities were more frequent. This dissertation divides the operational purposes of NPE into three categories, namely research-oriented, litigation-oriented and defensive-oriented, and discusses their impact on innovation from their respective purposes and characteristics.

In the following chapters, from chapter 2 to chapter 7 are the main text, including NPE's concept and classification, reasons for NPE's appearance, NPE's trend, three types of NPEs' profit-making logic, current and future possible impacts of NPE, how to deal with adverse effects, the inspiration that China can take from NPE. Chapter 8 is the conclusion and intentions for future research.

## 2. ABOUT NPES

### *2.1. What are patents for?*

There is no doubt that patent rights are the core assets of NPEs. According to WIPO's definition, "A patent is an exclusive right granted for an invention, which is a product or a process that provides, in general, a new way of doing something, or offers a new technical solution to a problem." While a patent is granted, its owner has priority in the use of that invention[1].

When knowledge enters the public domain and is not protected, it creates "free-riders" who use the technical knowledge contained in the invention without compensating the inventor for his investment in the creative activity. This can lead to a situation where inventors are reluctant to bring new inventions to market and tend to keep these commercially valuable inventions secret, a phenomenon that can create difficulties for the commercialization of technological knowledge.

By providing innovators with limited exclusive rights and the possibility to receive adequate remuneration for their creative activities, the patent system can change the situation of insufficient innovation while providing incentives. (WIPO, n.d.). At the same time, mandatory disclosure of patents and patent applications facilitates the mutually beneficial dissemination of new knowledge and accelerates innovation activities, avoiding duplication of effort.

The traditional use of patents is to protect innovation by excluding third parties. In addition, it also seeks to obtain income through royalties for the licensing of innovation. However, in recent decades there has been a strategic use of patents, tactics adopted by companies to increase their competitiveness in the market. For example, occupy territory and prevent access by third parties, thereby creating protective walls; signalling competencies to adversaries or potential partners; obtaining extensive portfolios to leverage bargaining power in the event of a dispute (cross-licensing) and obtain IP to enhance the company's reputation, attracting investment and appreciation on the stock market (Von et al., 2007).

[1] usually, technology

Patent themselves as a kind of intellectual property, have a close relationship with S&T innovation in terms of mutual promotion, integration, and symbiosis. At the same time, as an important indicator of innovation, a series of commercialization activities such as the operation of patents have a great impact on innovation performance.

### *2.2. How NPEs have developed over time*

To a certain extent, independent inventors can be considered as being representative of the activity of NPEs, who conduct technological research and development and hold patent rights but do not individually produce products or provide technological services for the patented technology. According to the behavioural characteristics of NPEs, universities and research institutions also can be regarded as representative of NPEs, which mainly engage in basic technology research and apply for patents on new technologies and obtain returns by licensing these patents to enterprises (Lan, 2020).

In addition, from the perspective of the development history of NPEs, NPEs emerged in the United States, where the patent system was most developed. After establishing the patent trading market in the 19th century, the value of patents was not limited to the value of technology. Many enterprises profited from patent transfer and licensing, and later developed into purely trading and transferring patented technologies (Miao, 2014). At this time, NPEs were patent brokers who charged intermediary fees.

It follows that most NPE business models assume a significant portion of the "intermediary" role in the patent market. From an economic perspective, the generation of these NPEs is essential since the patent market is relatively illiquid and inefficient. The main reasons are as follows:

Firstly, it is difficult to price patents. As intangible assets, patents lack a stable underlying asset to determine their value (Gans & Stern, 2010). Especially for patents that contain radically innovative technologies, it is hard to know the market reaction until the product or service is introduced.

Secondly, there exists an information asymmetry between buyers and sellers in the patent market, which leads to high search costs. For patent inventors, it is expensive to find all possible infringers and potential applicants in the market. For the patent user, it's hard to ascertain from the patent's textual description whether the patent is of real value to the product (Hagiu & Yoffie, 2013). This may stem from the fact that the value of

patents in many modern technologies is subject to strong complementary and combinatorial effects that exacerbate the information asymmetry between patent inventors and patent users (Jaffe& Lerner, 2006).

Thirdly, the threat of lawsuits exacerbates the cost of patent transactions. Patent transactions always occur in the shadow of litigation, exacerbating the difficulty of valuing patents and generating significant transaction costs (Lemley & Shapiro, 2005).

Finally, there is a market failure in the patent market, especially for individual inventors and small enterprises. Hagiu et al. (2009) found that individual inventors and small enterprises contribute 60% of all patents in the U.S., but only 1% of the total revenue from patent licensing.

From the social background, the profound changes in the external environment such as the economy, industry and technology have created favorable conditions for the development of NPE. On the one hand, with the development of science and technology and the continuous refinement of the social division of labor, the number of patents carried by a commodity is also increasing, giving NPEs the opportunity to "rip off" the patent implementers. On the other hand, some telecommunication giants have gradually divested their terminal production business, the roles of rights holders and users are separated, and the checks and balances in the original license negotiation are out of balance. Under the background of a new round of impact on the global economy and the maximization of patent value as the core demand of enterprises, the process of the obligee's active operation of patent assets or the rapid acquisition of huge revenue by subcontracting to NPE has accelerated (Yihua, 2011).

In countries where the intellectual property system was established earlier, such as the United States, enterprises have a strong awareness of intellectual property rights and therefore a strong ability to use patents, and many companies have gained considerable profits by virtue of their proficient patent operation skills. Moreover, with the development of the patent system over the years, more and more adjustments have been made to strengthen the protection of the interests of right holders, and the adjustment of the patent infringement remedy system and the rising amount of compensation have also stimulated the development of NPE enterprises(Le, Mei& Chunli, 2022).

NPEs may have been established for different reasons, such as gradually transforming from a brick-and-mortar company to an NPE, or the founders may have left their jobs after years of patent-related work in large companies to establish an NPE. Still, it is indisputable that they all saw the considerable profits and prospects brought by patent operations.

### *2.3. Controversies around the meaning and utility of NPEs*

NPE as a specific business model has been around for almost 30 years since the 1990s, but it is still not a familiar concept in China. Same to China's situation, NPE experienced a period of intense industry discussion at its inception in the United States. An early term related to NPE was "patent troll".

Although according to Wikipedia, the term patent troll was used in an article in *Forbes* magazine as early as 1993 and again in 1994 in the educational video *The Patent Video*, the meaning then was different from what patent troll means today. Brenda (2001) documents that the current widespread use of the term patent troll was adopted for the first time by Peter Detkin, Vice President, Assistant General Counsel of Intel Corporation. In 1999, Intel referred to some companies as "patent extortionists" when these companies demanded high fees from intel for licensed patents. However, Intel was sued for damage to reputation (libel). So, Peter Detkin called these companies "patent trolls" and defined them as "somebody who tries to make a lot of money from a patent that they are not practicing, have no intention of practicing and in most cases never practiced".

The report *Patent Assertion and U.S. Innovation* prepared by the President's Council of Economic Advisers, the National Economic Council, the Office of Science & Technology Policy Economic Council, and the Office of Science & Technology Policy identified several key features of the "patent trolls" business model, including the fact that patent trolls do not "enforce" patents themselves, that their claims are often made after irreversible investments have been made by real enterprises, and that patents are obtained only in order to gain large profits through the threat of patent infringement litigation. Patent trolls use their "non-enforcement" business model to effectively avoid countersuits in patent litigation and to keep themselves in a proactive position in the relevant market. (CEA, 2013)

In 2003, the report issued by the Federal Trade Commission (FTC) *To Promote Innovation: The Proper Balance of Competition and Competition Law and Policy*, uses the neutral concept "NPE"， which referred to the entities that hold the patent but do not use the patent in the actual production.

The report *Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition* (FTC, 2011) quoted another concept related to NPE which is Patent Assertion Entity (PAE), PAE referred to companies that are not engaged in technological research & development and product sales, but simply take patent license negotiation and lawsuits as a profitable business in the sequence of acquiring patent ownership or undertaking the least R&D investments to the development of patent technology.

Although nowadays these three concepts are different in meaning and extension, from the change in the concept of patent troll itself and from the NPE was once equated to patent troll to now extended terms such as Patent Assertion Entities and Patent Monetization Entities reflects the gradual change in the understanding of NPEs in American society through misunderstanding finally to today's neutral view after rational analysis of their rationality.

For China, NPE as a foreign object, existing certain challenges in translation and definition in initial stage. Yanbei (2016) points that "the pejorative translation and understanding of this concept and the confusion in the understanding have made the legal regulation of NPE more difficult and challenging" (p. 514.). However, more and more scholars and stakeholders now endorse the neutral concept of NPE, just like Yanbei (2016) claims that NPEs "takes patent rights as a crucial point, patent licenses as a lever, and patent lawsuits as a driving force, to try its best to achieve the given target of maximum benefits. This commercial mode should be interpreted as the use of the patent system, rather than a breach of the patent system" (p.519.). They also endorse the distinction of NPE into different business models such as offensive and defensive etc. based on target-oriented, identity attributes or other classifications, which are explored in terms of each of their categories.

In China, some scholars believe that the NPE model is an act of extortion in the name of exercising patent rights, which has disturbed the market order and directly equated it with Patent Troll and must be regulated in a special way. On the other hand, there is also

a contrary view that, against the background that China's patent trading market is still imperfect, NPE can, to a certain extent, activate the patent operation market and promote the realization of the value of patent technology, thus indirectly stimulating technological innovation.

Bian (2021) argues that some litigation strategies of NPEs with patent troll qualities, such as repeat litigants and preferring to target small retailers rather than a large manufacturer, may bias the incentives for innovation and put pressure on the overall operation of the Chinese patent system. Zhao (2019) similarly claims that the frequent exercise of NPEs can seriously affect the innovation capacity of China's industry, as on the one hand, the returns obtained by NPEs do not return to innovation; on the other hand, industrial companies spend a great deal of energy and money to cope with frequent litigation by NPEs.

Although the speculative NPEs in the NPE model tries to capture the value of patents in the form of patent litigation, for research-oriented NPEs and NPEs that mainly engage in patent operations like patent brokers, their main business lies in patent operations such as patent licensing and transfer, not patent litigation. The NPE model also plays the role of value finder, supply and demand matcher, and value realizer and defender in the IP market, and in general has a positive effect on IP protection. (Guo,2019)

Since NPEs have been active in China for a relatively short period of time, we can try to gain relevant experience from studies in countries where NPEs has been active for a longer period.

Cohen et al. (2015) hold a negative conclusion "…both surveys and large-sample evidence suggest that NPEs frequently act opportunistically, targeting cash and asserting weak patents. Mounting evidence also suggests that NPE litigation is having a large, negative effect on US innovation. That said, not all NPE litigation is clearly problematic – in particular, most of the NPE patent trolling that has been observed seems to be driven by large aggregators." (p.46.). Also, in Cohen et al. research of 2019, founds that firms significantly reduced its innovation activities after settling with NPE or losing to them in court. In fact, the paper estimates that firms who are successfully targeted by NPEs (resulting in either a lawsuit loss, or a settlement) reduce their innovation investment by an average of 20%. At the same time, Cohen et al.(2019) found neither signs of any

significant NPE transmission to the ultimate innovators, only 5% of NPE winnings is returned to innovators, nor a positive impact of NPE on innovation in their most prevalent industries. In other words, Lauren et al. argue that on average, NPEs seem to behave more like opportunistic "patent trolls". Bessen et al. (2013) are even more blunt in stating that the direct cost of NPE patent assertion relative to total corporate R&D expenditures is actually a huge tax on innovation investment.

Fischer et al.'s (2012) offered perspective may corroborate and explain this set of negative findings, "NPEs are peculiar players on markets for technology insofar as they are solely interested in the exclusion right, not in the underlying knowledge." (p.790) and neither as buyers or licensees nor as sellers or licensors of patents, are NPEs interested in the knowledge about the technology that a patent covers. Because of intangible assets and intellectual property have a characteristic, there is a separation between the asset - the knowledge - and the property rights associated with it[2]. This separation may manifest itself in a specific case where 'a firm may reinvent and practice some invention without owning or even knowing about the related patent, and, in turn, a patent owner may neither understand the knowledge underlying the patent nor know who else has this knowledge nor who uses it in practice.' (p.790.)

Nonetheless, Fischer et al.'s (2012) state that "Future research should seek to understand where, if anywhere, NPEs can have strong positive impacts on innovation, and where NPE activity should be curtailed." (p.18.).

### *2.4 NPE definition adopted in this study*

So far, there is no legal concept of NPE in China. The concept of NPE is proposed from a legal perspective through the report " *To promote innovation: The proper balance of competition and patent law and policy*" issued by the US Federal Trade Commission in 2003.

Therefore, this dissertation uses the neutral concept "NPE" proposed by FTC, which referred to the entities that hold the patent but do not use the patent in the actual production. (FTC, 2003)

[2] Since only in this case can the asset that is subject to a given property right be independently recreated by parties other than the rightful owner.

For the types of NPE, there is no classification standard yet, which usually varies according to the research direction. This dissertation divides NPEs into three categories based on their operational purposes and business models: research-oriented NPEs, litigation-oriented NPEs, and defensive-oriented NPEs[3].

Research-oriented NPE usually conducts basic research, and then applies for patents for inventions and licenses them but does not produce products. Its purpose is to innovate, and the patents it generated are generally innovative technologies. For example, universities and research laboratories.

Litigation-oriented NPE (speculative NPE) is an individual or company that actively initiates a patent infringement lawsuit to obtain compensation after purchasing a patent in the patent market but has never produced its patented product. The motivation for its "effort" to acquire and claim patents is to find targets and use legal weapons to extract high returns from them. Also known as "patent troll" because of its extortion-like behaviour.

Defensive-oriented NPE, as a response to speculative (litigation-oriented) NPEs, is a defensive-oriented company or alliance established to fight against speculative NPEs. Typically operates in the patent market by purchasing patent rights and licensing them to members.

[3] Although in some articles, there will be types of operational NPEs and intermediary NPEs, from the nature of the business model of NPEs, we can see that these three types of NPEs are consciously or unintentionally acting as intermediaries, and all NPEs all engage in patent operations in different ways, so they are divided into three types: research, litigation-oriented and defensive-oriented.

## 3. TRENDS OF NPE

### *3.1 General global trend*

Although there is a trend for NPEs to turn their attention to the mainland China market, the U.S. and Europe are currently the preferred litigation venues for NPEs. According to an analysis of litigation in which the NPEs as plaintiffs published by the Intellectual Property and Innovation Development Center of China Academy of Information and Communications in 2022, more than 98% NPEs choose the U.S. and Europe as the litigation venue, with the U.S. accounting for 94.69% of the litigation volume, the EU accounting for 3.89%[4], and other regions accounting for only 1.42% (Le, Mei& Chunli, 2022).

FIGURE 1- Global distribution of lawsuits with NPE plaintiffs: Insert here

Under the influence of the COVID-19 epidemic, the number of NPE lawsuits has not decreased; on the contrary, it is increasing. According to data released by RPX, although the COVID-19 epidemic continues to spread, in the second quarter of 2020, 1,199 new defendants were involved in the United States, of which NPE accounted for 52.8%, a year-on-year increase of 17.4%, the highest number of lawsuits in the second quarter since 2016. This trend continued in 2021, with 2,338 defendants added to patent litigation campaigns—an increase of 9.5% from the 2020 total of 2,135 defendants. (RPX, 2022)

FIGURE 2- Defendants Added to Litigation Campaigns by Year: Insert here

As early as 2017, ZTE's chief intellectual property lawyer Hu Yi and other experts were predicting that: according to the analysis of global intellectual property litigation trends, NPEs have gradually turned to EU countries led by Germany as the battlefield in the past few years, ZTE has been filed ten lawsuits in Germany this year, and they are all related to the U.S. NPEs; at the same time, more and more NPEs choose to compete in China, and China will be the new battlefield for the next 3 to 5 years (BIE, 2017). Today, five years later, although the number of NPE cases in China is negligible globally, China has become a patent battlefield for NPEs from the growth of its own cases.

[4] including Germany is accounting for 2.12%

### *3.2 NPE trends in mainland China*

In the IP Asia 2020 report released by Clarivate in 2020, NPEs have been actively filing lawsuits in mainland China since 2014. In 2019, the number of cases increased dramatically. From an industry perspective, the technologies of patents involved in the litigation are mainly distributed in electronic communication technology, especially since the number of wireless communication networks is the largest. This is highly related to the intensive innovation, fierce competition, and rapid development of the domestic communication industry (Clarivate, 2020).

FIGURE 3- Evolution of NPE litigation and types of action breakdown over the last decade: Insert here

TABLE I- Top 10 IPC classifications of litigated patents: Insert here

In addition, although there are no ongoing statistics and analysis reports on NPE activities in mainland China, news media reports and attention to some NPE cases in recent years can confirm from another perspective that NPEs are beginning to turn their attention to China, and their activities are gradually becoming active. For example, in 2016, Wireless Future Technologies[5] Inc appealed Sony to Nanjing Intermediate People's Court. This action was regarded as NPE testing the waters in China, receiving official media attention[6]. In 2017, ZeroTech and DJI were successively sued by an NPE for patent infringement (Jie, 2017). In 2020, iPEL[7], as a local NPE in the United States, took a different approach to patent acquisition and layout in China and used administrative enforcement to attack American companies (Ying, 2020). In the same year, the case of Conversant Wireless Licensing S.à r.l.[8] dispute with Huawei on standard essential patents was selected as one of the top ten IP adjudication cases with the most research value in China in 2020.

### *3.3 Causes of the trend*

China's economic development and the increasing R&D capability and market competitiveness of Chinese enterprises have provided the soil for the growth of NPEs.

[5] a subsidiary of the well-known Canadian NPE WI-LAN
[6] followed by the Chinese official media People's Daily
[7] Innovative Patent Ethical Licensing
[8] A famous NPE that holds one of the world's largest patent portfolios related to mobile communications networks.

Also, China has become the second largest target market for patent portfolio in the world after the United States. More importantly, China is also a global manufacturing base. Patent holders can initiate litigation both in the country where the goods are manufactured and where the goods are sold and used. (Jie, 2017) Therefore, China has become a market coveted by many NPEs. The trend of gradual activation of NPEs is usually due to a combination of many factors. The following will analyze the reasons for the gradual activation of NPEs in the patent market of mainland China from external and internal factors.

### *3.3.1 External factors: U.S. administrative investigations and congressional legislation against NPE*

Till now, the United States remains the primary battleground for NPEs, with the most significant number of NPE litigation cases in the world. But even so, the continuing attempts of legislation to curb patent trolls in the U.S. judiciary have led many NPEs to look outside the country to explore new markets.

To combat the behavior of "patent trolls", starting from the promulgation of the "Leahy-Smith America Invents Act" (AIA) in 2011, the United States has implemented various restrictions on "patent trolls" including the prohibition of suing in a single lawsuit Multiple infringers (Leahy-Smith America Invents Act, 1964); if the case is dismissed, the defendant can ask the plaintiff to pay the litigation costs; Changed the mechanism for allocating attorney's fees so that if the patentee (plaintiff) loses the case and is significantly more likely to be judged to bear the attorney's fees of another party.; the litigation of patent infringement cases is lower than the jurisdiction rules and other means, and the cost and threshold of unreasonable litigation in the field of intellectual property rights have been continuously increased (Chenhe, 2018).

And the changing rules of U.S. law have combined with other factors to result in a higher success rate for NPEs outside the U.S. during 2011-2016, making litigation outside the U.S. extremely attractive to NPEs (Clarivate, 2017).

FIGURE 4- NPE Win Rate 2011-2016 US vs. Non-US: insert here

### *3.3.2 Internal factors: Chinese companies have increased R&D capabilities*

In recent years, the R&D capabilities and market competitiveness of Chinese enterprises have continued to grow, and more and more attention has been paid to the

protection of intellectual property rights, which has led to the improvement of the quality and value of patents in the market, providing conditions for the growth of NPE.

From 2012 to 2021, China's national R&D investment increased from 1.02 trillion yuan to 2.79 trillion yuan[9], and the proportion of GDP will increase from 1.97% to 2.44%. According to the "Global Innovation Index Report" (GII) released by the World Intellectual Property Organization, since 2013, China's ranking in the Global Innovation Index has risen steadily for nine consecutive years, rising from 34th to 12th (Xutao, 2021).

The 2021 China Top 500 Enterprises list shows that the R&D investment of the top 500 Chinese enterprises has continued to increase, with a total investment of 1.31 trillion yuan in R&D, an increase of 21.50%. The R&D intensity also increased to 1.77%, an increase of 0.16 percentage points and a record high (Qian, 2021).

In addition, in terms of the number of patents, the number of valid invention patents held by the top 500 Chinese enterprises was 594,600[10], an increase of 22.78% over the previous year. According to data released by WIPO, in 2021, Chinese applicants will submit 69,500 international patent applications through the Patent Cooperation Treaty (PCT) route, a year-on-year increase of 0.9%, ranking first in the number of applications for the third consecutive year (CNIPA, 2022). Although the number of patents cannot fully represent innovation and R&D capability, in the context of increasing the strength of patent protection, the vast number of patent applications can provide strong ammunition support for speculators' speculative behaviour.

### *3.3.3 Internal factors: China's policy and legal attractiveness*

#### 3.3.3.1 Dimension 1: Policy

In terms of policy, the Chinese government proposed in 2015 that "innovation is the first driving force for development" (Binlin & Qingjie, 2022). Resources in all areas are strongly tilted toward innovative R&D.

[9] a year-on-year increase of 14.2%
[10] accounting for more than a quarter of the national total

3.3.3.2 Dimension 2: Law

On the legal side, China's newly amended IPR law in 2021 proposes to build an infringement compensation system oriented to the full realization of the value of IPR". Before this, the main disadvantage of patent-related litigation in China compared to Germany and the United States was the lower amount of damages and the difficulty of issuing injunctions. The new Patent Law, which came into force on June 1, 2021, has strengthened the protection of patent owners at the legislative level. For example, the new Patent Law adjusts the statutory cap on damages for patent infringement from one million RMB to five million RMB; the new Patent Law also introduces a punitive damages system, which will have an incentive effect on patent infringement litigation (Ping et al., 2021). Therefore, it is foreseeable that the number of patent infringement lawsuits will increase. The exponential multiplication of the number of damages will also attract more NPE to China to conduct litigation actions. The above changes in legal provisions, combined with the characteristics of NPE, may lead to the rapid growth of NPE litigation in China.

In addition to the attraction that the newly amended law brings to NPEs, Chinese IP law has advantages in terms of the scope of court relations, prosecution conditions, the process of proof, and especially the speed of trial and litigation costs.[11]

Furthermore, Clarivate (2017) showed that Chinese patent owners topped the list with a 58% win rate in infringement cases and made a prediction that despite the small number of NPE litigation cases in China up to that moment, it predicted that China may be the next focus area for NPE litigation based on the patent owner-friendly system.

FIGURE 5- Patent win rate in the infringement action: insert here

In general, as the value of Chinese patents has increased and IPR protection has been strengthened in recent years, the attraction of the Chinese law dimension for NPEs lies in the more specialized court hearings, simple litigation procedures, high litigation efficiency, low litigation costs and more accessible proof in mainland patent litigation, which may be one of the reasons why the focus of NPEs has started to shift to China. The

[11] For details, please refer to Annex 1

disadvantages of relatively low damages and the difficulty of issuing injunctions have also changed with the enactment of new regulations. The extensive sales and manufacturing markets, court injunctions, increasing damages, and short litigation cycles make the Chinese market an "ideal country" for NPEs.

3.3.3.3 Dimension 3: Court's behaviour

In the China Patent Investigation Report 2017, it was proposed that from the continuous investigation in the previous five years, the court had concluded that the amount of money has gradually converged to a high amount (CNIPA-IPDRC, 2017).

Since 2013, an investigation on "the amount of compensation awarded by the courts involving patent infringement lawsuits in the past five years" has been conducted. In terms of the distribution of different compensation amounts, companies have shown a pyramid-shaped distribution from high to low. In 2016, the proportions of "500,000-1,000,000" and "1,000,000-5,000,000" were significantly increased, and the proportion of "5 million and above" was also slightly increased.

The trend of high compensation amounts for court judgments is an excellent material stimulus for NPEs, which is bound to attract more NPEs to file lawsuits in China.

FIGURE 6- Court-awarded damages for companies involved in patent infringement lawsuits, 2016-2021: insert here

*3.4 Discussion*

With the economic and business perspectives, whether NPEs will continue to pay attention to and invest more resources in the Chinese market also depends on the subsequent changes in the Chinese patent protection environment. For example, whether the amount of compensation for patent litigation in China can bring sufficient material incentives to NPEs, whether the quality of existing patents can support the need for NPEs to initiate litigation or other operational actions, and whether there are domestic teams with sufficient experience and expertise in patent operation to provide support will affect whether China can become the next main battleground for NPE litigation (Jie, 2017).

In addition to the usual economic and legal discussions on the growing trend of NPEs in China, the analysis from a cultural perspective is equally interesting.

Some scholars believe that NPEs may suffer from public opinion pressure in China from a cultural perspective. For example, Liang, manager of Zerotech's IP department, once said in an interview; "China is a country that values virtue and morality, and it is difficult for NPEs to escape public opinion pressure, but Chinese companies do need to be prepared for a long-term battle" (Chenhe, 2018). The speculative nature of NPE's business model is against morality in Chinese culture. Its intermediary role[12] leads to the Chinese perception of NPE as a "reap without sowing" business. Therefore, NPE activities in China may be subject to cultural resistance, but they may have little impact on the course of NPE litigation and the outcome of the decision.

[12] neither creating nor using patents

## 4. THREE TYPES OF NPES' PROFIT-MAKING LOGIC

With the rapid development of contemporary technology, intellectual property represented by patents has transcended traditional understanding. The complete process of IP creation is more than just turning innovation into a value right by which to produce and sell technological products, so as to create economic value for society. It is also possible to transform such rights into economic benefits, i.e., to obtain direct financing and monetization benefits from the IP itself. In this context, the existence of NPE itself as a patent system or a companion of the capitalist market economy, which combines the dual characteristics of not enforcing patents and patent operation, is justified in itself. There are also significant differences in the profit logic of different kinds of NPEs in terms of their operational purposes. The following section will discuss the profit logic of three types of NPEs, namely, research-oriented, litigation-oriented and defensive-oriented, based on representative companies or institutions in the market.

### *4.1 Research-oriented NPE*

Research-based NPEs, such as those commonly found in universities, colleges and research laboratories, usually conduct basic research, then patent their inventions and license them to the public, without producing products. It is generally considered that their existence is justified because they aim to innovate, and the resulting patents are generally for technologies that are truly innovative (Yan, 2019).

Usually, such NPEs can be monetized through ways such as intellectual property commercialization in knowledge transfer. The commercialization process of each university or research institution may be different, but usually involves the following steps (WIPO, 2022):

- Submission of the innovation or discovery (usually in the form of an invention disclosure)

- Evaluation (an assessment is made to determine the scientific and commercial value of the knowledge)

- Protection (intellectual property or other types of protection)

- Business case and business plan (to determine if the innovation or discovery is truly viable), marketing, product development plans, and other business considerations

While knowledge transfer covers a wide range of formal and informal channels, and research NPEs can also be used for profit through (WIPO, 2022):

- Licensing
- Transfer
- Collaboration contracts
- Material transfer agreements
- Sponsored research agreements
- Consulting Agreements
- Franchising and establishment of subsidiaries and start-up companies
- etc.

The Office of Technology Licensing (OTL) of a university or research institution is the main executive department of the patent operation of Research-oriented NPEs, OTL provides a range of professional services to inventors from patent application to patent conversion process.

Stanford University's OTL was established in 1970, before that, just like other universities in the US, Stanford University used a third-party model for technology transfer. Under this arrangement, however, Stanford earned no more than $5,000 in total revenue from technology transfer in the 15 years of the early 1950s, a negligible amount compared to the university's overall research and operating expenses (CISTE, 2020). The creation and development of the Stanford OTL succeeded in ameliorating this dilemma with its working system and operating model.

In the half-century since the OTL was established, according to financial data, OTL has received licensing revenue from 2,539 inventions and technologies with cumulative technology licensing revenue exceeding $2.1 billion. Of these, 575 inventions brought in more than $100,000, and 103 of the 575 inventions brought in more than $1 million. (Weiwei, 2021).

FIGURE 7- Number of new patent licenses and patent licensing revenue at Stanford University, 2001-2021: insert here

FIGURE 8- Workflow of Stanford University OTL: insert here

OTL, as the main patent operation department of the research-oriented NPE, facilitates the transformation of Stanford's research results, turning science and technology into tangible products, and the income from the transformation is used to support the University's teaching and research work, thus creating a virtuous circle between the University's research work and technology transfer.

### *4.2 Litigation-oriented NPE*

For NPEs, to obtain profits through patents, either through licensing or through patent litigation, litigation-oriented NPEs mainly obtain profits through the latter. When making specific choices, NPE will calculate the net present value that can be obtained from patent litigation, and make certain discounts based on the cost of litigation and the risk that the patent may be invalidated. Usually, patent holders will assess the risk in patent litigation from the following three perspectives: 1) the quality of the patent 2) the market of the patented technology 3) the reputation of the patent owner. As the most important feature of NPEs that are the closest to patent trolls, litigation-oriented NPEs also arouse public disgust. They use patent rights as weapons and take the form of malicious lawsuits to force entities to respond to lawsuits after actual production. When an enterprise encounters a patent lawsuit, it will be caught in a dilemma: if it does not litigate, it may bear the risk of losing the lawsuit and face a high amount of compensation; if it actively responds to the lawsuit, it must spend a lot of time and lawyer fees When companies are tired of litigation, they tend to settle with plaintiffs, which is exactly the purpose of such NPEs.

The reputation of "litigious" and the title of patent troll have made litigation-type NPEs much criticized, and Intellectual Ventures (IV) Company is the most typical example, who be called as "patent troll" for a long time. IV, as one of the most well-known NPE institutions in the United States, has operations all over the world. In 2000, driven by the belief that "invention is the highest-value and most interesting part of the commercial food chain", Nathan Myhrvold[13] and Edward Jung[14] founded IV. At that time, IV has claimed that "litigation is a disastrous way of capitalizing patents" (Avancept LLC, 2011).

[13] The former Chief Technology Officer of Microsoft Corporation
[14] The former Chief software component engineer at Microsoft

Through the construction of the world's top-level technical, legal and economic expert teams, IV seeks patent investment opportunities with market prospects. Its patent sources can be divided into internal creation and external mergers and acquisitions. Although IV set up a special invention laboratory with the support of the ISF Foundation to demonstrate its determination to create inventions. However, based on the relevant data, the outside world does not recognize this. IV's invention lab is more of a tool to cover up its patent speculation. The second way is wider believed the real source of high-intelligence invention patents, which can be divided into more subdivision modes, including direct purchase and joint R&D (Liu, Zhou, & Xu, 2012).

Patent purchase is the basic business of NPE in addition to scientific research, and it is also related to whether NPE can grow and grow. IV purchases a variety of patents through its Patent Investment Fund, and the company already owns more than 95,000 patents in 2018, most of which were acquired through purchases (Vardi, 2018). IV also purchases patents through some "shadow companies" that ostensibly have no principal-agent relationship with IV, but IV is the actual funder, manipulating the funds and business of these companies. In addition, mergers and acquisitions of technology-based companies are also a way of IV's patent purchases.

IV uses its Invention Development Fund (IDF) to select inventors whose fields of invention and technical ideas meet the requirements of IV and apply for patents for the corresponding inventions. This business model is a strategy commonly adopted by IV entering Asian countries (Liu, Zhou, & Xu, 2012). After purchase, IV will do the patent integration. Repackage and combine patents according to their technical attributes and market expectations to create patent pools.

The final step is patent licensing or litigation. In the ideal situation, IV promotes patents and portfolios to the globally established patent trading platform to narrow the information gap between patent owners and patent buyers for the purpose of facilitating patent transactions and earning high commissions for its services. (Jin, 2020).

Another situation is litigation. Since 2010, IV's business direction has shifted from acquiring patent portfolios to directly suing technology companies with patents.[15] There have been a lot of claims that IV are the largest NPE or patent troll in the world, and people begun to discuss the possible impact of IV on the US patent system, national technological innovation, and even the development of the US economy (Matt, 2011).

IV patent litigation methods include three ways: Backdoor litigation, i.e., using the name of a shell company to initiate patent litigation; Direct litigation, i.e., initiating litigation directly in the name of the IV; Threat of lawsuit, i.e., claiming that it will initiate patent litigation against an enterprise, usually large enterprise, forced it to enter into a patent licensing agreement with the IV[16].

FIGURE 9- Workflow of litigation-oriented NPE: insert here

To sum up, Litigation-oriented NPEs, represented by IVs, benefit from licensing[17] or awarding damages from litigation.

### *4.3 Defensive-oriented NPEs*

The origin of Defensive-oriented NPEs[18] can be attributed to the growing threat of litigation-oriented NPEs to patent-practicing companies. By resisting NPE infringement, a defensive alliance can pre-empt an offensive NPE to license or purchase a toxic patent. Those who join the defensive alliance can pay less than the cost of litigation or settlement with NPEs, so as to reduce the risk and cost of patent litigation for customers. (Hagiu& Yoffie, 2011).

Among the NPEs belonging to the Defensive-oriented NPEs, the operation mode of RPX (Rational Patent) can often be used as one of the main types of reference objects. Founded in 2008, RPX Company positions itself as an institution that "conducts defensive patent acquisitions through market mechanisms to help clients reduce patent risks and related costs from NPE", typically, members can reduce their patent litigation costs and settlement fees by about half. Therefore, RPX is a listed company, and its main core

[15] On December 8th, 2010, IV started to initiate the first (batch) patent litigation in the United States. Companies involved in the lawsuit including: Altera, Lattice Semiconductor, Microsemi, Check Point, McAfee, Symantec, Trend Micro, Elpida Memory, Hynix Semiconductor.

[16] For details, please refer to Annex 2

[17] Possibly from settlements of litigation threats

[18] This kind of NPE is usually organized as a defensive alliance

business is to "mitigate the possibility of its members being sued". RPX will purchase some patents with potential litigation risks in advance and proactively through market analysis, so as to avoid NPEs obtaining the patents and filing lawsuits. The funds for RPX to obtain patents mainly come from the annual membership fee (charged according to the turnover of the member company), and each member can obtain the "authorization" of all RPX patents. While reducing members' harassment by litigation-type NPE, when members are sued by non-member companies, RPX can provide members with patents owned by them as counterclaims (Pengfei, 2013).

The current RPX membership fee is between US$65,000 and US$69 million, depending on the size of the member's own operation (Yiting,2016). However, the "rate card" will be locked from the beginning of the membership and will not be changed, and the actual annual payment will be rise based on the increase in the value of all patents acquired by RPX.

Here's how the model works (Larry, 2008):

- Companies pay annual fees.
- RPX buys patent portfolios to play keep away from patent trolls.
- Member companies benefit because the fees are less than what a court defense would cost.

FIGURE 10- Workflow of RPX (Defensive-NPEs): insert here

RPX's operation mode has two advantages for those who join as its "members": first, it reduces the number of patents that "patent cockroaches" can obtain; second, it can be understood that all members work together to obtain defensive patents, it can reduce these patents cost of acquisition (Wang, 2010). Currently, RPX has avoided legal and settlement costs counting $5,370,665,010 for its members (RPX, 2022).

## 5. THE IMPACT OF NPE ON INNOVATION ACTIVITIES IN CHINA

NPE has not been in China for a long time, and its impact on innovation is not as significant as in the United States and other regions, but it has attracted the attention of the high-tech industry. China Academy of Information and Communications Technology issued a risk warning for NPE in the latest development trend of 5G+ industry standard essential patents (CAIAT, 2021). In addition to risks, NPEs have different impacts on innovation due to their different operating purposes, which will be discussed in the following categories.

### *5.1 Research-oriented NPEs*

Since research-oriented NPEs including universities or research institutes, their patent quality is usually assured, and innovation is usually the starting point for research. Therefore, this type of NPE is generally conducive to a vibrant innovation market and is a positive player in promoting innovation activities in China.

The downside is that there are currently a large number of sleeping patents[19] in China's universities. As a research-oriented NPE, if its patent results cannot be transformed, it is a serious waste of research resources and does not meet the definition of innovation. Therefore, the Chinese government has been working to activate "dormant patents" in universities, and it is particularly important to promote and establish a professional team responsible for patent transformation, similar to OTL, to address this issue. This will be discussed in the next section.

### *5.2 Litigation-oriented NPEs*

Litigation NPEs have always been the most controversial and the most discussed NPEs. The negative impact of its obvious speculative and litigation tendency is often greater than the benefit brought by the patent operation business. Enterprises are often overwhelmed, and it also causes waste of social resources. Therefore this type of NPE is considered to do more harm than benefit for innovation.

[19] Sleeping patents are patents for inventions and utility models for which the patentee has obtained a patent ownership certificate in accordance with the law and are within the protection period of the patent right but cannot be converted or cannot be fully converted under the premise that the patentee is actively seeking the market for patent conversion (MBAlib, n.d.).

### *5.2.1 enterprise dimension*

#### 5.2.1.1 Suppressing the enthusiasm of enterprises

For some large technology companies, the company has a large scale of production, high investment and complex technology, and the products involve a large number of patents and are closely related. If a product is prohibited from being sold because it may infringe a patent right, it will inevitably lead to the developer of this product not being able to effectively recover the research and development costs and obtain profits (Ping & Yuanyuan, 2021). Failure to obtain innovation returns and incentives will lead to no sustainable funds to continue to invest in innovation and R&D, which will also lead to a decrease in the enthusiasm of enterprises for innovation and R&D, thus affecting the enthusiasm of China's innovation activities.

#### 5.2.1.2 Increase the cost and burden of enterprises, and limit the competitiveness of innovative enterprises

For enterprises, on the one hand, there is pressure from litigation, and NPE litigation is especially special for patent enforcement enterprises. The fact that NPE does not enforce patents and does not manufacture products makes it impossible for companies to use cross-licensing for settlements or use their own patent reserves to counterclaim when faced with their lawsuits. This makes the company have to spend a lot of manpower and material resources on the work of responding to the invalidation.

On the other hand, there is the financial burden. The economic burden first comes from the direct loss of responding to litigation. Patent litigation and patent licensing caused by NPE bring litigation and licensing expenses, which directly increase the cost of products. In particular, the cycle of patent litigation is very long. A patent litigation often takes more than two years or even longer. The long-term patent infringement litigation process also requires the company to spend a lot of manpower and material resources to deal with it, which is bound to bring a huge burden to the company (Ping & Yuanyuan, 2021). After Gaoyu sued DJI in 2016, when the DJI IP team talked about NPE, Cui, the person in charge, said that DJI's IP team can basically deal with the case independently, if some companies with incomplete intellectual property teams encounter this

situation, they have to entrust law firms to take care of invalidation process and litigation related matters, which can be quite expensive. Usually, the cost of entrusting a law firm to deal with a patent litigation case requires 100,000 to 200,000 yuan. Taking the 31 cases in which Gaoyu sued DJI for infringement, it may cost at least five or six million yuan to entrust a law firm to handle it (Chenhe, 2018). In the case of limited annual budgets, companies spend more funds on litigation, which means less investment in innovative R&D.

For many start-ups, spending of this order of magnitude is a big shock that can lead to product redesigns, business model changes, or even closing down. According to the White House report, in a survey of 223 early-stage innovative technology companies, 40% of the companies believe that NPE-type company lawsuits have a significant impact on their normal operations, including product updates, employee hiring and Fundraising and other aspects have different degrees of impact (President's Council of Economic Advisers et al., 2013).

The financial burden also comes from the indirect loss of losing the market. In the lawsuit, once a certain functional module of a product is found to infringe a certain patent right and an injunction is issued, and the product is prohibited from being sold, the company faces the problem of losing the market. And even though the company eventually won the case, the compensation received was far less than the loss. Dong, chairman of Gree, a famous Chinese home appliance company, said in an interview about the impact of NPE on the company: " Someone stole our patent and fought a lawsuit for two years. They (NPE) only compensated 2 million. It is time-consuming and labour-intensive. It is better to use these resources to develop new technology." Winning the lawsuit but losing the market made Dong really frustrating (Ye, 2016).

To make up for the loss, some companies may reduce future production capacity or pass on this part of the cost to consumers. These measures will bring about a sharp increase in product prices and ultimately damage the interests of consumers, weakening enterprises competitiveness while greatly increasing the burden (Ping & Yuanyuan, 2021). The reduction of corporate research funding caused by economic pressure is a great blow to innovation.

5.2.1.3 May have an impact on the enterprise's goodwill

NPE will not only hinder the technological innovation of the main company that develops the product and increase the cost of the product, but also the threat method it uses in order to obtain compensation may also detract from the goodwill of these companies. Negative news in the market can damage the brand value of a company, which is especially important for the goodwill of large companies. When the media is flooded with a lot of negative information about a company or a company's brand, consumers may doubt the value of the company's products. The loss of sales and brand value caused by damage to goodwill have a direct impact on the profit of the company, which may lead to a reduction in the resources invested in innovative research and development. (Ping & Yuanyuan, 2021)

5.2.1.4 May become a tool for vicious competition among enterprises

In addition to the threat of litigation-oriented NPE itself to enterprises, this business model also became a new path for vicious competition. Enterprises cooperate with litigation-oriented NPEs to transfer patent rights and file lawsuits against competitors, which not only avoid the reputation of being "litigious", but also benefit from the compensation for lawsuits. For example, a company called Digitude filed a patent infringement lawsuit at the ITC (US National Trade Commission) in December 2011 against smartphone and personal electronics manufacturers such as RIM, HTC, LG, Motorola, Samsung, Sony, Amazon and Nokia. It is worth noting that two of the patents were assigned by Apple to a shell company called Cliff Island LLC in 2011 and then transferred to Digitude. Opinions vary, with one suggesting that Apple may have been threatened by Digitude and forced to assign its patents; while another view is that Apple did so intentionally. By transferring patents to NPE through the agreement, on the one hand, Apple still retains the right to freely use the patented technology; on the other hand, Apple can also benefit from the compensation for lawsuits initiated by the transferee company while being exempted the from reputation of "litigious" (Jason, 2011).

*5.2.2 Social dimension*

1) Exacerbating the problem of the patent thicket, causing some industries to restrict competition

Patent pirates and their affiliated companies have a huge number of patents, which have constituted a technological monopoly in some technical fields, exacerbating the patent jungle problem. It achieves horizontal collusion through the integration of patent resources and transactions with affiliated companies, thereby inducing behaviors to restrict competition.

2) Weakening the incentive function of patents

NPEs take advantage of their financial and information advantages over the patentee, and may force prices down in patent acquisition; at the same time, they increase the cost of patent implementation by claiming high compensation, thus making the innovative inventors not get their due rewards and indirectly increasing the cost of the public to benefit from the patented technology, which distorts the incentive function of the patent system.

3) Cause the loss of state-owned assets

China is currently one of the most important patent sources for litigation-oriented NPEs. Although litigation-oriented NPEs purchase patents and commercialize them to a certain extent in the process of accumulating patent pools, let the value of patents exerted, if the boundary between service inventions and non-service inventions cannot be clearly defined, the patents purchased by NPEs may cause the loss of patents, and the loss of patents related to the national financial science and technology funds may cause the loss of state-owned assets.

On the one hand, in order to deal with the frequent lawsuits of NPE, industrial companies will spend a lot of energy and money to deal with the lawsuits, which will affect the normal investment of industrial enterprises in innovation, and ultimately damage the investment of Chinese industrial entities in innovation and patent protection. positivity. On the other hand, the rewards earned by NPE do not reward innovation. The essence of NPE's operation mode is to use the transferred technical assets to obtain "residual value", which cannot contribute to sustainable innovation, let alone invest in major technological research and development that affects the progress of society.

Of course, litigation NPE still has a positive impact on the patent market and innovation activity.

First, the quality of the patent can be checked. In litigation, because the patent has the possibility of being invalidated, it is to some extent the inspection and screening of the quality of the patent. Second, improving the bargaining power of individual inventors and small businesses especially provides a good opportunity for a single inventor to enforce his patent, because NPE has the advantages of capital and resources, effectively overcoming the consideration of a single inventor based on litigation costs, and the disadvantages of being reluctant to initiate litigation easily. Finally, the existence of NPE helps to enhance the liquidity of the patent market, improve the efficiency of the patent market, and is conducive to driving and encouraging patent transformation and technological progress.

In general, litigation-type NPE has more harm than good on innovation. From the national level, corresponding countermeasures and laws and regulations should be formulated to limit malicious patent litigation activities and protect Chinese enterprise innovation activities. Further countermeasures will be discussed in the "Solutions for the adverse effects of NPE " below.

### *5.3 Defensive-oriented NPEs*

The birth of defensive-oriented NPEs itself is to deal with litigation-oriented NPEs. Adding defensive--oriented NPEs can resist the drawbacks brought by most litigation-oriented NPEs to enterprises, bring protection to them, and enable enterprises to concentrate resources on innovation. But at the same time, we can see from the NPE profit logic that the membership fee of defensive NPE is not a small amount. Compared with the situation before the birth of litigation NPE, it is also an additional expense for enterprises. At the same time, because defensive NPE also needs to acquire a large number of patents and build a defensive patent pool, there is also the problem of the patent monopoly. For society, defensive NPEs have the same patent resources as litigation-oriented NPEs, and need to guard against sudden changes in their operational purposes and the possibility of becoming patent trolls.

# 6.SOLUTIONS FOR THE ADVERSE EFFECTS OF NPE

## *6.1 Solutions of other countries and areas*

In a mature IP environment, patent litigation is only one of the basic ways of NPE operation. For other operating methods such as patent licensing and patent transactions, the value of patent litigation also needs to be used as a reference basis in the value evaluation process (Jie, 2017). The immaturity of the intellectual property environment is the root cause of NPE speculation. To meet the challenges posed by NPE, some countries or regions have taken measures to safeguard their innovation and development. The following will list the measures of the United States, South Korea, Japan, French and the European Union, which are good references for China.

| US | South Korea | Japan | EU | French |
|---|---|---|---|---|
| 1. Clear the right holder has the right to apply for an injunction on standard patents<br>2. increase the difficulty to invalidate patents<br>3. clarify the choice of the place of action | 1. Government administrative ban<br>2. Judicial legislation<br>3. Establishing government-led NPEs<br>4. Establishing the insurance system | 1. Government administrative ban<br>2. Establishing IP Platform Fund | 1. Adjust the standard of issuing injunctions and clarify the obligations required of implementers<br>2. improve the transparency of standard-essential patents and enhance the predictability of the licensing environment for implementers<br>3. Regulating the licensing behavior of patent owners through the EU Court of Justice | 1. Establishing French sovereign patent fund |

### *6.2 suggestions for China*

In summary, the adverse effects of NPE can generally be dealt with at both the enterprise and national levels. Therefore, Chinese enterprises should have the awareness of preventing patent risks in the whole process of patent research and development.

| For Chinese enterprises | For government of China |
|---|---|
| 1. Monitor NPEs in the industry<br>2. Eliminate infringement risks by means of FTO[20] search<br>3. Compliance management to control the patent creation process of enterprises<br>4. Be cautious about the disclosure of information<br>5. Improve the enterprise intellectual property management system<br>6. Actively seek cooperation with NPEs | 1. Improve the regulation of monopolistic behavior<br>2. Make the substantive examination of patents more stringent<br>3. Increased burden of proof and disclosure obligations for plaintiffs<br>4. Increasing litigation costs for NPEs |

[20] Freedom To Operate, which refers to the investigation and research on whether the implementation of the technology may infringe the patent rights of others and violate other laws and regulations; FTO due diligence report is a legal opinion, which has certain legal effect.

## 7. INSPIRATION THAT CHINA CAN TAKE FROM NPE

China has been emphasizing the importance of innovation these years, with particular emphasis on the issue of patent conversion. However, the current patent conversion rate is low and the patent market is particularly inefficient. At a press conference, Shen Changyu, head of the State Intellectual Property Office of China, once said that there is a "dilemma" in patent conversion. On the one hand, the patents of many universities and research institutes are difficult to be discovered and applied; on the other hand, it is difficult for many small and medium-sized enterprises to obtain the required patented technologies (ZAOBAO, 2021). The business model of NPE not only brings challenges to the market, but this business model can also bring inspiration to the inefficiency of the patent market. In particular, the different services provided by the three different types of NPEs can be used as a reference for the problems of patent transfer and transformation in different fields in China.

### *7.1 Establish professional transformation service teams in laboratories of universities and research institutions*

At present, there are a large number of "sleeping patents" in Chinese universities and research institutions, and the problem of low patent conversion rate is very serious. According to the Survey and Research on the Status of Patent Transformation in Universities released in 2018, less than 5% of the scientific and technological achievements of university patents are really industrialized (CNIPA, 2018).

According to the 2017 China Patent Survey Report, the biggest obstacle to patent transfer and transformation in 54.1% of universities and research institutes is the "lack of professional teams for technology transfer", and this proportion has increased to 62.1% in 2018. Meanwhile, this option accounts for the largest share in this survey for four consecutive years from 2017 to 2020[21].

FIGURE 11: 2017-2020 The biggest obstacles to the transfer and transformation of patents in universities and research institution: insert here

In response to this current situation, the case of Standford OTL, a representative of research-oriented NPE, is a good reference for China. The Chinese government can

[21] After 2020, the options in this survey have changed.

encourage universities and research institutions to set up specialized patent service organizations based on the existing relevant organizations from the policy and financial aspects, and take the initiative to find transformation opportunities to match with enterprises in need, so as to improve the patent transformation rate and corresponding income of universities and research institutions.

### *7.2 Building patent service platforms*

At present, China's patent service institutions are mainly patent agents, and the development and application of patents are developing slowly, resulting in many patents being unable to function due to their independent existence. Therefore, the state should vigorously promote the construction of patent service institutions. On the one hand, the government can refer to the business model of NPE to set up a special patent operation service platform under the Intellectual Property Office to serve universities and enterprises and guide the circulation of the patent market. On the other hand, the government can introduce policies to encourage the establishment of various specialized patent service institutions in the market, especially by giving certain tax concessions to private capital to participate in the establishment of patent service institutions to broaden the channels of patent circulation. Moreover, the government can introduce relevant rules and regulations from the time of establishment to strictly control the behavior of patent service institutions, so as to kill "speculation" in the cradle while operating patents.

For a large number of patents of state-owned assets such as functional inventions, from the perspective of capital, we can follow the practice of Korean ID and promote the establishment of patent investment companies with state capital, which is conducive to the management of China's scientific and technological achievements on the one hand, and provides patent litigation support for enterprises on the other. Promote venture capital institutions to engage in patent investment, set up a sub-fund in the "Science and Technology Achievement Transformation Guidance Fund" specifically for patent transformation, attract private capital to participate in the establishment of patent service institutions, and improve the possibility of docking between patents and the market. (Wenbin, 2019)

### *7.3 Establish defense alliance/insurance system*

In the context of China's economic policy, which favors the development of technology-based industries, the increased emphasis on patents will lead to a higher risk of litigation. Therefore, the continuous improvement and development of the patent insurance system is particularly important to enable domestic high-tech enterprises to reduce patent litigation costs and compensation expenses when facing patent litigation. Patent insurance can be established with reference to the services provided by defensive NPEs or in cooperation with policy insurance companies.

The specific insurance model can be modelled on the "Mutual Aid Scheme" proposed by the UK Intellectual Property Office: SMEs with similar risks form a mutual organization and join together to deal with the risks they may suffer, with the members of the organization paying a premium equivalent to the level of risk they may suffer from their insured patents, and the government then allocates a certain amount of money to maintain the mutual aid organization. The government then allocates funds to maintain the operation of the mutual organization. When the members of the organization face patent litigation, the mutual organization will provide a certain amount of litigation expenses for the members to respond to the lawsuit, and the mutual organization can reinsurance the insurance premiums paid by the members, so as to ensure that the members receive sufficient financial support. The SME mutual model can show the leading function of the government while achieving professional operation target (Wenbin, 2019).

## 8. CONCLUSION

To sum up, all types of NPE patent operations-related businesses will objectively activate the Chinese patent trading market, which will help drive and encourage patent transformation and technological progress and promote the further improvement of China's intellectual property protection environment. There are certain benefits for innovation activities, so there is no need to panic too much about NPE entering the Chinese market. However, for the enterprise burden and social problems caused by NPE, the enterprise itself needs to pay attention to it and the state should avoid and prevent it from the legislative and administrative levels.

Research-oriented NPEs are mainly engaged in technology research and development and aim at innovation, which is generally beneficial to innovation; the speculative attributes of litigation-oriented NPEs lead to high overall costs to society when they realize the benefits of patent operations, which are more detrimental than beneficial to innovation; defensive-oriented NPEs, as a response to litigation-based NPEs, can provide protection to relevant enterprises to focus more on innovation activities.

The shortcomings about this dissertation mainly revolve around three aspects: firstly, there is a controversy about the classification method of NPE. At present, there is no clear classification method for the kinds of NPEs, and there has been a discussion about whether universities belong to NPEs. Secondly, due to the time of NPE entering China being too short, there are less relevant data. But now the Chinese government and related institutions have started to pay attention to NPE and started to investigate and collect data. Finally, it is difficult to define the motives of an NPE in actual cases. Therefore, future research can rely on the accumulated data support to confirm the impact of NPE on innovation.

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# PENDICES

*Annex 1: Comparison of the characteristics of patent litigation in China, the United States and Germany*

**Jurisdiction**

The protection of intellectual property rights is a major trend in China. It has changed significantly especially in the last two years, even to the extent of establishing special IP courts to govern patent litigation cases. In the U.S., the federal district court where the defendant is located or where the infringement occurred is responsible for hearing patent litigation; in Germany, the district courts set up IP trial courts, and most cases are concentrated in the three major district courts, such as Mannheim, Düsseldorf and Munich. Düsseldorf has more high-tech enterprises and is prone to technical disputes, so the court has more experience in handling them; Mannheim District Court has become a litigation hotspot due to the high success rate of the patentee; Munich itself is the seat of the European Patent Office (EPO), which has a unique advantage (Chinese national federation of industries, 2017).

Compared with the United States and Germany, where first instance patent cases are heard in district courts, most of the first instance patent cases in China are heard in intellectual property courts or intermediate courts, which shows that the courts hearing patent litigation in China are of a higher level and more professional. If we can break through the number of damages and add the critical factor of issuing the injunction, it is believed that more patent owners and NPEs will be attracted to litigation in China.

**Conditions of Prosecution**

Regarding the requirements for prosecution, China and Germany are similar and more precise than the United States. In the United States, it is necessary to point out the patent in question, the infringing product or act of the defendant, the factual basis of the alleged infringement of the defendant, etc. Moreover, the requirements of "whether to compare each technical feature" vary from one district court to another. In China, the following points must be confirmed: whether the owner of the patent in question is clear; whether the infringement is established; how to determine the amount of compensation based on

the establishment of infringement; and if a standard-essential patent is involved, whether the licensor meets the FRAND[22] obligation and other conditions. (CNFI, 2017)

**Evidence**

The evidentiary provisions in Chinese patent litigation are similar to those in Germany in that "he who claims shall prove" applies, and the process of proof in China is relatively simple compared to the evidence search procedure in the United States. For the patentee, the difficulty of proof in Chinese patent litigation lies in the evidence of damages, which explains many statutory damages cases in Chinese patent litigation. (CNFI, 2017)

**Trial speed**

The trial speed is arguably the biggest advantage of patent litigation in China. Compared to patent litigation in the U.S. and Germany, patent litigation in China takes very little time and is more efficient because of the time limit for review. In China's intellectual property courts, for example, the trial period for patent cases in Beijing, Shanghai and Guangzhou are 186 days, 196 days and 97 days respectively; in the United States, it takes an average of 2.5 years to reach the trial stage; in Germany, it takes an average of 0.75 to 1 year for the first trial, and usually 1 to 1.25 years for the appeal, and 1.5 to 4 years at the end of the trial in the Supreme Court, the speed of trial in the three countries shows a big difference. (CNFI, 2017)

**Remedies**

Although trial speed is relatively fast, compared to the United States and Germany, the amount of compensation in China is low, and the application of statutory damages accounts for an extremely high percentage of cases. Chinese patent litigation is also very strict about the application of injunctions, and only a few cases can obtain an injunction. However, as amended in 2021, the new patent law strengthens the protection of patent owners at the legislative level. The new Patent Law not only adjusts the statutory cap on damages for patent infringement from one million RMB to five million RMB, but also

[22] FRAND is the acronym for fair, reasonable and non-discriminatory. It generally arises in antitrust cases where an owner of intellectual property rights (IPR) refuses to grant a licence or refuses to grant a licence on FRAND terms. Source: https://www.fieldfisher.com/en/insights/what-is-frand

introduces a punitive damages system, which will have an incentive effect on patent infringement litigation. (CNFI, 2017)

*Annex 2: Three patent litigation methods of IV*

1. Backdoor litigation. The New York Times reported that IV hid behind more than 1,100 shell companies and threatened patent lawsuits. A typical case of IV litigating through these shell companies is Oasis Research v. Adrive. In 2007, IV purchased 6 inventions from inventor Crawford, on July 30, 2010 IV sold these patents to Oasis Research, which was only 12 days old, and a month later Oasis Research acquired Crawford's patent and a July 2010 The authorized patent initiated a patent lawsuit against 18 service providers such as ADRIVE and AT&T whose business involves cloud computing, namely the case of Oasis Research v. Adrive. Ostensibly IV was not involved in the lawsuit but is believed to be the manipulator behind the Oasis study. "Backdoor lawsuits" have been criticized more severely for being highly concealed, which is one of the very few intentions the public knew about IV patent litigation information until December 2010. As in the case above, prior to that IV In the case of patent mergers and acquisitions or initiating lawsuits, they are all carried out through shell companies. *The giants among us* (Feldman& Ewing, 2012) pointed out that IV has implemented more than 954 patent transactions and initiated a large number of lawsuits through shell companies.

2. Direct litigation. Since 2010, IV has started to initiate lawsuits "in person", and the targets of the lawsuits are all well-known companies. The company claims in the lawsuit that it purchased substantial assets and paid "hundreds of millions of dollars" to individual inventors for the patents in question, while the company earned billions of dollars from licensing businesses to use the patents. At the end of 2010, IV initiated infringement lawsuits against 9 companies on the 4 patents it owned; in July 2011, IV again initiated infringement lawsuits on the 5 patents it held, this time with a stronger lineup of defendants, including 12 international well-known companies; in October 2011, IV filed another lawsuit against Motorola for 6 patent infringements. Most famously, in February of this year, Symantec's court results came out, Intellectual Ventures won the case, and

Symantec had to pay about $17 million in infringement damages, casting a shocking bullet for the software world

3. Threat of lawsuit. IV had threatened to launch patent lawsuits against companies including BlackBerry maker RIM, Samsung and HTC, which were forced to reach patent licensing with IV considering the financial loss and reputational damage of the legal disputes. protocol. IVs get high financial returns from patent licensing agreements, but IVs generally refrain from talking about the revenue they get for doing so, and the companies involved have declined to comment on the agreements, making it difficult to get exact figures.

*Annex 3: Solutions for adverse effects for NPEs of other countries and areas*

*1. US*

In addition to the U.S. administrative investigations and congressional legislation against NPE mentioned in the previous section on the trend of NPE, the United States, in its continuous practice, has adjusted the patent litigation environment through legislative and judicial aspects to further clarify the scope of application of laws and regulations.

First of all, it is clear that the right holder has the right to apply for an injunction on standard patents. For example, the *POLICY STATEMENT ON REMEDIES FOR STANDARDS-ESSENTIAL* (USPTO& et al., 2019) issued jointly by the USPTO[23], the NIST[24] and DOJ[25] and the business evaluation letter of IEEE[26] intellectual property policy (DOJ, 2020) modified by the Department of Justice believes that applying for injunctive relief is an exclusive right granted by the law to the right holder, and this right will not be deprived after the patent is included in the standard.

Secondly, increase the difficulty to invalidate patents. The Supreme Court adjusted the criteria for determining patentability in the Berkheimer case decided in February 2018. (JUSTIA, 2018) It is more difficult for the accused infringer to use Article 101 of the Patent Law to invalidate NPE patents. The invalidity examination standards of the Trademark Office have also been adjusted accordingly.

[23] United States Patent and Trademark Office
[24] National Institute of Standards and Technology
[25] Department of Justice, Antitrust Division
[26] Institute of Electrical and Electronics Engineers

Thirdly, clarify the choice of the place of action. In February 2020, the U.S. Federal Circuit overturned a 2018 decision by the Eastern District of Texas[27] that denied an ISP's data center as a regular place of business, a decision that further scrutinized the choice of place of action in the TC Heartland case, which narrows the choice of venue for NPEs. (TC Heartland LLC v. Kraft Foods Grp. Brands LLC, 2017)

*2. Korea*

In order to avoid the impact of foreign NPE on domestic enterprises, the Korean government has made attempts in various aspects such as administration, legislation, and enterprise service and guidance. (Shijie, 2012)

1) Government administrative ban

Since intellectual ventures has purchased patents in many Korean universities, the Korean government and enterprises are deeply threatened. The government has issued documents to prohibit Korean university laboratories, research institutions and enterprises from selling intellectual property rights to IV and other patent investment companies. In 2009, the Korean Patent Abuse Prevention Forum announced the "Outline for the Prevention of Patent Abuse", which can be regarded as a legal constraint on the corporate code of conduct and is of great significance. South Korean news reports pointed out that this outline regulates the conditions for abuse of patent rights and the scope of claims for damages. For example, it is forbidden to use part of the patent right to claim compensation for the overall loss, and only the loss of the patent right infringement can be claimed; when an unlicensed patent is infringed, only the compensation equivalent to the patent licensing fee can be claimed.

2) Judicial legislation

In order to promote the transformation of patents, the Korean government plans to formulate the Basic Law of Intellectual Property and set up a National Intellectual Property Committee. The proportion of technology transfer and commercialization budget in the national R&D budget will be increased from 0.7% to 3% in 2013. While regulating the transfer process of patents from universities and research institutions, the

[27] The Eastern District of Texas was the favored venue of NPEs prior to the Supreme Court's decision in TC Heartland. In 2020, it took third place for overall and NPE litigation, in fifth place for operating company litigation. (https://www.rpxcorp.com/data-byte/west-texas-was-the-top-patent-venue-in-2020-as-judge-albright-sparred-with-the-federal-circuit/)

government also creates conditions for them to enforce their patents. In 2007, South Korea revised the "Korea Industrial Education Promotion and Industry-University Cooperation Promotion Act" to allow universities and scientific research institutions to set up technology-holding companies responsible for the commercialization of patents.

3) Establish government-led NPEs

In 2009, the Presidential Council on National Competitiveness and 13 government departments jointly developed the Strategy for Realizing a Strong Intellectual Property Nation. Under the strategy, the Korean government established a 20 billion won scale "Creative Capital" to explore the purchase of patents developed by Korean university laboratories, research institutes and companies, and to protect Korean companies from patent and licensing fee disputes with foreign companies.

In 2010, the first patent investment company Intellectual Discovery (ID) was established. ID is funded and established by the Korean government and is jointly managed by the government and enterprises. ID serves national research institutions and enterprises, services including R&D, patent licensing, patent pool building, etc. More often, it undertakes patent management and patent protection functions on behalf of the government, including defending against external NPEs through patent pools and providing financial support for the technology R&D of SMEs. ID not only competes with litigation-oriented NPEs such as IV in patent ownership but also becomes an opponent in patent litigation (Zheng et al., 2018).

4) Establishing the insurance system

In response to patent infringement lawsuits by foreign NPEs against domestic enterprises, in 2010, the KIPO began to evaluate the possibility of providing IP litigation assistance insurance for SMEs and has been working with several insurance companies to develop IP litigation insurance products and provide partial support for insurance premiums to SMEs. It has also established an early warning system for patent disputes, provided "one-stop" support services, and provided enterprises with pre-investigation services for patent dispute risks to reduce the incidence of patent disputes.

*3. Japan*

Japan's approach is similar to that of the Korean government. After noticing the threat of NPEs to the country's development, the government adopted corresponding restrictive measures, requiring relevant research institutes and enterprises not to sell technology and ideas to relevant NPEs, and at the same time, established an operating fund to provide an official operating platform for patent enforcement entities. For example, in August 2010, the Life Science IP Platform Fund, Japan's first patent fund, was established by the Japan Innovation Network Corporation (JINCO), mainly based on the "Law on Special Measures for Industrial Promotion and Innovation". "It is not for profit, but is similar to a public welfare organization, and serves as a means for the government to regulate the patent market, with the foundation bearing the R&D costs and patent maintenance costs and focusing on the biotechnology field. (Lan, 2020)

*4. EU*

The EU has attached importance to rule guidance in recent years and actively promoted the process of referee integration. Several measures have been taken:

- Firstly, adjust the standard of issuing injunctions and clarify the obligations required of implementers. In the 2020 Sisvel v. Haier case and the Nokia v. Daimler case, the German court held that the patentee of a standard-essential patent has the obligation to issue a notice of infringement to the implementer of the standard, and the implementer of the standard needs to clearly express its willingness to license FRAND when it receives a notice of infringement and cannot attach preconditions for FRAND licensing, this standard is similar to the Orange-Book-Standard[28].
- Secondly, to improve the transparency of standard-essential patents and enhance the predictability of the licensing environment for implementers. The Intellectual property action plan announced by the EU on November 25th, 2020, clearly indicates that it hopes to establish a mechanism for sharing information on standard-essential patents, and use artificial intelligence, big data and other

[28] Orange-Book-Standard (Az. KZR 39/06) is a decision issued on May 6, 2009 by the Federal Court of Justice of Germany on the interaction between patent law and technical standards, and more generally between intellectual property law and competition law.

technologies to establish a data platform to enhance the sharing of information related to the licensing of standard-essential patents (EU, 2020).

- Thirdly, regulating the licensing behavior of patent owners through the EU Court of Justice. In November 2020, the German District Court of Düsseldorf wanted the EU Court of Justice to clarify the key issues involved in the Nokia v. Daimler case (Nokia v. Daimler, 2020).

In practice, however, the European approach to NPE litigation activity is somewhat more tempered than in the US, with the German courts, for example, making clear that they see no reason to treat NPEs differently from other patent owners (Contreras& Picht, 2018).

*5. France*

The French government and banks jointly set up a sovereign patent fund focusing on the operation of patents to help enterprises transform their innovations and patent operations and reduce the opportunities for NPE speculation.

The French sovereign patent fund has been established, and the government and state-owned banks have invested in two phases. The French sovereign patent fund focuses on the operation of patents, explores the value of patents, and realizes the value of innovation and then reacts to innovation itself. Since there are many individuals and enterprises in France who are engaged in inventions, there is an urgent need for innovation to be transformed, and it is only when the inventions yield benefits that innovation can be sustained, which is the original purpose of the sovereign patent fund. In practice, a professional management and operation team has been set up, with experts from the intellectual property departments of well-known companies with extensive experience, as well as a reasonable profit-sharing system and a risk-bearing principle, with the Foundation assuming the main operational risks without the developers having to bear them. In the field of technology, the foundation is also constantly developing new areas.

*Annex 4:Suggestions for China of solutions for the adverse effects of NPE*

*6.2.1 suggestions for Chinese enterprises*

1) Monitor NPEs in the industry

Enterprises should search for NPEs relevant to the industry and monitor their behavior. The intellectual property management department of the enterprise can implement the filing system and early warning management for these NPEs. Pay close attention to the hotspots of lawsuits initiated by NPEs in the industry and the trend of patent transactions, conduct targeted analysis of the patent pools of NPEs, and especially do a good job of patent early warning for the main business. At the same time, enterprises in the same industry can set up an early warning platform to timely disclose and share relevant information of NPEs in the industry. The form of the industry early warning alliance will effectively improve the ability of individual enterprises to resist NPE lawsuits (Liyong, 2020).

2) Eliminate infringement risks by means of FTO[29] search

For enterprises, FTO search should be carried out before technology project approval, R&D and commercial application, in order to achieve the purpose of discovering patent walls and identifying infringement risks. In order to ensure the comprehensiveness of the search, on the one hand, it is necessary to ensure the diversity of search tools. Different retrieval tools have different advantages and disadvantages in terms of database retrieval functions. Repeated retrieval of multiple retrieval tools can maximize the possibility of checking for deficiencies and filling omissions. On the other hand, it is better to use multiple searchers for a unified search case. Due to the unavoidable subjectivity and different knowledge backgrounds, different searchers have different understandings of technology and search strategies. Back-to-back search by multiple people can minimize the impact of results. For the part of the search results that has the risk of infringement, the enterprise can avoid or eliminate it by evading design, patent licensing, or filing patent invalidation lawsuits (Liyong, 2020).

3) Compliance management to control the patent creation process of enterprises

[29] Freedom To Operate, which refers to the investigation and research on whether the implementation of the technology may infringe the patent rights of others and violate other laws and regulations; FTO due diligence report is a legal opinion, which has certain legal effect.

When the company conducts research and development of patent achievements, it strictly controls the quality and quantity of scientific research team personnel, and strictly enforces contract guarantee terms to reduce the possibility of leaks. Moreover, since China adopts the principle of first-to-file for patent granting, in addition to actively conducting valuable technological research and development, enterprises should also apply for patent protection for the research results obtained by the enterprise in a timely manner. For those research results that are not implemented but do not want to be mastered by competitors or obtained by NPEs and may pose a threat to the enterprise, enterprises can purposefully implement the strategy of disclosing research results. motivation to eliminate future hidden dangers (Hong & Miaotian, 2020).

4) Be cautious about the disclosure of information

When disclosing information such as press conferences and promotion meetings, in addition to paying attention to compliance and information review, the principle of minimization of necessity should be adhered to, and detailed information on products and technologies should be avoided. Irregular, unaudited disclosures can become litigious ammunition for NPEs (Liyong, 2020).

In view of the litigation characteristics of NPE, product information should be disclosed more cautiously at trade fairs, company websites and other occasions, and in particular, exaggerated representations of technical characteristics should be avoided in order to promote technical effects. Due to the technical solutions alleged by NPE are usually directly observable or necessary to standardize, there is no need to notarize the purchase of samples and conduct a lot of technical comparisons. Therefore, enterprises should be careful not to expose too much or inappropriate information about patented products in various materials.

5) Improve the enterprise intellectual property management system

Enterprises troubled by NPE should establish a special intellectual property department, integrate intellectual property strategy into the overall strategy of the enterprise, strictly control the quality of patents, and create patent barriers. Enterprises should start looking for compound talents who are not only well versed in patent policies and legal provisions, but also can accurately grasp the direction of technological development and be proficient in business strategies. They should also establish and

improve the intellectual property department and carry out effective intellectual property management (Yongshun& Lijuan, 2013). When applying for a patent, it is necessary to have professionals to strictly examine the patent application and claims, and require clear patent terms and clear scope of rights to prevent loopholes in application documents from being exploited by NPE (Xuezhong, 2013).

6) Actively seek cooperation with NPEs

The cooperation between NPEs and enterprises is nothing new. The Great Recession of 2008 appears to have been the catalyst for a large number of patents sold by operating companies to NPEs, according to the RPX Insight report (RPX, 2021). Looking back at that period, some operating companies sold their patent assets to NPEs due to financial distress. One season for enterprises sold their patents to NPE is to find new sources of income; another reason is that some projects have closed their product lines due to the shrinking market and maintaining product-related patent rights requires a lot of costs. These two reasons have contributed to the mode of cooperation between enterprises and NPEs (Shulian, 2021).

Enterprises can consider actively cooperating with defensive NPEs and other NPEs with patent operation business and use NPEs to realize the operation and protection of patent achievements. China's emphasis on intellectual property operation is relatively late. Enterprises with low level of intellectual property operation and inexperience make it difficult to make accurate and forward-looking judgments on the benefits of intellectual property achievements, and they also lack technical confidence. NPE has a team of top intellectual property experts who can cooperate with enterprises through acquisitions, obtaining patent licenses, funding patent R&D or direct research and development of patents, etc., to obtain patent rights or patent portfolios, and then help enterprises to quickly match patent holders and potential customers, promote enterprise technology diffusion and business transformation. And as mentioned above, defensive NPE can provide a series of help when companies encounter NPE lawsuits.

### *6.2.2 suggestions for the Chinese government*

Compared with the actions of enterprises, actions at the national level not only show the attitude towards NPE, but also their measures are more influential. The improvement of national laws and regulations plays a vital role in the maturity of the intellectual

property environment and the elimination of the negative impact of NPE. At present, China's legal system does not clearly define NPE, nor does it limit its behavior. Therefore, from the legal level, some practitioners, experts and scholars in related fields, combined with the experience of other countries, summarize the following suggestions:

1) Improve the regulation of monopolistic behavior

Article 48 of the Patent Law on the regulation of monopoly behavior is too general. In addition, the Anti-Monopoly Law regulates the abuse of patent rights, and the Civil Procedure Law regulates collusive litigation (malicious litigation). It is recommended that relevant departments further improve the system and conduct reasonable regulations on NPE's behavior. At the same time, attention should also be paid to distinguishing between normal intellectual property operations and "speculative NPE" (Jingqiu, 2020).

2) Make the substantive examination of patents more stringent

At present, the Intellectual Property Office of China does not pay enough attention to the feasibility of examining patented technologies and insufficient disclosure of technical content when conducting the substantive examination of patents. A more rigorous substantive examination will not only provide evidence for correcting NPE malicious litigation and resist indiscriminate litigation, but also help improve patent quality (Chenhe, 2018).

3) Increased burden of proof and disclosure obligations for plaintiffs

The US "Innovation Act" requires patent holders to disclose the parties who actually benefited from the lawsuit (called "truly interested parties") when suing. For subjects with economic interests in patents, such as the original patentee, information disclosure improves the transparency of patent ownership and can effectively prevent NPE from using speculative subsidiaries to initiate a large number of patent lawsuits (Xikai, 2014).

4) Increasing litigation costs for NPEs

For NPEs who abuse their right to sue, the excessive litigation burden will dispel their speculation, thereby effectively preventing the abuse of patent rights (Jiming, 2014). For specific clauses, please refer to the "Expense Bearing and Transfer Clause" stipulated in Part 3 of the Innovation Act of the United States, which expands the scope of the subject and object of joint liability. If the plaintiff refuses to execute the judgment, the court can

also decide that the plaintiff should be paid by the relevant subject with close interests, such as its parent company or other interested parties, according to the defendant's request. the original patentee.

The Supreme People's Court of China stated in 2021 that the People's Court will support the defendant's request for compensation for reasonable expenses such as attorney's fees, transportation costs, accommodation and food costs paid by the defendant in an IPR infringement lawsuit if the defendant submits evidence to prove that the plaintiff's lawsuit constitutes an abuse of rights and damages its legitimate rights and interests as provided by law (Ping, 2020).

From the perspective of administration and government services, combined with the experience of other countries, the Chinese government can consider:

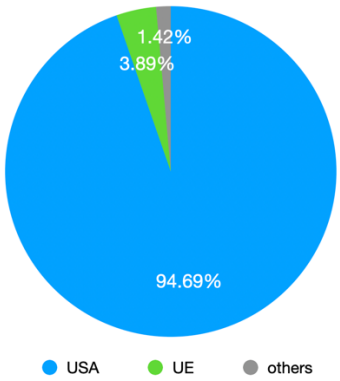
1) Establish a public operating fund or platform

2) Establish a patent insurance mechanism

3) Build a comprehensive link platform for building litigation information and patent information

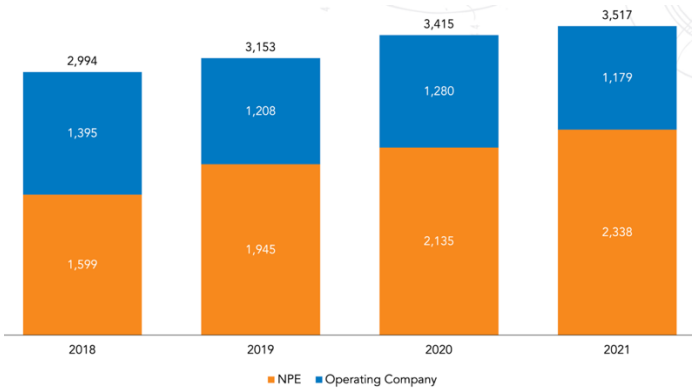
The details of the implementation will be discussed in chapter 7.

Figure& Table



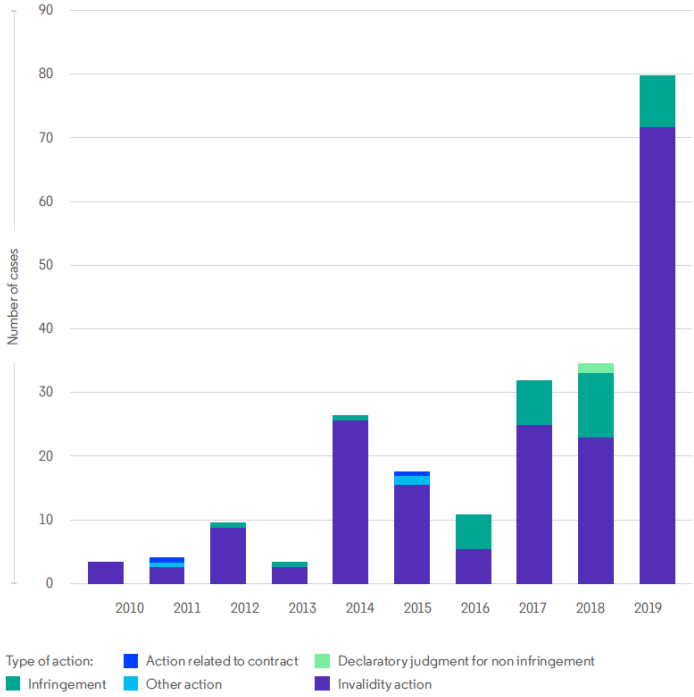

Source: CAICT

FIGURE 1– Global distribution of lawsuits with NPE plaintiffs




Source: RPX

FIGURE 2– Defendants Added to Litigation Campaigns by Year




**Source:** Darts-ip

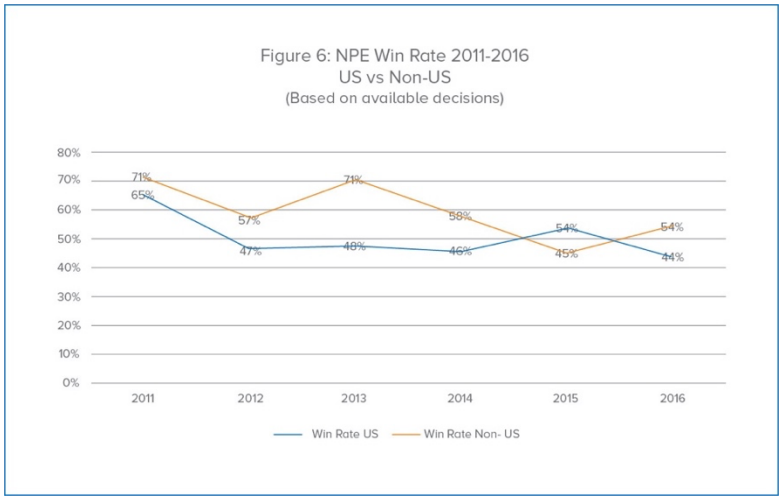
FIGURE 3- Evolution of NPE litigation and types of action breakdown over the last decade

TABLE I- TOP 10 IPC CLASSIFICATIONS OF LITIGATED PATENTS

| IPC | | Technical fields | Cases |
|---|---|---|---|
| 1 | H04W | wireless communication networks | 104 |
| 2 | H04L | transmission of digital information, e.g. telegraphic communication | 84 |
| 3 | H04B | transmission | 60 |
| 4 | H04Q | selecting | 27 |
| 5 | H03M | coding, decoding or code conversion, in general | 26 |
| 6 | H04J | multiplex communication | 25 |
| 7 | H01Q | antennas, e.g. radio aerials | 21 |
| 8 | H03H | impedance networks, e.g. resonant circuits; resonators | 16 |
| | G10L | speech analysis or synthesis; speech recognition; speech or voice processing; speech or audio coding or decoding | 16 |
| 9 | G01L | measuring force, stress, torque, work, mechanical power, mechanical efficiency, or fluid pressure | 14 |
| 10 | H04M | telephonic communication | 10 |

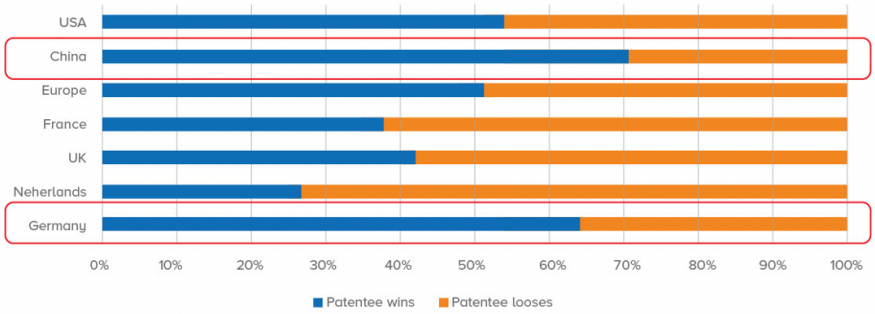
The patents include both NPEs and non-NPEs (For example, NPEs that filed an invalidity action against non-NPEs.)

**Source:** Darts-ip



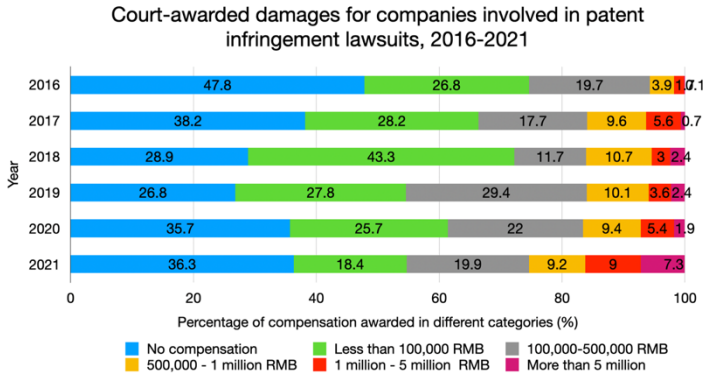

Source: Darts-ip

FIGURE 4- NPE Win Rate 2011-2016 US vs. Non-US: insert here



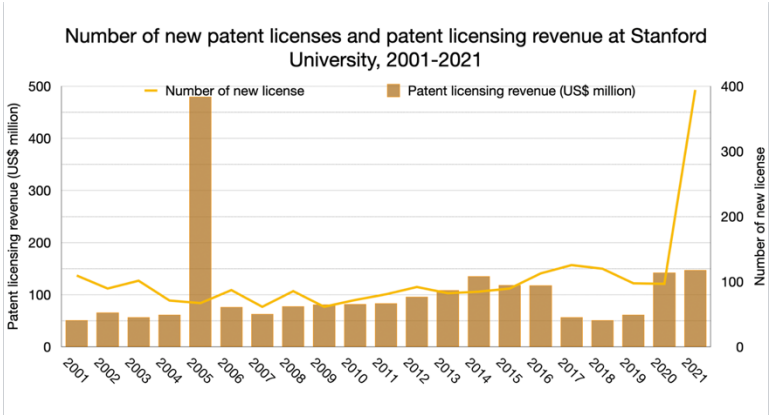

Source: Darts-ip

FIGURE 5- Patent win rate in the infringement action




Source: CNIPA-IPDRC

FIGURE 6- Court-awarded damages for companies involved in patent infringement lawsuits, 2016-2021




Source: Stanford OTL annual report

FIGURE 7- Number of new patent licenses and patent licensing revenue at Stanford University, 2001-2021

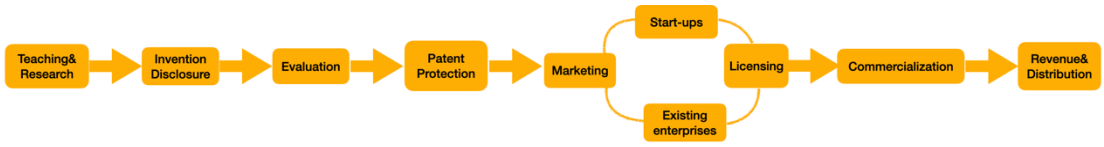
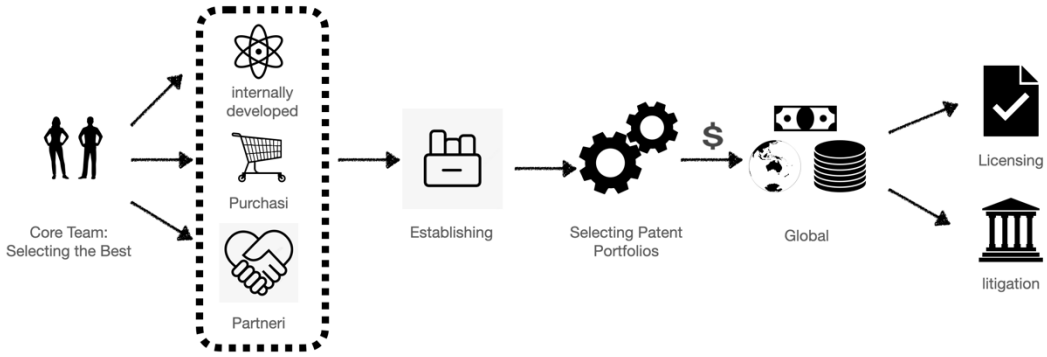
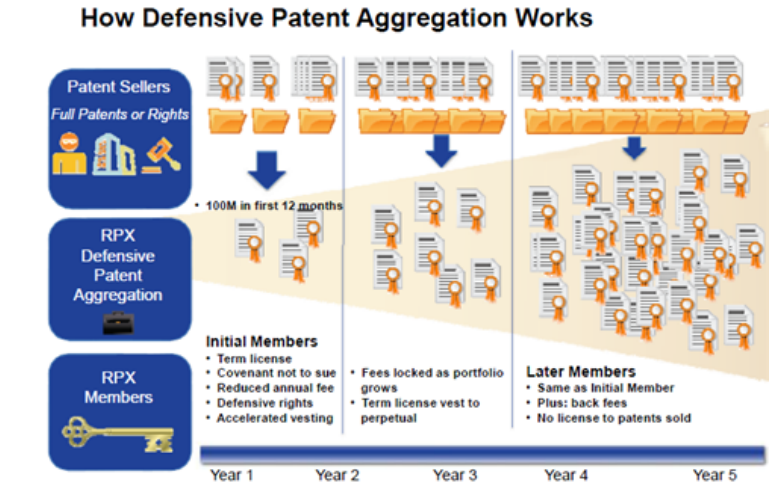


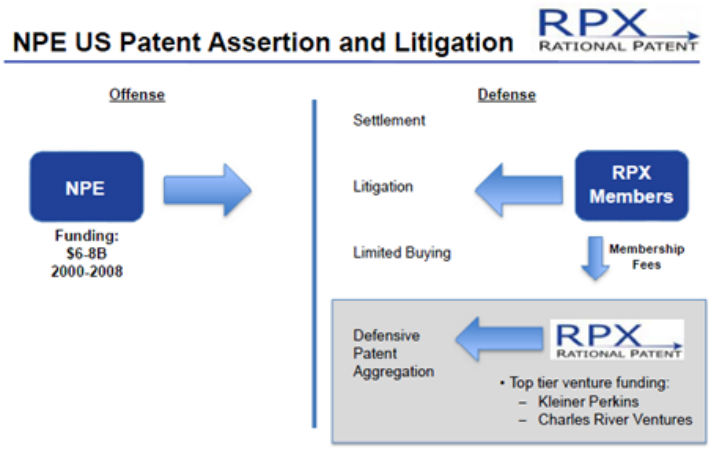

FIGURE 8- Workflow of Stanford University OTL




Source: Research Report on the Analysis of Patent Utilization in China

FIGURE 9- Workflow of litigation-oriented NPEs




Source: https://www.zdnet.com/article/rpx-can-it-defend-against-patent-trolls/

FIGURE 10- Workflow of RPX (Defensive-NPEs)

| | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| Lack of professional teams for technology transfer | 54.1 | 62.1 | 52.8 | 56.7 |
| Low level of technology of patent | 24.7 | 31.8 | 46.7 | 41.3 |
| Lack of motivation of inventors (faculty or staff) | 16.6 | 13.5 | 17.8 | 23.2 |
| Lack of motivation of patent management personnel | 4.8 | 3.1 | 4.3 | 3.3 |
| Insufficient financial support for industrialization of patent technology | 47.1 | 28.2 | 35.3 | 32.6 |
| Lack of patent revenue distribution mechanism | 19.6 | 15.8 | 12.9 | 12.5 |
| Others | 2.7 | 4.4 | 2.1 | 1.5 |

*This survey is multiple choice and the percentages add up to more than 100%.

Source: 2017-2020 China Patent Survey Report

FIGURE 11: 2017-2020 The biggest obstacles to the transfer and transformation of patents in universities and research institutions