

Legal Protection for Semiconductor Intellectual Property (IP)

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Abstract - Considering the value of semiconductor IP (Intellectual Property), fundamental knowledge of legal protection for IP is essential requirement for both IP providers and IP users. Since IPs are recognized as one of the intangible assets, present intellectual property system, such as patent, copyright, trade secret, and mask work protection system should provide certain legal protection by their own aspects.

This article describes how to protect IP effectively by each present intellectual property system and contributes to realize the smooth IP trade based on suitable legal protection.

I. Introduction

As a consequence of strong impact by semiconductor Intellectual Property (IP), IP is recognized as a driving force to accelerate a new semiconductor world [1]. In fact, it will be impossible to design a large scale IC without using certain volume of IPs. As a result, IP business is becoming more common and required to be smooth and legally stable trade. However, legal protection for IP is not simple issue, because there is not a specific rule to protect IP directly at the present. Although several present intellectual property systems could provide partial legal protection for IP, it is not sufficient to provide full coverage legal protection by a just single law. Therefore, it is very important to understand the characteristics of each intellectual property system and how to use these systems to achieve the sufficient legal protection.

II. Copyright

Most handily legal protection for IP might be a copyright (Fig.1). In brief, copyright could provide legal protection if someone makes the identical object from the original. From another aspect, it is out of range for protection if someone makes the identical object without recognition of original. It will be generated copyright when original work has done. Neither registration nor examination is required. Although it seems to be reasonable legal protection, there are some issues that IP should be concerned.

First, it is not make sure whether IP is the object of copyright law from the legal statement. Copyright law only can apply for the specific original work, such as music, play, program, etc, which are listed in the copyright law. Even if IP is recognized as the creative product, it is necessary for IP to be interpreted as one the classified category that can be protected by copyright law. Still under the argument for the

suitable category, it is agreement that IP should be the object of copyright law. Japanese copyright law might classify IP at language work, (Japanese Copyright Law, article 10, clause 9, no.10) [2].

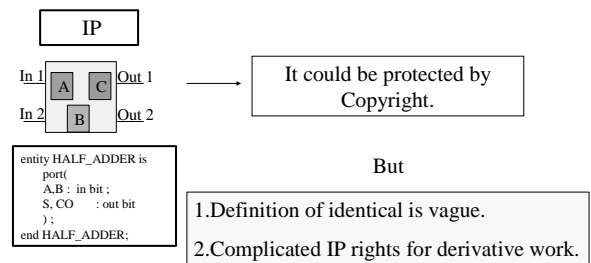


Fig.1 Copyright (1)

Second, it is hard to define the “identical”, which is crucial concept for copyright interpretation. In fact, IP is usually modified by users to adjust the required system. It is very important to decide what level of additional work is allowed as “identical”. If definition of identical is vague, it might cause confusion for IP businesses.

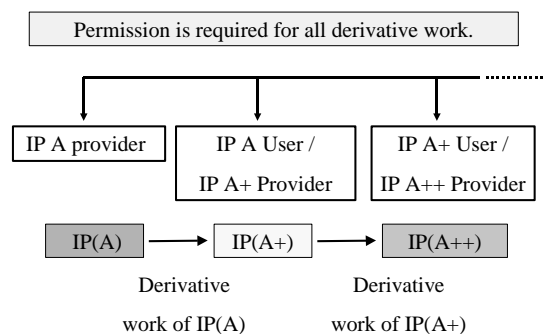


Fig.2 Copyright (2)

Third, derivative work is complicated issues for copyright (Fig.2). SoC makers require a variety of IPs to realize a large scaled system. It means SoC makers should be obtained permission from each IP providers, who are not always

original creators. Sometimes, IP is provided as a derivative work by third parties. As a result, SoC makers should pay attention to not only original IP providers but also the third parties that distribute a derivative work of original IP. It is obvious that SoC makers are getting into troubles for managing many legal rights and cause to inefficient paper works, although the purpose of IP is to improve productivity. As a result, copyright is easy to achieve and easy to get into legal trouble.

Fourth, fair use is the sensitive issues for copyright infringement. Fair use is a right to use copyrighted material for limited purposes and without the consent of the author. As long as purpose is noncommercial, educational, scientific, or historical, it could be recognized as fair use. It might cause the trouble when technology transfer would happen from the academic organization to the commercial businesses. Therefore, careful consideration for future possibility of transfer technology is necessary, when you decide to use someone's copyrighted IP in your research.

III. Trade Secret

Trade secret is another way to protect IP. A trade secret is defined as any formula, pattern, device, and compilation of information, which is treated with confidentiality. In Japan, the Unfair Competition Prevention Law protects trade secret. It prohibits the misappropriation of trade secret. Misappropriation is the improper acquisition of a trade secret by a person who knows that trade secret was obtained by improper ways, or use of a trade secret without consent. In order to protect IP as a trade secret, there are three fundamental requirements. These requirements are useful data, secret management, and non-publicity.

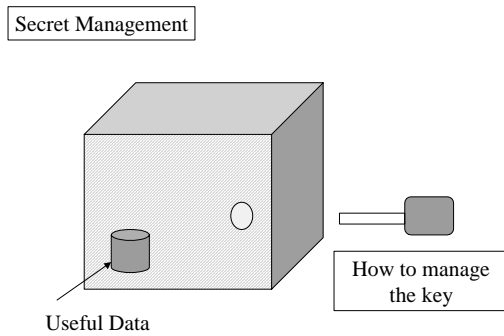


Fig.3 Trade Secret (1)

Because IP is no doubt to be valuable information, it is easy to meet the first requirement as useful data

For secret management, it is similar case that how to manage the key for the safety box (Fig.3). If data is stored in the stand-alone machine, it is easy to manage. On the contrary, is it will become difficult to satisfy this requirement due to the present working circumstance, which is networking and sharing design work. Under these working circumstances, it will be easy to access from the outside of

office; therefore, security of network and restricted access authorization for IP is crucial requirement to meet secret management. Finally, non-publicity is another hard requirement, considering the inherence of IP business. If IP providers sell their product to the users, IP providers should disclose the information of IP to the users.

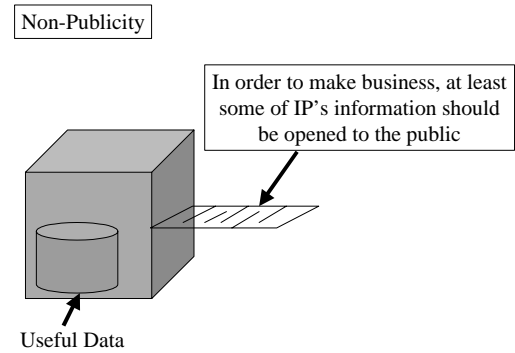


Fig.4 Trade Secret (2)

At this point, it is very important which information could be disclosed and which information could not. Unless this rule is unclear, it is getting trouble for non-publicity. One of the way to maintain the non-publicity, it will be good way to make non-disclosure agreement contract to prevent information publicity, just like technology licensing case. Considering the practical business, some of technical information disclosure is inevitable process for IP providers, however, it will be also risky that losing a chance to protect IP as a trade secret (Fig.4) [3].

IV. Patent

Indeed, the technically creative idea of IP could be protected as a patent if there are satisfied the following

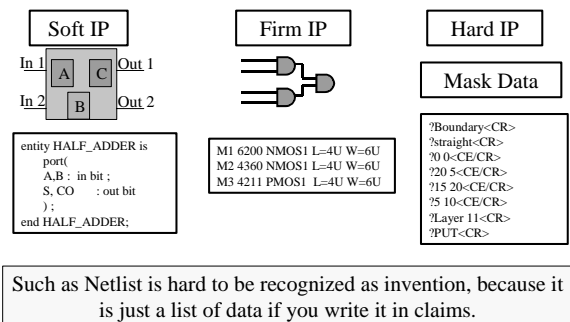


Fig.5 Patent (1)

requirements, such as novelty, inventive step, and proper description. Technical idea must be the newest one in the world to satisfy the novelty. Invention requires the certain

inventive step from the prior art level. Proper description is required to reexamine the invention by followers.,

However, patent system is aimed to protect the creative idea, not expression, it is important to understand how patent can provide legal protection of IP.

First, design data itself, such as a net list, could not be granted as patent, since it is the list of data, not an invention. (Fig.5)

Second, it is not match the level of technology and level of patent coverage. In other words, highest advanced level of technology is not always the profitable patent.

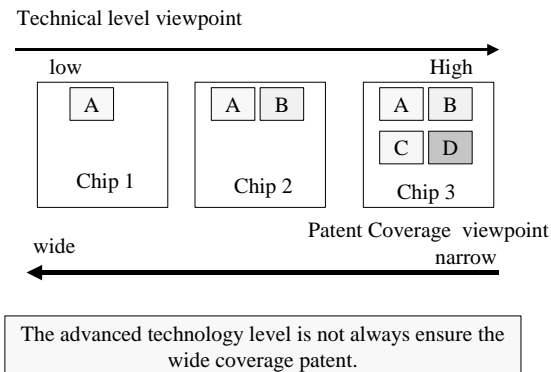


Fig.6 Patent (2)

Fig.6 shows the sample case. From the technical viewpoint, Chip 3 is more advanced technology because of four IPs are implemented in a single chip. However, from the patent view, if patent coverage for only Chip3 technology is not attractive. If IP A is unique, try to obtain Chip 1 technology claim, such as claimed “semiconductor chip including IP A”. It is much profitable patent than that of claimed for chip 3 technology.

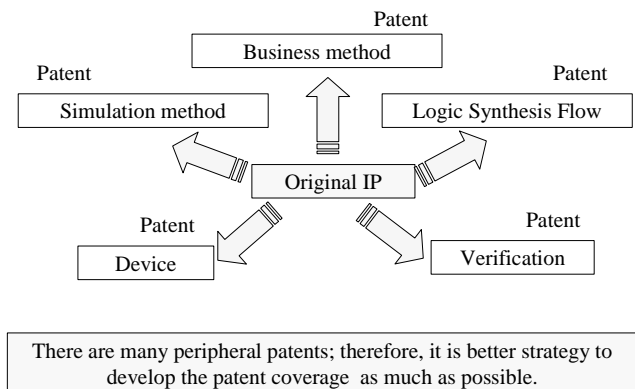


Fig.7 Patent (3)

Third, it is important attitude to develop IP related invention as much as possible, since IP is the element, not a system (Fig.7). Additionally, IP is large influence power not only for product, but also for a variety of systems. For example, IP could be essential element for EDA tool, verification system, as well as embodiment chip. In a sense,

it is much chance to obtain the patent at peripheral area, considering technical function of IP.

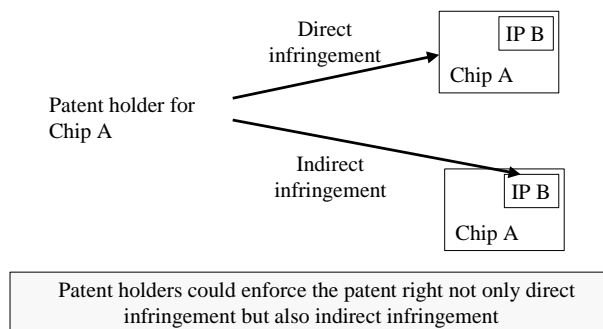


Fig.8 Patent (4)

Fourth, it is careful attention for patent infringement, for both IP providers and IP users. Especially, indirect infringement could happen, because IP is the element. For patent infringement, there are two types, direct infringement and indirect infringement. Direct infringement is the case that someone make chip A, but patent for chip A is hold by another patent holder. In order to prevent direct patent infringement, checking the granted patent is the best way, just like other product. On the other hand, indirect patent infringement is the more complicated case. Since IP is a part, it could happen in IP related business. Indirect infringement is recognized as supporters for direct infringement. Assume that chip A makers have been already patent infringement. If IP B provider know this situation, still continue to provide IP B, which is essential element for chip A, then, IP B provide is defined as an indirect infringement (Fig.8).

TABLE I
Indirect Infringement (Japan)

Country	Japan (Before Sept.1, 2002)		Japan (After Sept.1, 2002)	
	Objective	Subjective	Objective	Subjective
Requirement	Articles to be used exclusively for the manufacturer	None	Primary article for invention	Recognition of the article is patent infringement
Specific Use				
Neutral Use	Tort may apply			Excluding the common article in Japan; Tort may apply
Common Use				

As one of the embodiment of pro-patent policy, the enforcement of indirect infringement has just strengthened in September 1, 2002 in Japan (Japanese Patent Law, article 101).

There are two requirements for indirect infringement. One of them is the objective requirement, and the other is subjective requirement. For objective requirements, there are three kinds of categories. First one is “exclusive use” case. If parts will be designed for only specific user, they will be

categorized in “exclusive case”. Hard IPs, which are designed for specific makers, might be the “exclusive case”. Second one is the “common use”. If parts can be used by anybody, they will be categorized in “common case”. Soft IP, which is the source of the design and able to be used by any users, might be the “common case”. Finally, neutral case is defined as between the “exclusive case” and “common case”. Firm IPs might be the suitable example.

TABLE II
Indirect Infringement (Germany, U.S.)

Country	Germany		U.S.	
Requirement	Objective	Subjective	Objective	Subjective
Specific Use	Essential articles for invention, and apply for invention exclusively	Willful for infringement	Primary article for invention, and articles to be used exclusively for the manufacture of the product	Willful for infringement
Neutral Use	Essential articles for invention, and apply for invention non-exclusively (could be used others)	Willful for infringement	Primary article for invention, and articles to be used non-exclusively for the manufacture of the product	Active inducement
Common Use	Provided as common articles	Active inducement	Provided as common articles	Active inducement

Before amendment in Japan, indirect infringement required as exclusive use only and no subjective requirement. After the amendment in 2002, objective requirement is not limited for exclusive use, but added subjective requirement. Practically, subjective requirement means for recognition of the patent infringement.

Especially, this modification of rule is crucial impact for IP providers. Since IP is aimed to design for a variety of users, not only specific uses, IP could be object for indirect infringement. Once if IP provider is noticed that IP user makes patent infringement product, IP provider could be charged for indirect infringement, even if IP provider is not willful to support IP users. In Fig.8 case, IP B provider could be charged as an indirect infringement, if IP B provider is noticed that Chip A maker is patent infringement. Comparing other countries, each country defined as an indirect patent infringement. For example, Germany tends to classify more detail objective requirement, on the other hand, subjective requirement are treated more seriously in the U.S.

Fifth, the patent search is becoming very important process for the patent application. The purpose of the search is to try to decide whether the invention is novel or not. If determination is made to file the application, this search result could be used as the background of the invention. Patent search was recognized as the special skill; therefore,

only patent search experts could make patent research in the past. However, recent online patent database that is provided by national patent office could make applicants search by themselves. As a result, it has introduced a new rule that reporting prior art would be an obligation for the patent applicant in Japan. This rule was applied for the application after September 1, in 2002(Japanese Patent Law, article 36). In addition to the normal patent database, Japan Patent Office provides the Standard Technology Database, which is focus on specific technologies, such as semiconductor IP. The purpose of this database is to provide technology information for the specific field, which is mainly obtained from non-patent information source, such as technical journal, product catalogs, and WEB advertisement. It is also able to access by Internet. Since these kinds of database could be improved by users request, it is clever way for applicant to use the database, to maximize the patent search efficiency and to demand the improvement of database accessibility.

V. Mask Work Protection Law

Historically, mask data was more practicable than design data: therefore, mask data was needed to protect legally. For that purpose, there is Mask Work Protection Law, which is one of the TRIP’s requirements. Although this rule might be obsolete at the present semiconductor business, it could revise the rule to meet the present requirement. Technically, IP is classified for three type of IPs. These are called soft IP, firm IP, and hard IP. For the reason that soft IP and firm IP are enable to yield the different mask layout, it seems to be difficult to be in the scope of legal protection by Mask Work Protection Law.

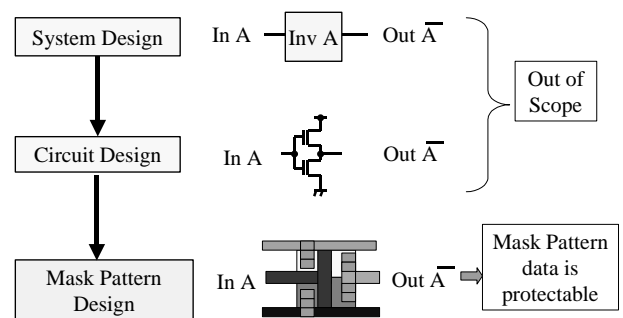


Fig.9 Mask Work Protection

Comparing above types of IPs, hard IP could be provided legal protection by this rule. Since Mask work is almost direct output form of hard IP, the scope of Mask Work Protection Law might include hard IP. Furthermore, Mask Work Protection law in Korea could be allowed to register the mask work data by memorial object, such as CD. This is one of the evidence that law is forecasted to protect IP itself. For the IP providers, this Korean rule is beneficial, since IP provides, who are not interested in making real chips, to

register their IP without submitting real chips. Still requirement of real chips for registration is common in the other countries, including Japan.

This is one of the typical case that rule is behind technology development; however, this rule could be revised according to the technology development. Just like Korean case, once hard IP is in the scope of legal protection, based on this rule, it could anticipate to extend the coverage of legal protection from the mask data to design data, which is firm IP and soft IP, in near future. This tendency would depend on what level of legal protection will be suitable for these type of IP.

VI. Proposal for Public IP Library

It is not easy to set the new rules for the advanced technologies; however, it is inefficient for researchers and engineers to work their research without stable conditions. Therefore, instead of the new rules, I would like to propose establishment of the Public IP library. This library could provide three major functions. First function is the registration of IP. IP library accept the registration of IP from IP providers who would like to obtain the proof of original. Once registration will start, it will be tend to accumulate the variety of IP information to the IP library. As

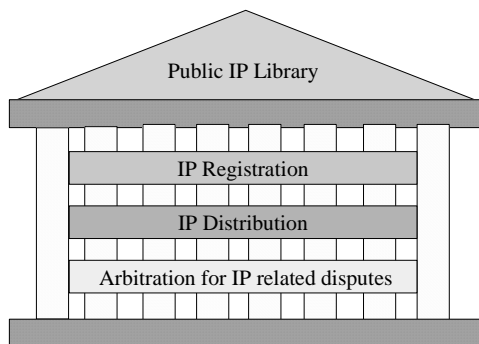


Fig.10 Function of Public IP Library

a result, IP library could be the Center of Excellence for semiconductor IP. Second function is IP distributors. Since IP library could gather many IPs, it could be possible to distribute IPs if IP providers are agree to do so. Although it is not practical in commercial purpose IPs; however, still there are many IPs, which are created by academia and purpose is for education or research. If these IPs are open to the public, they will be convenient for students who are studying for system design. Furthermore, IP library itself is able to offer the public subscription for useful IP for educational purpose. Third function is providing the arbitration for IP legal disputes. In order to settle the IP legal problems, IP experts with neutral status would be suitable. Since the noncommercial characteristic of IP library and advanced IP knowledge of members of IP library, it would provide suitable professionals for arbitration propose. I believe this kind of public organization will contribute to

improve the design environment of individual IP basic entry players, but also design efficiency for advanced development technology.

VII. Conclusion

Both technically and legally, IP is very important intangible asset; therefore, suitable legal protection would be requested to develop the IP research and business properly. One of the approaches is to make a new rule for IP. However, it should be carefully concerned for the balance of IP providers and IP users. Additionally, it should pay attention to the global viewpoint, not only handling in the domestic area. The other approach is to apply for the present rule to the IPs. For this approach, it will be required for IP players to understand the basic knowledge of each intellectual property legal system. Furthermore, IP players, including legal experts, should always concern what level of legal protection of IP is suitable for IP business development. Finally, it will be the time to consider the establishment of public IP library in the near future.

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