INTELLECTUAL PROPERTY PROTECTION OF INTEGRATED CIRCUITS: INTERNATIONAL DEVELOPMENTS AND THE CASE OF HONG KONG

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Protection of integrated circuits (ICs) is one of the most neglected fields within the area of information technology law. This article reviews the international developments in the protection of ICs and the case of Hong Kong. While Hong Kong has undoubtedly met international standards in this regard by creating a sui generis *system for protecting IC topographies, it has yet to deal with a fundamental and unresolved problem, namely, the relationship between the* sui generis *system and the copyright system. This article investigates the cause of the problem and traces it to two possible legislative oversights in the Copyright Ordinance (Cap 528).*

Introduction

Of all the fields within the area of information technology law, protection of integrated circuits (ICs) is one of the most neglected. While the cause for the neglect may be a subject of debate, such neglect is at odds with the significant role that ICs play in the information technology industry. Indeed, ICs lie at the heart of semiconductor chips, and with the advance in very large scale integration (VLSI) technology have come to be used not only in computers, but also in commodities ranging from aircraft, cars, home appliances and mobile telephones to watches and toys. Thus, it is no exaggeration to say that ICs are now present in virtually every electronic product. As such, their importance to a country's industrial development and economic growth cannot be overstated.

ICs are embodied in semiconductor chips, which are formed from layers of semiconductor material, metals and insulators containing components required to make up an electronic circuit. By a complex series of manufacturing steps, the layers are "sandwiched" together to form a three dimensional configuration of an IC, which determines the chip's functionalities. Hence, the critical step

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prior to the manufacture of a semiconductor chip is to create the precise layout-design (topography) of each of the layers[1] to be combined to form the IC desired.

Because of the high investment cost in designing IC topographies and the low cost in copying them, the legal protection of IC topographies has always been a concern of the semiconductor industry and of domestic legislatures. While there is little doubt that IC topographies are intellectual property, and ought to be protected as such, there is a question as to what form of protection is most appropriate. As drawings, should they be protected as copyright works? As designs for utilitarian objects, should they be regarded as industrial property and protected under the law of patents or any other industrial property law? And if neither of the preceding schemes is entirely satisfactory, should they be protected under a *sui generis* law specially devised for them?

This article discusses the international developments in the protection of IC topographies and examines the laws of some leading jurisdictions and the relevant international treaties. It shows that although the details of these laws and treaties differ, they all provide similar answers to the questions posed above. In light of these answers, Hong Kong's legislation on IC protection and the legal issues arising from the legislation are considered.

US Semiconductor Chip Protection Act 1984

The United States (US) was the first country to provide statutory protection for IC topographies. In 1984, the US Congress passed the Semiconductor Chip Protection Act to add a new Chapter 9 to its Copyright Act.[2] The subject matter protected under this chapter is "mask work", which is defined in section 901(a)(2) as:

> "a series of related images, however fixed or encoded –
> (A) having or representing the predetermined, three-dimensional pattern of metallic, insulating, or semiconductor material present or removed from the layers of a semiconductor chip product; and
> (B) in which series the relation of the images to one another is that each image has the pattern of the surface of one form of the semiconductor chip product."

Requirements for Protection

Under Chapter 9, a mask work is protected if it is original, "fixed in a semiconductor chip product" and satisfies a qualification requirement.[3] To be

[1] Such designs are collectively known as a "mask work" in the United States.
[2] Title 17, USC.
[3] Section 902.

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original, a mask work must be the independent creation of its author. Further, the mask work must not consist of "designs that are staple, commonplace, or familiar in the semiconductor industry, or variations of such designs, combined in a way that, considered as a whole, is not original."[4] The mask work is fixed in a semiconductor chip product when its embodiment therein is "sufficiently permanent or stable to permit the mask work to be perceived or reproduced from the product for a period of more than transitory duration."[5] To qualify for protection, the mask work must have a nexus with the US, such as being owned by a US national or domiciliary, being first commercially exploited in the US, or originating from a foreign country to which protection under Chapter 9 is extended.[6]

Even though mask works are protected under the US Copyright Act, it is apparent that they are treated differently from other copyright works. Indeed, the requirement that a mask work must not be "commonplace" does not apply to other copyright works and is reminiscent of the novelty requirement for patents. Further, the same Act requires that a mask work must be registered with the Copyright Office within two years after it is first commercially exploited anywhere in the world, failing which protection under the Act shall terminate.[7] This again is inconsistent with the no formality principle of copyright protection under the Berne Convention,[8] of which the US is a member.

The reason why mask works are treated so differently stems from their special nature: while they may be classified as copyrightable artistic works, they are in many ways utilitarian (or functional) works of an industrial nature. It is therefore deemed inappropriate to protect them by conventional copyright and so the approach adopted is a hybrid system between patent and copyright.[9]

Duration and Ownership

Protection for a mask work in the US lasts for 10 years, commencing on the date the mask work is registered with the Copyright Office[10] or the date the mask work is first commercially exploited anywhere in the world, whichever occurs first.[11] This short period of protection is another indication that mask works are not treated as conventional copyright works in the US.

4 Section 902(b).
5 Section 901(a)(3).
6 Section 902(a). See discussion below under "Reciprocity".
7 Section 908(a).
8 Berne Convention for the Protection of Literary and Artistic Works, Art 5(2).
9 The same can in fact be said of computer software. But unlike the case of mask works, there is global consensus that computer software is properly protected by conventional copyright.
10 The effective date of registration is the date on which the application, deposit of identifying material, and fee have all been received in the Copyright Office. US Copyright Act, s 908(e).
11 US Copyright Act, s 904. The exact expiry date is 31 December of the relevant year.

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The owner of a mask work is the person who created the work. In the case of a mask work made within the scope of a person's employment, the owner is the employer for whom the person created the work.[12] However, the Act is silent on the ownership of a commissioned mask work. Accordingly, in the absence of an agreement to the contrary, such a work should belong to the commissioned party as the creator of the work.

The owner of a mask work has the exclusive right to do and to authorise any of the following acts:

1 to reproduce the mask work by optical, electronic, or any other means;
2 to import or distribute a semiconductor chip product in which the mask work is embodied; and
3 to induce or knowingly to cause another person to do any of the acts described in (1) and (2) above.[13]

It is expressly provided that the distribution or importation of a product incorporating a semiconductor chip product is a distribution or importation of that semiconductor chip product.[14] Any person who performs any of the above acts without the owner's consent shall incur civil liabilities as an infringer.[15]

Exemption: Reverse Engineering

The US Copyright Act contains exemptions allowing certain acts to be performed without infringing any right in a mask work. The most important exemption relates to reverse engineering. Section 906(a) states that it is not an infringement for a person to reproduce a mask work solely for the purpose of teaching, analysing, or evaluating the concepts or techniques embodied in the mask work or the circuitry, logic flow, or organisation of components used in the mask work. Further, the person who performs such an analysis may incorporate the results obtained from it in an original mask work made to be distributed without infringing any right in the first mask work.

Section 906(a) is an attempt to codify established industrial practice, which enables a chip designer to study the working of a protected chip with a view to designing a second chip with the same functionalities. The intention is to allow improvements on, or alternatives to, existing chips to be made. What is unclear, though, is whether the provision allows the second mask work obtained by reverse engineering to be substantially similar to the first mask work, a scenario which under normal circumstances would be a copyright infringement.

12 *Ibid.*, s 901(a)(6).
13 *Ibid.*, s 905.
14 *Ibid.*, s 901(b).
15 *Ibid.*, s 910.

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This issue was considered by the Court of Appeals for the Federal Circuit in *Brooktree Corporation v Advanced Micro Devices*.[16] The court held that if the second mask work is not substantially identical to the first mask work, and its design involved significant toil and investment, it is not an infringement even if the two mask works are, in substantial part, similar. The court also noted that in a true case of reverse engineering, the defendant should have a long paper trail of records containing logic and circuit diagrams, trial layouts, computer simulations of the defendant's chip, and the like. The paper trail would be evidence of independent effort. Thus, whether there has been reverse engineering or mere plagiarism can be shown by looking at the defendant's records.

In effect, the *Brooktree* case has laid down two different tests for infringement depending on whether or not the defendant can establish reverse engineering: if the defendant can (for instance, by producing an adequate paper trail), the appropriate test for infringement is "substantial identity"; but if the defendant cannot, the usual copyright test of "substantial similarity" applies.

Other Exemptions

Another exemption under the US Copyright Act relates to the doctrine of exhaustion of rights upon first sale. Section 906(b) provides that the owner of a particular semiconductor chip product made by or with the consent of the owner of the mask work is allowed to import, distribute, or otherwise dispose of or use that particular semiconductor chip product without infringing any right in the mask work. This exemption applies to subsequent dealings with physical copies of a semiconductor chip product after their first sale.

Immunity is also given to an innocent purchaser of an infringing semiconductor chip product. Before the innocent purchaser has notice of protection with respect to the mask work embodied in the infringing product, the purchaser shall incur no liability for importing or distributing the infringing product. But once the purchaser has such notice, it shall be liable for a reasonable royalty on each infringing product that it imports or distributes. The amount of royalty shall be determined by the court in a civil action for infringement unless the parties resolve the issue by voluntary negotiation, mediation or binding arbitration.[17]

Reciprocity

As far as foreign countries are concerned, the most important provision of the US Copyright Act is section 902(a). Pursuant to the provision, mask

[16] 977 F 2d 1555 (Fed Cir 1992).
[17] Section 907.

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works originating from a foreign country are protected in the US only if any of the following conditions are satisfied:

1 the foreign country is a party to a treaty affording protection to mask works to which the US is also a party;
2 the foreign country protects mask works originating from the US on substantially the same basis as that of its domestic mask works; or
3 the foreign country protects mask works originating from the US on substantially the same basis as that under Chapter 9 of the US Copyright Act.

The effect of this provision is to impose a reciprocity requirement on every foreign country that desires protection of its mask works in the US. The foreign country must offer protection to mask works in its territory and extend the protection to mask works originating from the US. As a result, many developed countries swiftly introduced legislation to meet the US request, most notably Japan and the European Community. These legislative activities eventually culminated in the Treaty on Intellectual Property in Respect of Integrated Circuits[17A] adopted by the World Intellectual Property Organisation (WIPO) in 1989, which was later incorporated in the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)[17B] concluded in 1993 as part of the Agreement Establishing the World Trade Organization.

European Community Directive

In December 1986, the European Community (EC) issued a Council Directive on the Legal Protection of Topographies of Semiconductor Products[18] (the EC Directive) to harmonise the law within the Community and to ensure that member states amended their legislation to qualify for reciprocal protection in the US. The subject matter of protection is the "topography" of a semiconductor product, which is defined in Article 1(1)(b) of the EC Directive as:

a series of related images, however fixed or encoded:
(i) representing the three-dimensional pattern of the layers of which a semiconductor product is composed; and
(ii) in which series, each image has the pattern or part of the pattern of a surface of the semiconductor product at any stage of its manufacture.

[17A] *See* http://clea.wipo.int/lpbin/lpext.dll.
[17B] *See* http://www.wto.org/english/docs_e/legal_e/27-trips.pdf.
[18] Directive 87/54/EEC.

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Though phrased slightly differently, this definition is essentially the same as that of "mask work" in the US Copyright Act.

Requirements for Protection

Like the US Copyright Act, the EC Directive stipulates three requirements for the topography of a semiconductor product to be protected: originality; fixation; and qualification. Except for a few subtle differences, these requirements are largely similar to those of the US.

Under Article 2(2) of the EC Directive, the topography of a semiconductor product is original if it satisfies two conditions: (1) it is "the result of its creator's own intellectual effort"; and (2) it is "not commonplace in the semiconductor industry". Where the topography consists of elements that are commonplace in the semiconductor industry, it shall be regarded as original to the extent that the combination of such elements, taken as a whole, fulfils the conditions mentioned above. This requirement for originality is similar to that of the US.

However, unlike the US Copyright Act, the EC Directive does not require a topography to have been implemented in a semiconductor product to be regarded as fixed. Indeed, the only stipulation under the EC Directive is that a topography must be "fixed or encoded", in whatever form.[19] This should mean that if a typography is produced on paper as a series of circuit diagrams, or in any other tangible medium, it would be protected under the EC Directive regardless of whether it has been used to manufacture a semiconductor product. This contrasts with the US position, which only protects mask works fixed in semiconductor chip products.

The qualification requirement under the EC Directive is similar to that of the US Copyright Act. Generally, the right to protection only applies if the topography is owned by a national or domiciliary of a member state, or is first commercially exploited within a member state.[20] But unlike the US Copyright Act, there is no express reciprocity provision in the EC Directive. Instead, all member states are free to negotiate and conclude agreements with non-member states, or to make proposals to the EC Commission to extend protection to a non-member state throughout the EC.[21]

The EC Directive does not make registration a compulsory requirement across the EC. The matter is rather treated as one of domestic legislation to be left to individual member states.[22]

[19] Arts 1(b), 7(1)(c).
[20] Arts 3(3), (4).
[21] Arts 3(6), (7).
[22] Art 4.

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Duration and Ownership

Under the EC Directive, rights in a topography arise as soon as it is first commercially exploited anywhere in the world, or is first fixed or encoded. Where registration is a condition for protection, the rights arise when an application for registration is filed, or when the topography is first commercially exploited anywhere in the world, whichever is the earlier.[23]

Rights in a topography shall normally expire 10 years from the end of the calendar year in which the topography is first commercially exploited anywhere in the world. Where registration is required, the rights shall expire 10 years from the end of the calendar year in which the application for registration is filed, or in which the topography is first commercially exploited anywhere in the world, whichever is the earlier. Where a topography has not been commercially exploited anywhere in the world within a period of 15 years from its first fixation or encoding, the rights shall expire unless an application for registration has been filed within that period in those member states that require registration.[24]

The EC Directive only provides that the owner of a topography is the person who created the work.[25] Although there is a provision governing the ownership of employee topographies and commissioned topographies, the provision is not mandatory and it is left to individual member states to adopt it by domestic legislation.[26]

Under Article 5(1) of the EC Directive, the owner of a topography has the exclusive right to authorise or prohibit any of the following acts:

1 reproduction of the topography; and
2 commercial exploitation, or the importation for that purpose, of the topography or a semiconductor product manufactured using the topography.[27]

The definition of "commercial exploitation" includes "the sale, rental, leasing or any other method of commercial distribution".[28] However, as Article 5(1)(b) only refers to "topography" and "semiconductor product manufactured using the topography", it is not entirely clear if it also applies to articles incorporating such semiconductor products.

Exemptions

The EC Directive also contains exemptions similar to those in the US

[23] Art 7(1).
[24] Art 7(3), (4).
[25] Art 3(1).
[26] Art 3(2).
[27] Art 5(1).
[28] Art 1(1)(c).

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Copyright Act. Reverse engineering is expressly permitted under Article 5(3), which states that the exclusive rights in a topography shall not apply to "reproduction for the purpose of analysing, evaluating or teaching the concepts, processes, systems or techniques embodied in the topography or the topography itself". By virtue of Article 5(4), the results obtained by such analysis may be used to create another original topography. It is, however, unclear from the language of the provision as to what extent a topography obtained by reverse engineering may be substantially similar to the topography that has been reverse engineered. In the absence of any authority on this point, it is uncertain whether the *Brooktree* test in the US discussed earlier will be adopted by the EC.

Other exemptions under the EC Directive relate to exhaustion of rights upon first sale and acts of innocent purchasers. Article 5(5) provides that it is not an infringement to commercially exploit, or import for commercial exploitation, a topography or a semiconductor product manufactured using the topography if the act is committed after the topography or the semiconductor has been put on the market in a member state by or with the consent of the right holder. Article 5(6) grants immunity to an innocent purchaser of an infringing semiconductor product for commercially exploiting that product if, at the time the purchaser acquired that product, it did not know and had no reasonable grounds to believe that the product was infringing. However, for acts committed after the purchaser has the requisite knowledge, the purchaser shall be liable for payment of an adequate remuneration to the right holder.

These exemptions are all similar to those in the US. But the EC Directive goes further by allowing a member state to permit the reproduction of a topography privately for non-commercial aims.[29] This exemption for private and non-commercial reproduction of topographies is not expressly provided for in the US Copyright Act.

WIPO Treaty

The Treaty on Intellectual Property in Respect of Integrated Circuits (the WIPO Treaty) was adopted by WIPO at a diplomatic conference in Washington in May 1989. It was prepared in response to legislative activities in the US, Japan and the EC, with a view to forming a union conferring protection on ICs.

The subject matter of protection under the WIPO Treaty is "layout-design (topography)", which is defined in Article 2 as:

[29] Art 5(2).

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"the three-dimensional disposition, however expressed, of the elements, at least one of which is an active element, and of some or all of the interconnections of an integrated circuit, or such a three-dimensional disposition prepared for an integrated circuit intended for manufacture."

This definition differs from those in the US Copyright Act and the EC Directive, and the inclusion of the phrase "however expressed" makes the definition much broader. It is also clear from the definition that there is no need for the topography to have been implemented in an IC; it is sufficient that the topography is "prepared for an integrated circuit intended for manufacture".

Requirements for Protection

Unlike the US Copyright Act and the EC Directive, the WIPO Treaty has laid down only one requirement for protection: originality. The requirement is set out in Article 3(2), which is worded similarly to Article 2(2) of the EC Directive. Essentially, the topography must be the result of its creator's own intellectual effort and must not be commonplace among creators of topographies and manufacturers of ICs. Where the topography consists of a combination of elements and interconnections that are commonplace, the combination, taken as a whole, must be original.

Adopting a flexible approach, the WIPO Treaty does not stipulate any specific form of protection for topographies but allows each contracting party to offer protection through a special law on topographies or laws on copyright, patent, utility models, industrial designs, unfair competition or any other law, or a combination of any of those laws.[30]

Duration and Ownership

Under Article 8 of the WIPO Treaty, protection of topographies is to last for at least eight years. This minimum term of eight years is shorter than the terms of protection in the US and the EC. However, Article 8 is silent as to when the period commences. Presumably it would have to depend on the form of protection offered in the relevant contracting party.

In accordance with the definition of "holder of the right" in Article 2, ownership of topographies is governed by the applicable law of the relevant contracting party. Pursuant to Article 6(1)(a), the right holder of a topography has the exclusive rights to perform the following acts:

1 reproducing the topography, whether by incorporation in an IC or otherwise; and

[30] Art 4.

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2 importing, selling or otherwise distributing for commercial purposes the topography or an IC incorporating the topography.

The language of Article 6(1) seems to suggest that protection is confined to topographies and ICs incorporating protected topographies, and does not include articles that incorporate such ICs. This is narrower than the protection provided in the US.

Under the WIPO Treaty, any contracting party is free to consider other acts as unlawful if performed without authority. But the right holder may not exercise its rights in respect of an identical original topography independently created by a third party.[31]

Exemptions

Article 6 of the WIPO Treaty contains exemptions relating to reverse engineering, exhaustion of rights upon first sale, and acts of innocent purchasers. Article 6(2)(a) provides that the reproduction of a protected topography is not an infringement if the act is performed "for private purposes or for the sole purpose of evaluation, analysis, research or teaching." Because "private purposes" are allowed, the scope of exemption under this provision is broader than that in the US and similar to that in the EC.

Article 6(2)(b) allows the creation of a second topography that complies with the originality requirement on the basis of evaluation or analysis of a protected topography. Any act performed in respect of the second topography will not infringe the rights in the first topography. But as in the case of the EC Directive, to what extent the second topography is allowed to be similar to the first one is unclear.

Exhaustion of rights upon first sale is codified in Article 6(5), which allows a contracting party to consider lawful the act of importing, selling or otherwise distributing for commercial purposes a protected topography, or an IC incorporating a protected topography, that has been put on the market by or with the consent of the right holder.

Innocent purchasers are protected in Article 6(4). An innocent purchaser of an infringing IC is not liable for importing, selling or otherwise distributing for commercial purposes that IC if the purchaser did not know and had no reasonable grounds to know that the IC incorporates an infringing topography at the time it was acquired.[32] In stark contrast to the US Copyright Act and the EC Directive, the WIPO Treaty contains no express provision stipulating compensation after the innocent purchaser has the requisite knowledge.

[31] Art 6(2)(c).

[32] As in the case of Art 6(1) concerning the right holder's exclusive rights, the language of Art 6(4) seems to exempt only dealings with ICs incorporating infringing topographies and does not extend to dealings with articles incorporating such ICs.

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This would imply that the innocent purchaser would remain immune even if that purchaser subsequently obtains knowledge, as the knowledge was absent at the time the infringing product was acquired.

Compulsory Licensing

A unique and contentious feature of the WIPO Treaty concerns its compulsory licensing provision. Article 6(3) permits a contracting party to enact legislation empowering its executive or judicial authority to grant a compulsory licence in certain circumstances to a third party for performing an act which would otherwise infringe the rights in a topography. The compulsory licence may only be granted in circumstances "that are not ordinary" after unsuccessful efforts to obtain authorisation have been made by the third party in line with normal commercial practices, and where the granting authority finds it "necessary to safeguard a national purpose deemed to be vital".

A compulsory licence extends only to the territory of the country in which it is granted, and is subject to the payment of an equitable remuneration by the licensee. The granting of compulsory licences is open to judicial review. When the conditions for granting a compulsory licence cease to exist, the licence shall be revoked.

TRIPS

Despite WIPO's support, to date the WIPO Treaty has failed to obtain five ratifications required for it to enter into force under its Article 16(1). The US and Japan, the world's two largest producers of ICs, have maintained their opposition to the WIPO Treaty, particularly with regard to its compulsory licensing provision, its short term of protection, its lack of compensation for innocent infringement, and its inadequate protection in relation to articles incorporating manufactured ICs based on protected topographies.

It was not until 1993, when TRIPS was concluded, that the WIPO Treaty came to importance in the field of ICs. Section 6 of TRIPS, entitled "Layout-designs (Topographies) of Integrated Circuits", expressly incorporates the WIPO Treaty by reference. Almost all of the substantive provisions of the WIPO Treaty are included. But there are also modifications which, to a large extent, are made to meet the objections to the WIPO Treaty raised by the US and Japan.

The major modifications made to the WIPO provisions as incorporated in TRIPS are as follows:

1 The minimum eight year term of protection is extended. For member countries not requiring registration, the term shall not expire until 10 years from the first commercial exploitation of the topography anywhere

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in the world.[33] For member countries requiring registration, the term shall not end before the expiration of a period of 10 years commencing from the filing date of application for registration or from the first commercial exploitation of the topography anywhere in the world.[34] However, a member country may provide that the term shall lapse 15 years after the creation of the topography.[35]

2 The exclusive rights of the right holder of a topography are broadened. The rights to import, sell or otherwise distribute for commercial purposes shall apply not only to the protected topography and an IC incorporating such a topography, but also an article incorporating such an IC.[36]

3 The immunity granted to innocent purchasers is also broadened. It applies not only to acts performed in respect of an IC, but also acts performed in respect of an article incorporating such an IC. However, the immunity shall cease as soon as the innocent purchaser has acquired the requisite knowledge. Thereafter, the purchaser may deal with its stock on hand but shall be liable to pay a reasonable royalty to the right holder.[37]

4 The compulsory licensing provision, Article 6(3) of the WIPO Treaty, is excluded from TRIPS.[38] Where the law of a member country permits compulsory licensing of topographies by or for the government, the conditions governing compulsory licensing of patents shall apply *mutatis mutandis*.[39] Of these conditions, the most important is that the proposed user has made efforts to obtain authorisation from the right holder on reasonable commercial terms and that such efforts have not been successful within a reasonable period of time. But this condition may be waived by a member country in the case of a national emergency or other circumstances of extreme urgency or in cases of public non-commercial use.[40]

Summary of International Developments

As can be seen from the international developments discussed above, what has emerged as an international trend is in substance a *sui generis* system for protecting IC topographies that displays both patent and copyright features.

33 TRIPS, Art 38(2).
34 *Ibid.*, Art 38(1). Note that the phrase "whichever is the earlier" is absent from the provision. Thus semantically, the ten year period would commence from the *later* of the two relevant events.
35 *Ibid.*, Art 38(3).
36 *Ibid.*, Art 36.
37 *Ibid.*, Art 37(1).
38 *Ibid.*, Art 35.
39 *Ibid.*, Art 37(2).
40 *Ibid.*, Art 31(b).

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These features include, *inter alia*, the following:

1 the requirement that the topography must not be commonplace for it to be regarded as original;
2 the possibility of registration as a condition for protection; and
3 the much shorter term of protection (10 years) than that required under the Berne Convention relating to copyright (which is the life of author plus 50 years).

Apart from these *sui generis* features, other common features that may be observed include:

1 prohibitions against the reproduction of a protected topography, and commercial dealings with the topography, ICs incorporating the topography or articles incorporating such ICs;
2 exemptions relating to reverse engineering and exhaustion of rights upon first sale; and
3 exemptions relating to acts of an innocent purchaser before it has notice of protection in respect of the topography, and liabilities for payment of a reasonable royalty thereafter.

Whatever one's assessment of this *sui generis* system, the features mentioned above are now *de facto* international standards for the protection of IC topographies. Any country that intends to join the global community of IC protection will have to include such features in its legislation.

Hong Kong's Protection of IC Topographies

Just a few months after TRIPS was concluded, Hong Kong passed its first law on the protection of IC topographies, the Layout-Design (Topography) of Integrated Circuits Ordinance (the IC Ordinance).[41] Not surprisingly, the IC Ordinance is modeled on TRIPS, which puts Hong Kong on a similar footing to other leading jurisdictions. However, there are also some features in the IC Ordinance not found in TRIPS:

1 In addition to being original and not commonplace among creators of topographies and manufacturers of ICs,[42] a topography must be recorded in documentary form or incorporated into an IC to be protected under

[41] Cap 445. The Ordinance was enacted on 30 March 1994.
[42] *Ibid.*, s 3(1). The same provision states that if a topography consists of a combination of elements and interconnections that are commonplace, then the combination, taken as a whole, must be original and not commonplace.

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the IC Ordinance (the "fixation" requirement).[43] Further, the topography must be owned by a "qualified person" or first commercially exploited in Hong Kong or in a qualifying country (the "qualification" requirement).[44] A qualified person must have a sufficient nexus with Hong Kong as defined in section 2(1) of the IC Ordinance.[45]

2 No registration is required for protection under the IC Ordinance.

3 A topography belongs initially to the designer. Where the topography is created by an employee in the course of his or her employment, the employer is the owner. Where the topography is created in pursuance of a commission, the person who commissioned the topography is the owner. All these, however, are subject to agreements to the contrary.[46]

4 While reverse engineering is allowed under the IC Ordinance, the second topography thus created must be *different* from the topography that has been reverse engineered.[47] How different the two topographies must be is a moot point. But by stressing that they must be different, the scope of permissible reverse engineering under the IC Ordinance is clearly narrower than that under TRIPS or any of the laws discussed earlier, all of which only require the second topography to be original.[48]

5 Unlike TRIPS, but similar to the US Copyright Act, the IC Ordinance contains a reciprocity provision which empowers the Chief Executive to designate any country as a "qualifying country" if he or she considers that the laws of that country also provide qualified owners as defined in the IC Ordinance adequate protection in that country.[49] A qualifying country enjoys the same status as Hong Kong in relation to the qualification requirement mentioned in 1 above.

6 In contrast to TRIPS, the IC Ordinance expressly permits the granting of compulsory licences. But unlike the WIPO Treaty, which allows such licences to be granted to any third party, the IC Ordinance only allows them to be granted to the government. Further, the circumstances for compulsory licensing must be such that the territory is in a "period of extreme urgency" as declared by the Chief Executive in Council, which

[43] Section 3(4).

[44] Sections 2(1), 3(1).

[45] Section 2(1) defines a "qualified person" to be either (i) a natural person who is domiciled or ordinarily resident or has the right of abode in Hong Kong or in a qualifying country, or who has a real and effective industrial or commercial establishment for the creation of topographies or for the production of ICs in Hong Kong or in a qualifying country; or (ii) a legal person the domicile, place of incorporation or place of formation of which is in Hong Kong or in a qualifying country, or which has a real and effective industrial or commercial establishment for the creation of topographies or for the production of ICs in Hong Kong or in a qualifying country.

[46] Section 2(2).

[47] Sections 5(c), (d).

[48] *See* US Copyright Act, s 906(a); EC Directive, Art 5(4); WIPO Treaty, Art 6(2)(b).

[49] Section 24.

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declaration is necessary or expedient for maintaining or securing "supplies and services essential to the life of the community".[50]

To offer an international perspective on IC protection and by way of comparison, a summary of the international laws together with the IC Ordinance is tabulated in Table 1 below. Looking at the Table, there is no doubt that the IC Ordinance has established in Hong Kong a *sui generis* system for protecting IC topographies commensurate with international standards. Although to date the IC Ordinance has not generated any judicial activity, it can be argued that its mere existence has already made a contribution to Hong Kong by making Hong Kong part of the global community of IC protection.

Table 1
International Protection of IC Topographies

	US Copyright Act, Chapter 9	EC Directive	WIPO Treaty	TRIPS	Hong Kong IC Ordinance
Conditions for protection	Original and not commonplace. Fixed in a semiconductor chip product. Satisfies qualification requirement.	Original and not commonplace. Fixed or encoded in whatever form. Satisfies qualification requirement.	Original and not commonplace.	Original and not commonplace.	Original and not commonplace. Recorded in documentary form or incorporated into an IC. Satisfies qualification requirement
Registration requirement	Compulsory.	Optional.	Optional.	Optional.	None.
Term of protection	10 years from application for registration or first commercial exploitation anywhere in the world, whichever is the earlier.	10 years from application for registration or first commercial exploitation anywhere in the world, whichever is the earlier. 15 years from fixation if not commercially exploited.	At least 8 years.	At least 10 years from application for registration or first commercial exploitation anywhere in the world. Member country may specify a maximum of 15 years from creation.	10 years from first commercial exploitation anywhere in the world. 15 years from creation if not commercially exploited.

[50] Section 18.

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	US Copyright Act, Chapter 9	EC Directive	WIPO Treaty	TRIPS	Hong Kong IC Ordinance
Ownership	Creator is first owner. Employee work belongs to employer.	Creator is first owner. Ownership of employee or commissioned work governed by domestic law.	Governed by domestic law.	Governed by domestic law.	Creator is first owner. Employee work belongs to employer. Commissioned work belongs to commissioner.
Infringing acts	Reproduction of the mask work. Importation or distribution of semiconductor chip products incorporating the mask work or articles incorporating such semiconductor chip products.	Reproduction of the topography. Commercial exploitation or importation for commercial exploitation of the topography or semiconductor products incorporating the topography.	Reproduction of the topography. Importation, sale or distribution for commercial purposes of the topography or ICs incorporating the topography.	Reproduction of the topography. Importation, sale or distribution for commercial purposes of the topography, ICs incorporating the topography, or articles incorporating such ICs.	Reproduction of the topography. Commercial exploitation (including importation for commercial purposes) of the topography, ICs incorporating the topography, or articles incorporating such ICs.
Reverse engineering	Allowed. The 2nd mask work may be substantially similar to the 1st mask work but not substantially identical.	Allowed. Unclear as to how similar the 2nd topography may be to the 1st topography.	Allowed. Unclear as to how similar the 2nd topography may be to the 1st topography.	Allowed. Unclear as to how similar the 2nd topography may be to the 1st topography.	Allowed. 2nd topography must be different from the 1st topography.
Exhaustion of rights provision	Included.	Included.	Included.	Included.	Included.
Innocent purchasers	Not liable before the purchaser has knowledge. Liable for reasonable royalty after the purchaser has knowledge.	Not liable before the purchaser has knowledge. Liable for reasonable royalty after the purchaser has knowledge.	Not liable if the purchaser does not have knowledge when acquiring the infringing IC.	Not liable before the purchaser has knowledge. Liable for reasonable royalty after the purchaser has knowledge.	Not liable before the purchaser has knowledge. Liable for reasonable royalty after the purchaser has knowledge.
Private non-commercial reproduction	No express exemption.	Exempted.	Exempted.	Exempted.	Exempted.
Reciprocity provision	Included.	Not included.	Not included.	Not included.	Included.
Compulsory licence	Not provided.	Not provided.	Provided and available to any third party.	Not provided.	Provided but available only to the government.

One Remaining Question for Hong Kong

There is one remaining question for Hong Kong, and it is this: what is the relationship between the *sui generis* system under the IC Ordinance and the copyright system under the Copyright Ordinance?[51] This question arises because topographies are invariably represented as drawings, which are also protectable as artistic works under the Copyright Ordinance.[52] Would it therefore follow that IC topographies are to enjoy dual protection in Hong Kong under both the *sui generis* system and the copyright system?

Unlike the Copyright, Designs and Patents Act 1988 of the United Kingdom (the UK Act), neither the IC Ordinance nor the Copyright Ordinance contain any provision addressing this fundamental question. This is surprising in itself given that the Copyright Ordinance is based on the UK Act. But one may also suggest that the absence of such provisions is precisely the legislative intent: that is that there is nothing that prevents IC topographies from enjoying dual protection in Hong Kong.

However, a moment's thought would reveal that this conclusion, logical as it is, is by no means satisfactory.

Dual Protection

To appreciate why dual protection of IC topographies is unsatisfactory, one only has to look at the relative scope of the two protection regimes. To begin with, if owners of IC topographies could rely on copyright to protect their interests, the *sui generis* system would be rendered superfluous for most practical purposes. The reasons are as follows.

Firstly, the protection under the copyright system is much broader in scope than that under the *sui generis* system. This is clearly shown by the provisions on primary infringements and secondary infringements in the Copyright Ordinance.[53] These provisions already cover, and indeed go beyond, the infringements proscribed by the IC Ordinance.[54]

Secondly, the requirement for copyright protection is lower than that for the *sui generis* protection. A work only needs to be original to attract copyright. But to trigger the *sui generis* protection, the work must also be "not commonplace".

Thirdly, the term of protection under the copyright system (which is the life of the author plus 50 years)[55] is much longer than that under the *sui generis* system (10 years).[56]

[51] Cap 528.
[52] Note that "artistic work" includes any drawing or diagram, which are protected irrespective of artistic quality: Copyright Ordinance, s 5.
[53] Sections 22–35.
[54] Section 4.
[55] Copyright Ordinance, s 17.
[56] IC Ordinance, s 6.

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On the other hand, if one takes the opposite view and assesses the *sui generis* system from the perspective of an IC user or a competitor of the IC owner, the value of the *sui generis* system is immediately apparent. To these users and competitors, the *sui generis* system has at least three significant features not superceded by copyright, namely, the defence relating to reverse engineering,[57] the defence of private non-commercial reproduction,[58] and the much shorter term of protection.

From these observations one can readily see the problems created by dual protection. Consider this very simple example. Suppose the owner of a new IC topography, represented as a series of two dimensional drawings, finds that a competitor has copied the topography by making an IC incorporating it. What actions can the owner bring against the competitor? Obviously, the owner can sue under the IC Ordinance in respect of the topography. In addition, as the topography is represented as a series of two dimensional drawings, the owner can sue under copyright on the ground that the competitor has made a three dimensional copy of the two dimensional drawings.[59] But what if the owner chooses to sue only under copyright? In such a case, can the competitor raise any of the defences available under the IC Ordinance? If not, then what is the point of having those defences in the IC Ordinance, which can be circumvented so easily by the owner?

A closer analysis of the simple example above would expose even more problems. If the topography is already out of its term of protection under the IC Ordinance, dual protection should mean that the topography would continue to be protected by copyright. But would such protection last until copyright expires? Given that the intent of the IC Ordinance is not to grant such lengthy protection to topographies, the answer should have been "no". On the face of it, this seems to be precisely the intent of section 87 of the Copyright Ordinance. Section 87 reads:

"(1) This section applies where an artistic work has been exploited, by or with the licence of the copyright owner, by –
  (a) making by an industrial process articles falling to be treated for the purposes of this Part as copies of the work; and
  (b) marketing such articles, in Hong Kong or elsewhere.
(2) ...

[57] *Ibid.*, ss 5(c), (d).

[58] *Ibid.*, s 5(b). Note that this defence is broader than the defences of fair dealing under the Copyright Ordinance, ss. 38, 39, which are only limited to certain specific purposes.

[59] Cf. Copyright Ordinance, s 23(3). Note that copying can be direct or indirect: *ibid.*, s 22(3)(b). Also note that the pre-1997 provision, s 9(8) of the UK Copyright Act 1956, which specified that the making of a three dimensional object would not infringe the copyright in a two dimensional artistic work if the object would not appear to non-experts to be a reproduction of the artistic work, is no longer part of the Copyright Ordinance.

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(3) After the end of the period of 15 years from the end of the calendar year in which such articles incorporating an unregistered corresponding design are first marketed, the work may be copied by making articles of any description, or doing anything for the purpose of making articles of any description, and anything may be done in relation to articles so made, without infringing copyright in the work."

The effect of section 87 is that if an artistic work incorporating an "unregistered corresponding design" has been industrially exploited by making articles to the design, then after 15 years from the first marketing of such articles, the artistic work may be copied by making articles of any description without infringing copyright in the work.[60] In short, it means that once an artistic work has been industrially exploited, its artistic copyright can only prevent unauthorised industrial exploitation for 15 years and not for the remainder of the full copyright term.

Unfortunately, although section 87 is able to prevent other designs that have been industrially exploited from enjoying the full copyright term, it does not apply to IC topographies. The reason is a rather subtle one that can be attributed to a possible legislative oversight.

The trouble lies in section 86 of the Copyright Ordinance, which states that the term "corresponding design" in section 87 means "a design within the meaning of the Registered Designs Ordinance (Cap 522) which if applied to an article would produce something which would be treated for the purposes of this Part as a copy of the artistic work." If one then turns to the Registered Designs Ordinance, one will find that "design" is defined as "features of shape, configuration, pattern or ornament applied to an article by any industrial process, *being features which in the finished article appeal to and are judged by the eye* ...".[61] Clearly, IC topographies, invisible to the user in the finished articles (semiconductor chips), do not have such appeal to the eye and accordingly cannot be "corresponding designs" within the meaning of section 86.[62] It follows that section 87 of the Copyright Ordinance does not apply to IC topographies, which therefore remain entitled to the full copyright term. This plainly defeats the purpose of the IC Ordinance of imposing a much shorter term of protection on IC topographies.

[60] Note that IC topographies are not registrable designs according to s 8(1) of the Registered Designs Ordinance (Cap 522). Hence s 87(2) of the Copyright Ordinance, which relates to "registered corresponding design", does not apply to IC topographies.

[61] Section 2(1), with emphasis supplied.

[62] This observation is buttressed by s 8(1) of the Registered Designs Ordinance, which expressly states that IC topographies are not registrable.

[63] *See* Part III of the UK Act, ss 213–264.

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Other Possibilities

If dual protection is not the answer, logically there are only three other possibilities for the interplay between the *sui generis* system and the copyright system:

1 There is exclusive protection for IC topographies under either one of the two systems. That is to say, topographies are protected under either the *sui generis* system or the copyright system, but not both.
2 There is consecutive protection for IC topographies under the two systems. That is to say, topographies enjoy protection initially under the *sui generis* system for the prescribed period under the IC Ordinance, and upon expiry of the said period, enjoy protection under the copyright system.
3 IC topographies are protected exclusively under the *sui generis* system alone; they do not enjoy protection under the copyright system.

None of these possibilities is in fact supported by existing laws. But just for the sake of argument and completeness, let us assume that they are. In this case, neither 1 nor 2 above is in any way more satisfactory than dual protection. With regard to 1, if IC topographies were to enjoy exclusive protection under either one of the two systems, an anomalous situation would arise: topographies which are commonplace would attract a broader and longer protection (under copyright) whereas topographies which are not commonplace could only enjoy a narrower and shorter protection (under the *sui generis* system). This is illogical. In a similar vein, if IC topographies were to enjoy consecutive protection as described in 2 above, topographies which are commonplace would enjoy the broader protection (under copyright) right from the beginning whereas topographies which are not commonplace would have to wait until the narrower protection (under the *sui generis* term) has expired. This again is contrary to reason.

Of the three possibilities above, 3 seems to offer the simplest and cleanest solution. It also appears to be commensurate with the legislative intent of the IC Ordinance to establish a *sui generis* system specifically for IC topographies. However, by stipulating that IC topographies can be protected under the *sui generis* system alone and not under copyright, drawings representing topographies which are considered commonplace would be left unprotected. Why such drawings are deprived of protection merely because they represent topographies (but otherwise are of the same nature as other design drawings) is a question that is difficult to answer.

Conclusion

This article has reviewed the international developments in the protection of IC topographies and examined the case of Hong Kong. While there is no

doubt that Hong Kong has met international standards of IC protection by virtue of a *sui generis* system created under the IC Ordinance, a fundamental and unresolved problem is the relationship between the *sui generis* system and the copyright system under the Copyright Ordinance. The cause of this problem can be traced to two possible legislative oversights.

First, although the Copyright Ordinance has adopted most of the provisions in the UK Act, it has not created a similar (unregistered) "design right" as in that Act.[63] A close reading of the UK Act will show that although the same word "design" is used, the definition of "design" in the context of "design right" does not require any appeal to the eye.[64] This differs significantly from the definition of "design" in the context of "registered design" for which appeal to the eye is an essential element.[65] By not creating a design right within the copyright regime, the Copyright Ordinance has only adopted the definition of "design" in the context of "registered design".[66] This definition immediately excludes IC topographies, which are never meant to have appeal to the eye in the finished article. Hence the failure of section 87 of the Copyright Ordinance to prevent industrially exploited topographies from enjoying the full copyright term, as previously discussed.

Second, by omitting design right from the Copyright Ordinance, the legislature has also omitted two very important provisions of the UK Act governing the relationship between design right and copyright: namely, sections 51 and 236. Section 51(1) of the UK Act reads:

> "It is not an infringement of any copyright in a design document or model recording or embodying a design for anything other than an artistic work or a typeface to make an article to the design or to copy an article made to the design."

The effect of section 51(1) is to prevent the owner of a design document or model from suing for copyright infringement where the infringing act is the making of an article to the design. In such a case, the owner must sue for design right infringement. In other cases, section 236 of the UK Act will come into play:

> "Where copyright subsists in a work which consists of or includes a design in which design right subsists, it is not an infringement of design right in the design to do anything which is an infringement of the copyright in that work."

64 "Design" in this context is simply defined as "the design of any aspect of the shape or configuration (whether internal or external) of the whole or part of an article": UK Act, s 213(2).

65 *See* UK Registered Designs Act 1949, s 1(1) as amended.

66 *See* Copyright Ordinance, s 86.

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Section 236 is the opposite of section 51(1) and complements the latter. The effect of section 236 is to prevent the owner of a copyright work incorporating a design from suing for design right infringement where the defendant's act infringes copyright (but does not involve the making of an article to the design, which is governed by section 51(1)). In such cases, the owner can only sue under copyright.

In the context of IC protection, the combined effect of sections 51 and 236 in the UK is plain. The sections prevent the owner of an IC topography from suing under *both* copyright and design right. In contrast, without similar provisions in the IC Ordinance and Copyright Ordinance, there is nothing to prevent owners of IC topographies in Hong Kong from suing under both the *sui generis* system and copyright. This gives rise to problems as discussed earlier.

The task is now clear. Hong Kong must clarify its position on IC protection with regard to the relationship between the *sui generis* system and copyright. Unless this is done, the scope of IC protection in Hong Kong will remain uncertain, and the usefulness of the *sui generis* system *vis-à-vis* copyright will continue to be questioned.

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