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PROTECTION OF INTELLECTUAL PROPERTY RIGHTS IN OUTER SPACE

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ABSTRACT

The commercialization of outer space is developing into a new stage. Intellectual property rights are based on a strict territorial approach, which is incompatible with the rules regarding space activities. This paper aims at examining the issue of patent protection in outer space and proposing a viable regime for the protection of the so-called "space patent". It is believed that such an international framework will promote the development of space activities and respond primarily to the need of patent protection by the States and private entities.

1. INTRODUCTION

Intellectual property rights are based on a "strict territorial" approach. However, the concept of territorial sovereignty does not exist in rules regarding space activities.

As clearly defined in the Outer Space Treaty, outer space is not subject to national appropriation and free use shall be carried out for the benefits and interests of all countries.[1] Reconciling these two different approaches proves to be a difficult task. Nevertheless, providing protection for intellectual property rights arising out of space activities is vital to the sustainable development of outer space. With no appropriate intellectual property regime in place, interests and enthusiasm of private entities in space activities will wane, which will be devastating to space development.[2]

This paper aims at examining the issue of patent protection in outer space, comparing the international Patent legal framework for space-related activities and proposing a viable regime for the protection of the so-called "space patent". Detailed analysis will be made in Part 2 to the application of current concept of patent to inventions from space activities. Part 3 will be devoted to the discussion on the US and ESA regimes for use, transfer and ownership of patents.

Part 4 will analyze relevant provisions in the 1998 Intergovernmental Agreement (IGA). Part 5 elaborates on the establishment of a special regime and the improvements to be made in view of the special nature of space patents. This paper concludes that space patents are special in many different ways and that a special regime for space patents will be

meaningful in many aspects.

2. SUBSTANTIAL REQUIREMENTS FOR PATENT PROTECTION

Three substantial requirements should be satisfied for an invention to enjoy patent protection: novelty, inventive step and industrial application. The third element is easy to satisfy as long as the invention can be made or used in any kind of industry actually or constructively.[3]

The first two elements are closely related. It involves two-step analysis. Firstly, what is considered as "novel" compared with the prior state of art? Second, what is the degree of inventiveness to satisfy patentability?

Novelty is determined in reference to existing knowledge at the invention. The Patent Ordinance of Hong Kong adopted the term "state of the art" to determine the degree of novelty.[4] This ordinance further defines the time factor in determining admissible state of the art: before the deemed date of filing of an application for a standard patent for the invention or, if priority was claimed, before the date of priority; or before the date of filing of an application for a short-term patent for the invention or, if priority was claimed, before the date of priority.[5]

The provisions above are important to patent protection in outer space. Scientific staff normally station in the ISS for some period of time. Before formal application for the Patent protection is submitted, the invention could have been used in the ISS or known by other staff stationed in the ISS. In this situation, it is important to make sure that the present rules will not cause problem to the interpreting the term of "novelty".

Then, to what extent will the above situation be exempted from normal rules? With no clear rules in place, we may rely on the strict confidentiality rules in the ISS Crew Code of Conduct.[6] According to this Code, each Cooperating Agency, or the data owner or provider shall give instruction to their astronauts for the marking of data generated onboard the ISS and consequently trigger the application of the protective measures;[7] any disclosure by the crewmembers without prior written approval will be considered as violation of the confidential requirement; the crewmembers are required to mark and protect as long as the confidential requirement remain in place; such requirement may last till after the return phase and when the mission is finished.[8] Based on the above strict rules, we can see that the novelty requirement will not be easily compromised by acts of any disclosure without prior approval.

The Patent Ordinance requires that to qualify for a patent an invention must involve an inventive step. [9] The requirement of non-obviousness or inventiveness, forming one of the

important bases for patent application, is particularly relevant for space products or inventions. Outer space provides a zero-gravity and ultra-vacuum environment not available on Earth. For example, the purity level may be sufficient to justify the inventiveness requirement.

If not, the process of production or invention in the unique environment itself could possibly provide another justification for inventiveness. It has been suggested that the process reactions in outer space are not the same and that the resulting product is patentable. [10] By emphasizing and patenting the process, protection will automatically extend to the product of such process. However, it is important to note that "even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself" and if "the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process."[11] A recent decision from the U.S. Court of Appeals for the Federal Circuit (CAFC) again states, "Regardless of how broadly or narrowly one construes a product-by-process claim, it is clear that such claims are always to a product, not a process." [12] The above observation is especially meaningful to the potential product-by-process claim for products arising out of scientific experiments in outer space. By identifying at least one novel feature of the product, relevant parties may submit product-by-process claim upon returning to the Earth and successfully obtain patent protection.

3. USE, TRANSFER AND OWNERSHIP OF PATENTS

3.1. Present Regimes Concerning Ownership of Patents

With private entities increasingly active in space activities, a proper framework to identify the ownership of a certain patent becomes more and more important. Based on the 1958 regime, patent will be the property of the US if any private entities enter into contract with NASA. [13] This will no doubt discourage private parties from participating in space activities. The US has taken the initiative to formulate a structure for the creation, use, transfer and ownership and protection of patent with relation to the ISS as an ISS intellectual property reference guide.[14]

NASA makes allocation of the ISS resources available to a commercial user through two forms of agreements: Space Act Agreement and Cooperative Research and Development Agreement (CRADA). The two forms are quite similar, but the first form is more flexible, thus, the second form is not routinely used by NASA. [15] The form of Space Act Agreement is especially meaningful for the commercialization of outer space. Previously, under the 1958 National

Aeronautics and Space Act (Space Act), NASA may enter into and perform contracts, leases, cooperative agreements, or other transactions as may be necessary to conduct its work;[16] the owner of the inventions arising out of the above contracts or agreements shall be the United States government.[17] The form of Space Act agreement does not fall under any specific category defined in the above Space Act, but is considered as other transactions.[18] Under this categorization, Space Act Agreement aims to procure property or services for the direct benefit of NASA with little or no involvement of NASA and NASA can accordingly tailor the allocation of intellectual property rights according to the nature of the particular agreement and contributions of the parties.[19]

With this new arrangement, NASA can further elaborate on the detailed ways of allocation. Space Act Agreements are further divided into non-reimbursable and reimbursable agreements based on whether NASA received payment for the goods or services it provides. No matter which type of agreement it belongs to, title to inventions will remain with the respective investing parties. In view of the fact that NASA is reimbursed under reimbursable agreements, NASA will grant an exclusive, royalty-free, irrevocable license to the other party.[20] No exchange of patents is required under non-reimbursable agreements, but NASA may consider granting to the participant an exclusive or partially exclusive commercial license.[21]

European Space Agency (ESA), as one of the most important international organizations on space activities, does not have specific regulations on the above issue. Relevant rules and guidelines can only be found in the General Provisions on Intellectual Property Right: the General Clauses and Conditions for ESA Contracts (General Provision)[22] and the Resolution on the Rules concerning Information, Data and Intellectual Property (ESA Resolution) adopted by the ESA Council on December 19th, 2001[23]. Both documents adopt similar position as defined by NASA, though the elaboration has been much simpler. Under the General Provision, "the contractor shall be the owner of any invention made in the course of or resulting from the work undertaken for the purpose of the contract and shall be entitled to protect such invention by patent or other form of industrial property right in accordance with the applicable laws."[24] Similarly, the ESA Resolution takes it as the general principle that the ownership of information, data and intellectual property developed under a contract with ESA will remain with the contract whoever has developed them.[25]

3.2. Joint Invention

For joint inventions on Earth, there is so far no clear answer to the application of rights and obligations. Usually, in

agreements related to joint invention on Earth, the resolution of the issue depends on the definition of joint invention and any provisions relating to invention where the owner is only one of the cooperating parties.[26]

Scientific experiments in outer space normally require the involvement and collaboration of the inventive endeavors of two or more parties. Thus, the question arises as to who can be considered as an inventor. Inventors should be those making contribution to the inventive idea and to the final result.[27] Normally, crew members or astronauts merely follow instructions in performing experiments and thus, cannot be considered as inventor(s). But it is of course possible that a crew member or astronaut conceives of a patentable invention while working on the experiment. In this situation, inventorship can be confirmed based on the above standard of contribution to the inventive idea and the final result. This situation is, however, quite rare; no crew member or astronaut has become an inventor so far.[28]

The second issue relates to the rights of each co-inventor. In the US, each co-inventor named on a patent application owns that patent. In the absence of any agreement, each co-inventor owns 100 per cent of the patent, regardless of the share of contribution of each inventor.[29] NASA offers general principles on joint inventions arising out of Space Act Agreements: NASA and the other party will identify and report the invention to each other and cooperate in obtaining patent protection; the two sides will consult with possible support and advice from the US Government, and agree on the title of ownership, protection and license conditions.[30]

4. THE IGA PROVISIONS CONCERNING INTELLECTUAL PROPERTY

Article 21 of the IGA touches on several important aspects. First of all, it clearly provides a territorial approach based on the ownership/registry of elements for the issue of jurisdiction: an invention taking place in or on a Space Station flight element shall be deemed to have occurred in the territory of the Partner State of that element's registry.[31] Such a conclusion results from the application of the principles of jurisdiction and control of the state of registry over the individual flight element.[32]

However, the above assumption does not impact the ownership of the invention, nor does it preclude the right to file a patent application in multiple States.[33] The IGA further provides that, "in respect of an invention made in or on any Space Station flight element by a person who is not its national or resident, a Partner State shall not apply its laws concerning secrecy of inventions so as to prevent the filing of a patent application in any other Partner

State that provides for the protection of the secrecy of patent applications contacting information that is classified or other protected for national security purposes."[34] Accordingly, the territorial provision in the IGA simply supports the place where the invention takes place.

The territorial approach in the IGA is especially meaningful in dealing with the issue of utilizing a patent in outer space, but it does not clearly speak out under which law patent utilization or infringement activities will governed. Under normal situation, once the utilization of a patent occurs in a US space element, then it will be treated in the same way as any other such activities within the US territory. That means, any patent utilization or infringement activities will be solely governed by national law of the Partner State of that space element's registry. This understanding is also in line with the normal national rules on intellectual property protection whose application extends to anywhere within its jurisdiction. However, it can be argued that the activities will be governed by the law of the State which grants the patent. This argument can be deduced from relevant provisions in the IGA. According to Article 21 (4), if the infringement occurs in or on an ESA-registered element, it is not possible to recover in more than one European Partner State for the same infringement of the same intellectual property; in case of multiple actions are brought for the infringement of the same right in different European Partner States, a court may grant a temporary stay of proceeding in order to wait for the outcome of an earlier-filed action; furthermore, satisfaction for recovery of damages in one of the actions shall prevent further recovery in any pending or future action based on the same act of infringement.[35]

5. A SPECIAL SPACE PATENT REGIME

With States drastically relaxing their monopoly over space exploration and activities, private entities are increasingly interested in space investment and research.[36] As discussed above, the three requirements of patentability need to be further elaborated to accommodate the special outer space environment. While the IGA provides guidelines for intellectual property protection at international level, national laws have a final say in detailed application process. Patent protection in outer space environment is not well coordinated against international background. Conflicts can arise when two patents from two nations cover essentially the same invention out of scientific experiments in outer space. Considering the exorbitant expenses involved in space activities, the lacking in a coordinated patent regime specially designed for the environment of outer space will in the end let many potential interested private entities down and drive them away from this field.

Accordingly, it is important to consider creating a special international legal regime for patents arising out of space activities.[37]

Two important treaties exist at the moment dealing with patent application: Paris Convention and Patent Cooperation Treaty. Now the question is whether we should have a separate treaty to define the new type of patent. The author takes the view that it is not necessary to add to the patent field a new treaty. All patents are the same in essence. As discussed above, the difference lies in the evaluation stage: how to apply the existing requirements. The purpose of creating a regime for this type of patents basically serves to facilitate patent application and easy reference, while keeping in mind the fact that outer space is a special environment to carry out scientific experiments. Accordingly, the present coordination work needs to focus on the procedural aspects. The author proposes to set up a new category named 'space patent' under the framework of the Patent Cooperation Treaty. A special patent office (say, Space Patent Office) could be established for the purpose of space patent application.[38]

5.1. Space Patents

The first question is what kind of invention can be registered as 'space patent'. Or we may say, what subject matter will be dealt with by the 'space patent office'. No doubt, space patent office shall deal with patent related to space activities. Five categories of inventions have been identified to be related to space activities: (a) inventions made on earth for space applications; (b) inventions made on earth for terrestrial applications as a result of space activities (including telecommunications); (c) inventions made in outer space for terrestrial applications; (d) inventions made in outer space for spatial applications; (e) inventions patented on earth for spatial applications used in outer space.[39] Some scholar has been able to re-categorize space patents into two: space-activity inventions resulting from job done on earth (including categories (a), (b) and (e)); space-related inventions made in outer space (including categories (c) and (d)). [40] The author would single out category (e) for discussion due to its special legal status as mentioned below.

5.2. Space Patent Cooperation

Space-activity inventions resulting from job done on earth do not distinguish much from other inventions on earth. The only difference is the original purpose of the activities. Thus, the existing patent regime does not need for major change for those inventions, but we do need to note that considerations on public policy and national security will play an important role in the application process due to its sensitiveness to national interests. The problems exist with other two types of space patents, which will be discussed

below.

5.2.1. Extension of Patent Protection in Outer Space

As mentioned above, intellectual property law is territorial in nature. No protection will be provided outside national boundaries, and of course not to the non-sovereignty area of outer space. Then, the problem arises as to whether inventions patented on earth enjoy protection when applied in outer space (referring to categories (c), (d) and (e)). The IGA resolved the issue in a restricted sense: for purposes of intellectual property law, national jurisdiction shall extend to a specific part or a flight component of the ISS itself.

However, outer space is much broader; so how about the protection of intellectual property in other parts of outer space? Little national legislation has touched on the point. International agreements on patent protection (namely, the Paris Convention, the Patent Cooperation Treaty and the WTO Agreement on the Trade-related Intellectual Property Rights (TRIPs)) have also been very ambiguous, lacking ostensible wording on the issue. The only possibility for patent protection in outer space is to extract some words or provisions in the international agreements and give them a broad explanation. For example, we may interpret the term "vessel" in the Paris Convention [41] to include a space object or rely on the simple statement in the TRIPs that patents shall be available and patent rights enjoyable without discrimination as to the place of invention[42]. But all these efforts are marginal and do not form a strong legal basis for patent protection in outer space.

The actual legal vacuum and uncertainty of the legal status constitutes one of the most important concerns for those potential private entities. It is important to clarify the issue by noting that relevant national laws will be extended to outer space and that inventions patented on earth will be protected while using in outer space. While the States can make explicit national rules on the issue of extension, it would be more efficient and effective to make such rules in an international agreement like the IGA.

A further question to be resolved concerns the applicable law. By referring to the Outer Space Treaty, jurisdiction and control over a specific space object lies on the State of registry. [43] The act of registration has accordingly resolved the issue of jurisdiction. With regard to patent protection in outer space, we can similarly rely on the connecting factor of the State patenting the invention. The national law of the State which has patented an invention will continue to apply to the use or infringement of the patent in outer space.

5.2.2. Cooperation on Priority of Claims

Following the same model in the Patent Cooperation Treaty, a centralized 'international application' procedure will be set up for the granting of various space patents at national or regional level. A declaration may be attached in the application claiming the priority of one or more earlier applications filed in or for any State. This will be done through a single operation which calls for the designation of targeted States. As discussed above, a space patent office will be established to examine applications and issue space patents. An 'international search' system will also be created to facilitate the application examination process. The rules in the existing Patent Cooperation Treaty on the priority of claims will continue to apply.[44] However, we need to reconsider the issue of the priority period concerning space patent in categories (c) and (d).

Two main patent systems exist currently: first-to-invent and first-to-file.[45] Under the two systems, the awarding of patent will be based on the two different factors: the activity of developing an invention and the act of filing an application. During the WTO Uruguay Round negotiations, the TRIPs was reached, trying to unify the intellectual property regime, particularly with respect to patents. One of the most achievements was the adoption of the "first to file" system.[46] The act of filing becomes a vital point. However, as mentioned above, scientific staff will normally station in the ISS for several months. The act of filing will start only after their return to the earth and showing of the product or invention. The priority period of six months may not be sufficient for the purpose of protection in this situation. It is thus necessary to consider a longer priority period for space patent in categories (c) and (d).

6. CONCLUSION

The present legal regime for outer space does not provide clear guidelines on property rights. From the first sight, the territorial nature of Patent law and the non-territorial nature of space law are difficult to reconcile. However, we should note that intellectual property has attracted a significant amount of interest on an international scale and international conventions have been adopted ensuring minimum rights and providing certain measures for enforcement of those rights by the Contracting Members. [47] Accordingly, barriers between these two areas of law are not insurmountable.

This paper has analyzed the application of the existing patent conception to space activities and necessary accommodations need to be made for protection of space patents. The paper proposes to set up a special regime for space protection within the current regime created by the Patent Cooperation Treaty. Further conceptual clarification is made to the extended application of patent protection on earth to

outer space. Such an international framework will in the end promote the development of space activities and respond primarily to the need of intellectual property protection by the States and private entities.

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[2] Anna Maria Balsano, Intellectual Property within Public International Research Organizations: The Example of the European Space Agency, *The Proceedings of the 36th Colloquium on the Law of Outer Space*, IISL 3 (1993).

[3] Office of Technology Licensing, University of Florida, Invention and Inventorship to Potential Investors, available at <http://www.rgp.ufl.edu/otl/inventorship.html> (last visited May 10, 2006).

[4] Patent Ordinance (Cap. 514), s. 94 (1).

[5] Patent Ordinance (Cap. 514), s. 94 (2).

[6] ESA Council Information Document: The ISS Crew Code of Conduct, ESA/C (2000)14, February 29, 2000.

[7] Andre Farand, Astronauts' Behavior onboard the International Space Station: Regulatory Framework, available at <http://portal.unesco.org/shs/en/file_download.php/785db0eec4e0cdfc43e1923624154cccFarand.pdf> (last visited May 11, 2006).

[8] The ISS Crew Code of Conduct, Section V.

[9] Patent Ordinance (Cap. 514), s. 96.

[10] Sa'id Mosteshar (Ed.), Research and Invention in Outer Space: Liability and Intellectual Property Rights 193 (Martinus Nijhoff Publishers: Dordrecht, 1995).

[11] The Manual of Patent Examining Procedure of the U.S. Patent and Trademark Office, s. 2113, quoting *In Re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed.Cir. 1985).

[12] *SmithKline Beecham Corp. v. Apotex Corp.*, Fed. Cir., No. 04-1522, decided February 24, 2006.

[13] Section 305 (a) 1-2 of the 1958 National Aeronautics and Space Act, P.L. 85-569, as amended.

[14] Intellectual Property and the International Space Station: Creation, Use, Transfer, and Ownership and Protection, prepared by the Office of the General Counsel, National Aeronautics and Space Administration, September 1999, available at <http://www.hq.nasa.gov/ogc/iss/index.html> (last visited April 29, 2006).

[15] For a brief outline of some of the significant differences between CRADAs and Space Act Agreements, see *id.*

[16] Space Act, section 203 (c) 5.

[17] *Id.* Section 305 (a).

[18] 42 U.S.C. section 2473 (c) (5) and (6).

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[20] Space Act Agreement, Annex I sample clause 1.2.e.e. II-III.

[21] Space Act Agreement, Annex I sample clause 1.2.d.d.

[22] ESA/C/290, rev. 5.

[23] ESA/C/CLV?Res.4 (Final).

[24] General Provision, Clause 37.

[25] ESA Resolution, Chapter II: Rules

concerning Information, Data and Intellectual Property, section I.

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[42] TRIPs, Article 27.

[43] Outer Space Treaty, Article 8.

[44] Patent Cooperation Treaty, Article 8.

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