

RECENT DEVELOPMENTS IN PATENTS FOR OUTER SPACE

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¹ Introduction

Industrial competition is heating up in orbit, particularly in Low and Medium Earth Orbits (LEO & MEO). Patents are becoming a weapon of choice for pre-emptive strikes against the adversary in grappling for market share. Hughes Aircraft Co. has demonstrated the economic importance of patents used in outer space by winning a multimillion dollar patent infringement suit against the US Government. Foreign competitors attacked in parallel suits settled out of court for undisclosed amounts in excess of tens of millions of dollars. More recently the infringement suit of TRW vs. ICO has been settled out of court in a deal in excess of \$ 150 MUSD, but this has left many legal questions unanswered, in particular the possibility of patent protection of certain regions of outer space and the compatibility of such monopoly with the provisions of the Outer Space Treaty (OST).

As part of the settlement, ICO agreed to drop its patent invalidity suits around the world so the TRW patent is now virtually unchallenged. As the terms of the settlement concern only the parties (TRW & ICO), the TRW patents may still give rise to infringement proceedings aimed at keeping any newcomers out of MEO.

Other recently granted space patents will be briefly presented to demonstrate potential conflicts between the temporary monopoly granted to a patent owner, and the Space Benefits clause of Art. 1 OST, and the non-appropriation clause of Art. 2 OST. Examples include Nortel's patent on "psuedo" geostationary orbits ; Ericsson's "GSM in the sky" ; Teledesic's patent on the principle of frequency coordination of non-GEO with GEO satellites in FSS bands ; the "COMSAT Manoeuvre" for end of life ; the Motorola patent on the use of "smart" satellites in LEO.

These cases tend to demonstrate that a US patent is the best (presently the only) weapon for IPR star wars, as a result of the US Space Bill which extended the US territory to Outer Space for application of US patent law. A similar initiative has been introduced to the European Commission by the European Space Agency in response to the Green Paper on the Community Patent. After successful lobbying by Eurospace, the European Space Industry Association, the European Parliament has issued a recommendation "that the Community patent should ensure the protection of inventions produced or used on board spacecraft and satellites". The Commission was expected to issue its ruling before the IISL conference in October, 1999, however the collective resignation of the Commission this spring has set back that schedule..

We can thus anticipate that in the near future, there will co-exist at least two regimes of municipal patent law in Outer Space. Unfortunately, no provisions have

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been introduced in these national and regional laws to ensure that the grant of a patent is compatible with the provisions of the OST. Such an initiative has been introduced to the French Ministry of Foreign Affairs to be mentioned in the interministerial conference on the revision of the European Patent Convention, which was convened in Paris in June 1999 at the initiative of France.

The Workshop on Intellectual Property (IP) and Space Activities held at Unispace III in July, 1999 under the auspices of the UNCOPUOS, has recommended the harmonisation of international IPR (Intellectual Property Rights) standards and legislation relating to Outer Space activities, among nations and private sectors, and with the legal principles developed by the UN in the form of treaties and declarations, such as non-appropriation of outer space. This Workshop further recommended that the UNCOPUOS investigate these issues, and in view of the highly technical nature of IPRs, with the help of specialised agencies such as the World Intellectual Property Organisation (WIPO).

WIPO in turn has informally agreed to seek a study budget in the time frame 2000-2001 to these questions (the budget is submitted but not yet approved).

The author proposes that an appropriate forum for harmonisation could be the Millennium Round of the World Trade Organisation (WTO), however this would require reopening of the TRIPS negotiations (Trade-Related aspects of Intellectual Property rights), a prospect which apparently is not presently in favour among the WTO member nations.

As for enforcement and dispute resolution, the author proposes that a unique international forum should be contemplated, such as the IP arbitration board of the WIPO. Such an international instance could be mandated by either the UN or the WTO to judge not only on validity and infringement of a space patent, but also on the compatibility of the

claimed monopoly with international treaty provisions.

Evolution of Space Activities

Once reserved for the super-powers of the cold war space race, outer space has gradually become the theatre of massive private investments for civilian applications, in particular telecommunications, television broadcast, earth observation, and localisation and navigation aids. Entrepreneurial activities are in the planning stages for micro-gravity science and manufacturing, wideband internet access and interactive data delivery such as telemedicine or video on demand, and solar energy farms and lunar mining.

Private investments exceeded taxpayer funded efforts for the first time in 1998, representing tens of billions of dollars per year for the space segment alone.

Prices for some satellite constellations currently in the news are about \$5 Billion for Motorola's Iridium, \$4.7 Billion for ICO (up from \$3.5 B), \$4.5 Billion for SkyBridge (up from \$3 B with 80 satellites instead of 60), and a whopping \$9-\$10 Billion for Teledesic's 288 satellite constellation (expert analysts contend that this figure is optimistically low).

As a rule of thumb, the accompanying ground segment (earth stations, satellite control, and user terminals in the newest systems) represent investment totalling between 1 to 3 times that of the space segment. And operator service revenues should amortise those investments in less than 3-5 years, particularly for the LEO and MEO satellites which have much shorter lifetimes than GEOs (3-5 years vs. 15 years).

An immediate result of such important investments, business plans, and the pots of gold at the end of the rainbow is that economic forces are irresistably dictating the law of the

marketplace. When such sums are at play, politics, and in particular international diplomatic relations, take the back seat with respect to economic pragmatism.

At the same time, in almost all sectors of activity involving high technology, high risk, high stakes and high potential gains, there is a significant increase of aggressive behaviour on the part of IPR owners, which may take the form of increased litigation or aggressive licensing campaigns. This of course makes it difficult for any newcomer to enter the marketplace without a substantial initial entry ticket to acquit the costs of acquiring licenses of third party rights.

Patents are thus becoming a preferred weapon to help to obtain or defend market share, or to procure revenues from someone else's market share.

In fact, in spite of the currently aggressive environment, we have little knowledge of the licensing terms which are concluded under peaceful conditions. Such agreements are generally kept confidential.

However certain disputes have resulted in the terms being publicly disclosed, either by obligation (in the case of judgement or information to stockholders of publicly traded companies) or by way of the press in case the Parties desire publicity of their agreement.

Examples of Patent Disputes

First, we can cite the little-known example of Space Systems Loral (SS/L) vs. ComDev, a Canadian manufacturer of space equipment. SS/L attacked ComDev in infringement proceedings and simultaneously requested injunction on imports from the International Trade Commission (ITC) for subsystems supplied to a US satellite manufacturer for the Intelsat program. There was finally settlement out of court, by which SS/L granted a license and ComDev was

allowed to supply its customer with removal of the ITC injunction.

However the terms of the settlement were painful for ComDev. A \$3 Million up front cash payment for past sins (although the product was undeliverable under the ITC injunction), followed by a licensing royalty of approximately 100 % of the product price.

Where this agreement is particularly vicious, is that a smaller (4%) royalty must be paid each time that ComDev receives a "qualifying offer" for supply of filters, even if ComDev does not actually fill the order.

Our second example concerns the famous Hughes Aircraft Company (HAC) Williams patent,² concerning a method for obtaining and maintaining satellite attitude on orbit. The case Hughes Aircraft Corporation (HAC) vs. US government³ is probably the most well known, both by the length of the litigation (well over 10 years) and the amount of damages finally awarded (on the order of hundreds of millions of dollars)⁴. Aside from these procedural details, there are several interesting aspects which extended the US case law well beyond its former legislative and common law limits.

The first line of defense of the US government was that the Hughes patent was generated under contract to the US government (Department of Defense funding). However the contract apparently omitted to specify license or

² US-A-3,758,051, 1973.

³ For discussions of the Hughes case, cf. BNA vol. 52, pp. 250-252, idem vol. 46, pp. 428-430, idem vol. 36, pp. 555-556, idem vol. 26, pp. 491-492.

⁴ For discussion of the dispute on the evaluation of damages in the Hughes case, see Christol, C. "Damages and Intellectual Property " An Up-Date on Hughes Aircraft Company vs. USA", in Proc. 39th Colloquium on the Law of Outer Space, pp.210-214 ,AIAA, Washington D.C. 1996.

title of the inventions to the US government.

A second aspect is that the claimed invention concerns a method for controlling the attitude of a satellite on orbit, thus can logically only be used and infringed on orbit, outside of the territory of US patent protection. The Hughes lawyers were able to convince that the actual use of the infringing satellites occurred on US territory, because downlinks containing useful signals were beamed from the satellites to the US territory. They further invoked the doctrine of maritime law, since the satellites received control signals from US territory, they should be considered as under the "control" of the US and thus under US jurisdiction. This doctrine has subsequently been codified and incorporated into US patent law by the so-called US Space Bill.⁵

The most recent case is that of TRW vs. ICO Global Communications Ltd. The TRW patent, directed to a mobile satellite communications system, wherein the satellites are positioned between 5600 and 10000 nautical miles altitude, raises questions about compatibility with the non-appropriation provisions of article 2 of the 1967 Outer Space Treaty (OST), as previously discussed in this forum⁶.

However the consequences of the TRW-ICO case are far-reaching for reasons that are rather circumstantial than legal.

TRW sued ICO in a California court because the ICO satellites were under construction at the Hughes plant in California. TRW requested injunctive relief to prevent ICO from being able to launch those satellites. However, according to a literal construction of the claim of the TRW patent, those satellites could not be

infringing unless they were launched to an altitude between 5600 and 10000 nautical miles.

And the California court decided that the infringement was not characterised, thus no injunctive relief for the Plaintiff, who promptly lodged an appeal. The mere fact that ICO was in litigation, whether justified or not (as judged in the first instance), was sufficient to prevent ICO from gathering sufficient financial resources to continue its project. Even though ICO had prevailed in the first instance, they were constrained to seek settlement in order to stop TRW's hostilities and to seek to reassure potential investors.

TRW has thus demonstrated that, on the basis of a US patent whose validity is contested, both according to the patentability criteria of US patent law, and because of non-compatibility with the article 2 of the OST ; via the US Space Bill which extends US jurisdiction onto orbit⁷ ; even when all parties are in agreement that infringement is not characterised (and so judged) ; a US company can prevent a foreign (non-US) world wide project from being launched.

This case was settled out of court for \$150 Million in ICO equity for TRW. However all legal proceedings were stopped, leaving several questions without

⁷ 35 U.S.C. 105 reads in part :

" Any invention made, used or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States shall be considered to be made, used or sold within the United States for the purposes of this title, except with respect to any space object or component thereof that is specifically identified and otherwise provided for by an international agreement to which the United States is a party, or ... carried on the registry of a foreign state in accordance with the Convention of Registration of Objects Launched into Outer Space."...

⁵35 U.S.C. 105

⁶ Smith, B.L. et al., Proceedings 40th Colloquium on the Law of Outer Space, International Institute of Space Law, pp. 169-176, published by AIAA, Reston VA, USA, 1998

judgement : validity of the patent ; validity of the claims directed to orbital altitudes ; and finally, is the US the correct jurisdiction for judging a potential infringement on orbit, in view of the fact that the allegedly infringing satellites were not to be under US jurisdiction or control, but rather that of a foreign entity (ICO Holdings is established in the Bermudas, with head offices in the UK).

The recent development is that ICO has declared bankruptcy in late August 1999, having been unable to find its investors. The TRW US lawsuit may have contributed to permanently kill this international satellite enterprise. Furthermore, since the settlement concerns only the Parties, TRW may continue to attempt to assert these rights granted by the USPTO (US Patent and Trademark Office) against all comers in MEO (Medium Earth Orbit). Especially since TRW apparently has no plans to fly a system such as claimed in the famous patent, thus third parties are the only potential source of revenues.

Other Recent Patents in Outer Space

A random sampling of recent patents granted for use in outer space reveals that patentees are attempting to secure ever greater scope of monopoly in extraterrestrial activities.

A now venerable patent was granted to Comsat, the US Intelsat signatory, for the "Comsat Manoeuvre". Normally, the end of a telecommunication satellite's useful life is determined by the end of the fuel necessary to maintain it at its exact position on geostationary orbit. The Comsat patent concerns a method to prolong a satellite's useful life by letting it drift from its nominal position, thus conserving precious fuel and extending the period during which the satellite is at least approximately at its nominal position.

Any satellite which finds itself short of fuel at end of life will start to drift and may potentially infringe such a patent.

Space Systems Loral has a granted US patent⁸ directed to a satellite telecommunications system which has been baptised "GSM in the sky" by the specialised press, wherein the satellite(s) simply replace a terrestrial GSM base station.

Nortel has a patent pending⁹ worldwide concerning orbits close to the geostationary orbit, slightly inclined with respect to the equator, but with the same 24 hour period. Once again, satellites which drift from their nominal geostationary orbit could be potential infringers of this patent if and when it is finally granted. In any case, if this patent is indeed granted, it implies that one would not be free to double park along the geostationary arc, because this double parking zone would be forbidden by one or more patent monopolies.

Motorola is proprietor of a patent granted in the US¹⁰, recently granted in Japan¹¹, and recently successfully opposed in Europe¹², concerning a satellite communications system serving mobile terminals relying on the use of "smart satellites" in LEO (Low Earth Orbit). In view of the scope of the claims granted in the US, a company which wants to fly LEO satellites for communications to mobile terminals without risk of infringement of the Motorola patent, should fly only "dumb" satellites.

A final example is the recently granted US patent to Teledesic, concerning the frequency coordination between LEO satellites and GEO satellites.¹³ The claims are directed to a method and a communication system for sharing frequencies between GEO satellites and non-GEO satellites, wherein appropriate measures are taken to avoid

⁸ US 5 448 623 = EP 536 921 (A1)

⁹ EP 836 290

¹⁰ US 5 410 728

¹¹ JP 2-179035 of July 12, 1999

¹² EP 365 885 B1, judged revoked after appeal, T0365/98-351 of 28.4.99.

¹³ US 5 822 680 of 13.10.98

any possible interference between the two : i.e. the ground stations do not communicate with the LEO satellites of the second system if and when such communications would be beamed across the equatorial plane in which the GEO satellites reside and operate. The different independent claims of this patent address practically all conceivable alternatives for a LEO constellation to comply with the Radio Regulations of the International Telecommunications Union (ITU) which require that any newly proposed satellite co-ordinate with existing satellites on GEO orbit in order not to cause harmful interference to those existing satellites.

Which Patent Protection for What Purpose

World-wide patent protection is costly, in the range of at least \$50 - \$100 thousand dollars per invention, depending on the length of the technical description, the number of countries, and possible difficulties encountered in the prosecution of the application. Patent owners want to make such an investment pay off by taxing competitors. This requires some type of enforcement mechanism. US patent proprietors can use their patents in outer space if the alleged infringement occurs aboard an object under jurisdiction or control of the US¹⁴ or its natural or legal citizens. However, for the rest of the world, there is at present no other explicitly competent jurisdiction¹⁵.

A similar initiative to the US space bill has recently been introduced into the European Community Patent Directive now in preparation by the European Commission, to dole Europe with extraterrestrial patent protection for space objects under jurisdiction and control of European member states or their natural

¹⁴ cf. note 7 *supra*

¹⁵ except by international convention, for example the IGA (Intergovernmental Agreement) concerning IPR aboard the International Space Station.

or legal citizens. However the proposed wording of the legislation, although quite similar, is not identical. And it is to be expected that interpretation arguments of validity and infringement before a European judge would not necessarily give the same result as before an American jury trial. As both texts contain specific exclusions to claims of jurisdiction for space objects on the UN registry of another state, this could conceivably lead to forum shopping via UN registry.

Forum Shopping via UN Registry

The Flagship principle as embodied by the IGA solves the forum shopping dilemma for this project by agreement between the partners. However, the Flagship principle in maritime law has led to convenience registry. Could this also happen for registry of space objects under the most favourable regime ?

US patent law and IGA make explicit reference to the State of Registry to determine the applicable law. However, for space activities undertaken by entities in the private sector there remains the possibility of a clever choice of the State of Registry.

U.N. Registry : In Which Country ?

Several legal consequences may govern the choice of a registry state for space objects : Ownership, fiscality, liability, jurisdiction and control, hence applicable law, in particular for patent enforcement.

The 1975 U.N. Registry Convention¹⁶ provides that the "Launching State" will register each object launched in a national register, and inform the U.N. Secretary General. However the "Launching State" has multiple definitions in art. 1 of the 1975 treaty :

¹⁶ A/AC.105/572/Rev.1

- the State that launches ;
- the State that procures the launching ;
- the State from whose territory an object is launched ; or
- the State from whose facility an object is launched .

Which Applicable Law in Outer Space ?

In view of the US Space Bill, the IGA, and provisions on UN Registry for determining the "nationality" of a space object, it appears that the US IPR law is the law which is most often applicable. Indeed, in the case where US law is not applicable, it would seem that there is no clear answer, as no other country has yet passed space-specific IPR legislation.

However US patent law has no explicit mechanisms to take into account the provisions of the Outer Space Treaty (OST) in the examination procedure leading to the grant of a patent. This means that the U.S.P.T.O. can (and does) grant patents in conflict with the basic principles of the OST.

Perceived Problems in Applying IPR Law in Outer Space

The contrasts and possible conflicts between space law and IPR law are numerous and manifest. A few examples :

- Space law is extraterrestrial, IPR law is terrestrial ;
- Space law is the same for all states, IPR is different from state to state ;
- Space law is extraterritorial, IPR law is territorial ;
- Space law says share benefits, IP law grants a monopoly to the inventor.

Current Situation and Tendencies

Space activities are attracting multi-billion dollar investments from the private sector. The use of IPR in space activities is becoming more and more aggressive, with attempts tending towards the total exclusion of competitors from certain activities or certain regions of

space (or both). The founding principles of IPR and the OST seem to have been forgotten by the main players. This may be simply because the main players are no longer those States who signed the Outer Space Treaty thirty years ago, but rather private enterprises hoping to cash in on the enormous revenues foreseen in consumer mass markets. In the opinion of the author, it is time to take corrective action before it is too late.

Possible Corrective Actions : Harmonisation

In order to resolve apparent or potential conflicts with the fundamental principles which may arise from the use of IPR in space activities, one possible corrective action could be an attempt towards harmonisation of applicable law. Harmonisation would require that there be at least one other national law in addition to the US law, which is for now the only explicitly applicable law for IPR in outer space. Europe may enact a similar provision within the Community Patent, but this could take a number of years.

Shouldn't some of the other space-faring nations consider legislation similar to that of the US Space Bill ? This suggestion has recently been made by lobbyists from the French space industry to French officials who are contemplating a minor revision of French patent law, and preliminary contacts have also been made with Indian officials to sensitise them to this problem.

However, even if other space powers eventually undertake appropriate legislation to make their national IPR laws applicable to space activities, we will still be confronted with a patchwork of virtual territorial considerations in order to determine which is the applicable law in a given case, and forum shopping is likely to become a favourite pastime under such a regime.

Possible Corrective Actions : Globalisation

A preferable solution would be "Globalisation" of the jurisdiction in outer space activities, i.e. a single, world-wide IP legislation for space activities. This could be imagined as a treaty under the auspices of the UNCOPUOS. We could recommend to establish space and its accesses (launch sites, vehicles) as a single territory with a single, uniform law.

A "Space Patent" could be imagined as a new "Country" designation on a PCT (Patent Co-operation Treaty) application, to be examined and granted under the auspices of the WIPO (World Intellectual Property Organisation).

Such a space patent, once granted, should be administered and interpreted by a single, universal enforcement body such as an international court of law or an international arbitration authority. Perhaps such an arbitration authority could be created under the auspices of the World Trade Organisation (WTO), aided by the World Intellectual Property Organisation (WIPO) for the IPR aspects. WIPO has already established a board of arbitration for Intellectual Property matters, and it should not be difficult for them to acquire the necessary competence to act on space matters.

This board could be empowered to arbitrate on matters such as space patent validity and compatibility with international law, alleged infringement, conditions of licensing to third parties, etc.

To aid the Board in its considerations, we propose that a code of conduct be elaborated for the use of such patents. This code of conduct should reflect the basic principles of IPR and the OST and rely on them for its terms. We are committed to promoting the progress of science and the useful arts, while rewarding inventors for their efforts, and procuring Space Benefits for all mankind. Any appropriation (or monopoly) of any region of space for any use should be formally precluded. Patentability, if

incompatible with the basic principles, should be excluded. Such exclusion would be most effective if operated in the patent examination phase.

As for licensing conditions to third parties, in order to fulfill the principles of the OST space benefits clause, licenses should be made on a non-exclusive, non-discriminatory basis, on fair and reasonable terms and conditions. Such fair and reasonable conditions may depend on the economic and scientific development of the Licensee, as reflected in the UN Resolution on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interests of All States, Taking into Particular Account the Needs of Developing Countries,¹⁷ which states in particular :

in Para. 2 : " States are free to determine all aspects of their participation in international cooperation ... on an equitable and mutually acceptable basis. Contractual terms in such cooperative ventures should be fair and reasonable and they should be in full compliance with the legitimate rights and interests of the parties concerned, as, for example, with intellectual property rights. "

And in Para. 5, last alinea : "International cooperation, while taking into particular account the needs of developing countries, should aim, *inter alia*, at the following goals ...

... Facilitating the exchange of expertise and technology among States on a mutually acceptable basis. "

We urge the necessity of a globalisation of applicable law, which could be obtained through the efforts of an international treaty organisation such as UNCOPUOS, as recommended by the

¹⁷ A/RES/51/122, 4 Feb. 1997

Workshop on Intellectual Property (IP) and Space Activities held at Unispace III in Vienna in July, 1999 under the auspices of the UN. WIPO officials have expressed their willingness to undertake a study of possible actions in the time frame 2000-2001, and are awaiting budget line approval.

Other Possible Corrective Actions

The conflicts between municipal IP law and the Outer Space Treaty could be avoided by introducing a specific mechanism into the patent examination procedure in order to respect treaty obligations. This has already been suggested by some authors in order to take account of treaty provisions concerning certain biotechnology inventions which may rely on or influence human genetics. It would be sufficient to require the patent Examiner to refer a patent application for treaty interpretation by a body qualified to interpret the treaty obligations, for example the European Court of Justice for European treaties, or the International Court of Justice for International treaties.

Such a provision has been suggested to the French Diplomatic Delegation to the intergovernmental conference on the revision of the Munich convention on the European patent. However, it seems that the Ministers of the Member states are more preoccupied with the high costs of the European patent procedure, the translations, and the integration of new member states from the former eastern bloc countries.

Conclusions

As we have analysed the situation in the preceding pages, we see that the economic environment of space activities is evolving extremely rapidly, and that the enormous investments involved are leading to a more and more aggressive behaviour on the basis of Intellectual Property Rights granted by

national jurisdictions, which are then brought into play in an international arena against multinational companies.

Only one national jurisdiction, the US, has attempted to accompany this evolution by modifying its legislation. Others may follow, but we see that there is tremendous inertia on the part of legislators, who are for the most part unaware of the problems which arise between IPR law and the basic principles of the exploitation of outer space as laid down in the Outer Space Treaty.

And finally, we have the international public law (e.g. OST) and the international institutions (UNCOPUOS, WIPO, WTO), which are moving even more slowly in response to this changing environment.

What can be done ? Beyond lobbying and showing examples of patent actions which defy principles, logic or reason, all we can hope for is that somehow the obligations accepted by governments under international public law, can be translated and be compelling for legal and natural persons which are citizens of the states which have agreed on the treaty provisions. This requires some type of "enforceable enforcement". In other words, not only a dispute resolution and an enforcement body, capable to judge the validity and the extent of rights, as well as their possible infringement, but also a body which can effectively remedy the claims of a patent owner or of a third party against which a patent has been wielded abusively.

Until such issues are ironed out, I believe it is safe to say that the Outer Space Treaty simply does not effectively apply to intellectual property in outer space. In other words, IPR actually constitutes an exception to the provisions of the OST until this situation is resolved.