

APPLICATION OF INTELLECTUAL PROPERTY RIGHTS IN SPACE ACTIVITIES: A LEGAL ANALYSIS

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Abstract

The present paper focuses on offering a regulatory approach that would make it possible to apply intellectual property rights to outer space activities, in a realistic, enforceable, and workable manner. As outer space activities transition from monopoly to commercialization, it is necessary that the present regulatory framework should also evolve. The regulatory environment is evolving. A suitable intellectual property rights legal framework is necessary for this. Since the five outer space protection treaties do not specifically address the problem of intellectual property rights in outer space, there has been a significant reduction in the state and business sector participation in space activities. The approach suggested in the present paper might not have a strong theoretical basis, hence, it does not suggest to create a separate intellectual property rights regime expressly for outer space. In the present paper, the author, would first discuss and analyze the particular legal issues surrounding patent protection in outer space, and then, relying on Article VIII of the Outer Space Treaty, suggest an alternative IP framework (which would be better to meet the immediate and future demands of space development).

Keywords: Copyright; Intellectual Property; Patents; Space Commercialization; Space Exploration

Introduction

Because space operations call for advanced technology, there are large running costs and substantial continuous expenditures. As such, space activities were the exclusive purview of government organisations during the beginning of the space age, mostly for military and exploration purposes. Still, they became more commercialised and privatised as technology advanced. For instance, several decades ago the United States started privatising its space sector by enacting laws and regulations to support private enterprises. In many aspects of space activity, therefore, there is a clear tendency towards increased involvement by commercial companies (Bromberg, 1999). Some individuals might not be aware of how much of our everyday life now involves satellite broadcasting, telecommunication services, and remote

sensing data from space. States nowadays promote private enterprises to engage in space activities because the development of space activities requires large expenditure. The capacity of such private entity involvement to yield a return on their investment is a prerequisite. Therefore, in light of the growing amount of research being conducted by space-faring countries, Leepuengtham (2017) argues that it is pertinent and imperative to discuss the matter of intellectual property rights and their acquisition in relation to space operations. In return for their investment, one possible approach to serve and ensure the interests of private sector is to safeguard intellectual property rights in space activities. Any space investor should have legitimate worries, nevertheless, about the extent and application of the Outer Space Treaty of 1967's "freedom of exploration," "use," and "non-appropriation" of space. According to these ideas, information and benefits from space activities will be shared; but, space technology owners are probably going to be hesitant and unwilling to share such technology without first getting a fair return, such as securing their work against IPR infringement or licencing it to potential end users (Paxson III, 1993). Though intellectual property law and space law take distinct tacks, state practice as it stands now protects intellectual production arising from space operations. The legal system governing patentable ideas created on board the International Space Station is one of the most often mentioned and well-known instances in this regard; it required clarification in the Intergovernmental Agreement signed by the participating states.

As the convergence of four fundamental factors operating in our world—sovereignty, international law, scientific progress, and last but not least, intellectual property—space law was formed and is still developing. These categorical directions will continue to influence human attitude to space. Furthermore, whereas the protection of private intellectual property is the cornerstone of intellectual property law, the primary goals of outer space law are to ensure advantages for all people. This contradiction seems to create the conditions for inconsistent use of intellectual property laws to things and activities in space. But as most space-related activities and items originate on Earth, this impression is obviously *ex facie* illusionary (European Commission, 2020).

An invention and production of a lunar module, or "moon buggy," on Earth, for example, would undoubtedly fall under the jurisdiction of the intellectual property laws of the relevant State. The problem would come, though, if a State produced an object or machine in space during its extraterrestrial space operations that would not have a territorial connection because property rights cannot be acquired in space. In communications technology, this kind of situation is especially clear (Abeyrante 2011). Should State "X" download some data related

to an outer space project in which it is involved, for instance, and it is intercepted by another State and sent to its space station in space, or more seriously, should a space station of a nation other than State "X" directly access and use such material and data, exclusively in space, would State "X" have any recourse to pertinent intellectual property laws against such an infringement in outer space?

Especially when their work is employed in space, it is arguably unfair for parties who have put in time and money to exploit space activities to be unprotected and lose control of the benefits of their output. As such, a protective framework is required to ensure an investment in space. But how may the interests of commercial entities for intellectual property protection in outer space activities be appropriately balanced with the public advantages of space activities? This raises a number of issues, including: Is it against state responsibilities under the current space treaties for intellectual property law to be applied to space activities? Should the "non-appropriation" and "common heritage of mankind" concepts found in outer space treaties force right-holders to give up intellectual property protection in works or innovations made or created there? Even if it could be pleasing to a minority if incentives like financing, contracts, etc. are made available, such a move would unavoidably discourage researchers from making their work available for public use in the absence of protection against infringement. Moreover, what precisely are these "benefit" concepts of space law and how much do they relate to the protection of intellectual property in space activities? Space-generated intellectual property subject-matter is protected quasi-territorial under OST's Article VIII principle of state jurisdiction over space operations. This calls for the creation of an IP administration structure appropriate for the specific project or programme.

There are different kinds of intellectual property rights that can be used to space activities in terms of protection. Still, the space sector mostly relies on copyright and patents at the moment. Regarding their applications to outer space operations in terms of enforcement and subsistence, both kinds of intellectual property protection raise doubts and difficulties. As such, it is imperative to assess how well space activities are safeguarded by the current patent and copyright laws.

Moreover, the foundation of intellectual property law is territoriality, whereas space is not subject to any sovereignty. There are, however, some exclusions, notably the 1974 Registration Convention, which increases the signatories' accountability for their space-launched items. As of right now, there is no worldwide or international IP protection that allows

a right holder to obtain protection without regard to geography; instead, one must look for protection in each unique protecting nation. When national IP law is applied in space, where there is no law, concerns so arise. Legally speaking, there is also the issue of jurisdiction in space. According to Article I of the Outer Space Treaty, the outer space is *res communis*, or a region where no state may assert sovereignty. But a lot of governments have established specific tenets that allow them to reach space, and the Inter-Governmental Agreement ('IGA') offers one such foundation. Article 5(2) of the IGA establishes, among partner states, jurisdiction and control over the International Space Station to the state of registration of each space station component. Is it possible for a state to prosecute someone for an act done in space? Which legal justifications exist for claiming jurisdiction? Should jurisdiction over activities in outer space be established by application of territoriality, nationality, or any other principle? Furthermore, should an incident happen at the International Space Station (ISS), may the state of registration claim its jurisdiction based on the quasi-territorial jurisdiction principle? These queries raise problems that would require more research, including those of proper jurisdiction and applicable legislation as well as the recognition and execution of foreign judgements.

'Private vs. Public' Conflicts *vis-à-vis* IPR and Space Law

The Berne Convention (1883), Paris Convention (1886) and Agreement on Trade-Related Aspects of Intellectual Property ('TRIPS Agreement') are the most significant ones on intellectual property. The initial group of multilateral agreements addressing copyrights, patents, trademarks, and designs consisted of the first two conventions. An agency of the UN, the World Intellectual Property Organisation (WIPO) is in charge of the Paris and Berne Conventions as well as a few additional IP conventions and agreements. The World Trade Organisation (WTO) drafted and oversee TRIPS Agreement, the most recent and maybe most extensive international convention pertaining to intellectual property rights (Aplin & Davis 2009). According to Taubman et al. (2012), this agreement mandates that its members fulfil the substantive requirements of the most recent editions of the Paris and Berne Conventions, therefore establishing the minimal levels of protection for all members of the organisation. By essentially globalising IPR protection, TRIPS Agreement has so ushered in a new phase in the history of IPRs (Sell, 2003). The fundamental legal framework for IPR protection is jointly provided by these international treaties.

Apart from their importance, it is also noteworthy that most spacefaring nations are signatories to the binding international treaties i.e. the TRIPS Agreement and the Outer Space Treaty ('OST'), which have both gained broad support. The fundamental character of the public versus private conflict between the legal frameworks of outer space and IP, as per Smith (1996) can be shown in a rather comprehensive way by comparing the beneficiaries, directed protected interests, and conferred rights of the two legal regimes (Malagar et al. 1999).

The points of difference between Space law and Intellectual property law can be highlighted from the following table:

<i>Aspect of Difference</i>	<i>Under Space Law</i>	<i>Under IP Law</i>
Beneficiaries	States are the main beneficiaries of space law	Natural/legal persons are the beneficiaries of IP Law
Directly Protected Interests	Protection of 'province of mankind' under space treaties	Exploitation of private rights in IP treaties
Rights Conferred	Principle of freedom of exploration and use in Article I of the OST	Exclusive rights granted under TRIPS Agreement

Therefore, one of the most significant OST concepts is the exploration and utilisation of space for the benefit of humanity as stated in Article I. First off, according to OST, outer space benefits only states and intergovernmental organisations. In contrast, IP legislation mostly benefit natural or legal people. Second, OST emphasises in Art. I that space exploration and activities will benefit all countries, without respect to their economic status and without prejudice. This is what the phrase "province of mankind" means inherently. Furthermore, economic moral rights are granted to IPR owners who can use them in a variety of ways for financial benefits, therefore protecting private rights in contrast to outer space law. Assignments, licences, sublicenses, mortgages, obligatory licences, etc. are among the ways of exploitation. Thirdly, without requiring approval from other nations, OST further states that any state or commercial actor operating under state supervision, licencing, and consent is free to explore and use space for scientific study. The free use of space includes commercial/economic purpose, according to most academics. Contrarily, a number of exclusive and monopolistic rights are granted by IP law to stop other parties from violating the owner's IPRs without the owner's prior approval or valid reason.

Applying Intellectual Property Rights in Outer Space

The basic need for a state to be recognised as such is sovereignty, which is based in territory, population, power, and recognition. It is not unexpected that the earliest international space treaties concentrated especially on the problems of national aspirations and the growth of sovereign states. Especially, the drafters felt that the appropriation of space was a crucial issue that required unique provisions. For example, the Cold War was a time of worry that outer space would become a new front in the superpowers' military confrontation, when the Outer Space Treaty was signed (Krause 2017). The negotiation of the Outer Space Treaty took into account the commercial utilisation of space, which would come to pass decades later. There was some early dispute when that treaty was being drafted over the legality of private sector space operations. Future space exploitation by the private sector was something the United States wished to leave open. The Soviet Union was so against this concept that the draft they put forth said, "All activities of any kind pertaining to the exploration of outer space shall be carried out solely and exclusively by States..." The Soviets then agreed to a compromise approach put up by the United States, in which each government would be accountable for the acts of its citizens in space (Dempsey & Manoli 2017). The following was included into Article VI of the Outer Space Treaty:

States ... shall bear international responsibility for national activities in outer space ... whether such activities are carried on by government agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with ... [this] Treaty. The activities of non-governmental entities in outer space, ... shall require authorisation and continuing supervision by the appropriate State party to the Treaty. (Sgobba & Chiesa 2022).

As far as international space law is concerned, this demonstrates that state sovereignty in outer space is constrained since it has been rejected by the UN and is not further addressed in their treaties (Thornburg, 2019). Though it is assumed that Article II of the OST forbids the exploitation of exhaustible spatial resources, it has not been disputed that the exploitation of space resources could barely be forbidden under this provision. Generally speaking, those who support a reading of Article II of the OST such that would make the exploitation of natural resources in outer space illegal have not been able to support their claims with any solid legal foundation that could distinguish between the sovereign right to exploit natural resources in a certain area and the exercise of territorial sovereignty over that area. Still, since the start of the 17th century, this distinction has been rather clearly understood in international law, and in particular in the law of the sea (Blake & Freeland, 2017).

International law promotes a stable and well-organized legal system intended to ease tensions and promote collaboration, hence containing the drive of national goals. Conversely, the main programmatic and preventive function of Space Law is to establish the foundation of government interactions in space. International law and the applications of it in space consequently follow parallel paths. In fact, space law changes along with diplomacy and international law (Schrogl, 2016). Space law inherits its limitations and shortcomings as well when it embraces the pre-existing channels and legal structures of international law. It is clear, for example, that neither time nor the superpower confrontation was appropriate to create enforcement mechanisms for space law during the 1960s and 1970s when the core space law was being negotiated. A special court such as the subsequent International Tribunal for the Law of the Sea was unthinkable, and the Liability Convention's Article XIV Claims Commission was more of a theoretical than a useful instrument. States are likewise hesitant to bring space law matters to the International Court of Justice. One of these is the occasionally loose registration of space objects, however this has no effect on the fundamentals of space law. Insofar as they have been recognised and their return has been desired, neither astronauts nor items that have fallen on Earth have been left stranded. With the exception of one substantive restriction (Article IV, which states that state parties cannot place any kind of weapons in outer space and that space activities are for peaceful purposes only, thereby prohibiting the establishment of military bases and scientific research conducted by military personnel), the Outer Space Treaty as an arms control treaty recognised the permissibility of military uses of outer space. Aside from the far-off region of celestial bodies, the Outer Space Treaty is neither an arms race-prevention or disarmament accord, unlike the Moon accord. 'Peaceful use obligation' (introduced in the OST preamble but not defined further on) has guided the military uses of space for communication, positioning, remote sensing, electronic intelligence, etc. (Bajrami & Talmon, 2020). Space research and exploration are impossible without science (Wesseling, 1998). That knowledge has produced the world as we know it. This is especially valid with regard to space exploration and scientific endeavours associated to space. Scientific developments are crucial to international space law and part of the duties of state parties. The very high standards for funding, work, and expertise that characterise science indicate the necessity for a trustworthy legal framework that considers the particular requirements of scientific research and technical innovation. Generally supporting and ensuring a constantly expanding intellectual community and technical advancement is one of the main goals of intellectual property ('IP') rights. Space exploration depends on establishing and rewarding a conducive environment for research and development (Amadeo, 2019). Nothing this comment

looks at would be anything more than science fiction without it. Though different nations approach the fundamental theories of intellectual property in different ways, the utilitarian, incentive-based view is by far the most commonly acknowledged (Fisher, 2001). As such, it is thought that if intellectual products of social value were vulnerable to theft or excessive reproduction, their output would suffer (Landes & Posner, 1989). In the field of space, an ineffective IP system not only has financial and societal consequences but also jeopardises the accomplishment of space exploration and colonisation and delays their success. Between these four core elements, nevertheless, is an open question: how will the territorial character of IP respond to the advancement of space-based technology? The investigation is focused on territoriality, non-appropriation, and private actors: it is time to consider the idea that territoriality and non-appropriation of resources in outer space are in reality antiquated constructs as IP spreads into space (Davis, 2018). These ideas might not only be ineffective in controlling the next wave of space commercialization, but they might actually slow it down. Researchers and practitioners have already pointed up problems with the practicality of a territorial IP in an environment without an undisputed authority. Among these problems are the infringement of patents in space (Taghdiri, 2013) and the patenting of orbits to claim physical areas of space. For example, the Registration Convention states that the country a space object is registered under has jurisdiction over everything that occurs inside the item. Jurisdiction over space objects therefore flows from the launching state. Therefore, the United States obviously has jurisdiction over any legal issues between Company “A” and Company “B” if both rockets are launched from the same nation, like the United States. The launching state would not always default to the nation of origin, though, if the possible infringer wanted to get around the patent and launch from a different country. The two countries would have to agree on which would be the launching state and, consequently, which would have jurisdiction over the legal dispute under Article II Section 2 of the Registration Convention. Proper development of a commercial dimension in space can be hampered and inefficient by the assertion and enforcement of IP rights through a legal system whose structure seems impervious to change. As was covered in the thesis introduction, problems result from the fundamental incompatibility of intellectual property and space law. Indeed, intellectual property law is strictly territorial, not totally uniform, and based on exclusive rights, whereas international space law is non-territorial, uniform, and based on shared knowledge (Gabrynowicz, 2006).

A productive and healthy scientific environment in space depends critically on an extraterrestrial legal infrastructure for IP development and enforcement (Weisfeiler 2019).

According to this concept, the legal system must critically evaluate the difficulties brought about by the comparison of intellectual property rights with space-related U.N. treaties. This work is still needed as much as it was yesterday. Commercial space actors have emerged and the original, all-public paradigm has been gradually declining since Arianespace became the first commercial space transportation enterprise in the world in 1980 (Grush 2019). This basic shift has changed the financing sources, the nature of the cooperation between space agencies and commercial organisations, and the possibilities for space technology. The 1967 Outer Space convention is the first fully fledged international convention on space. Subsequently, the 1968 Rescue Agreement, the 1972 Liability Convention, and the 1975 Registration Convention all further build on the Outer Space Treaty's provisions. Lastly, despite its limited number of parties—just eighteen—the 1979 Moon Treaty is seen as a failure as no nation participating in manned space missions has ratified it because of its strict requirements and ambiguous language. Notably, the Treaties formalise the dual function of states governments or their agencies as space actors and supervisory authorities; they do not address private entities or directly control their operations (Szoka & Dunstan, 2012). The "common heritage of mankind" concept of the Moon Treaty ensures that space and its riches remain shared heritage. But the idea mandates that the exploiter split any profit with all governments even if it guarantees equal freedom of access. The laws pertaining to intellectual property are affected by this concept. As the states have interpreted the Common Heritage concept differently. Developing countries often maintain that as common lands belong to "all nations," any profit from the exploitation of such common resource should be distributed equally across states, irrespective of their individual contributions to the specific exploitation (Baslar, 1998). With this view, countries would profit from exploitation operations without having to spend money or brains. Conversely, industrialised nations take references to fair sharing to mean that all governments have the same freedom to freely utilise natural resources, so that no state has a right to the technology or to invest in the discovery of others (Buxton, 2004). Although some academics therefore consider "province of all mankind" and "common heritage of mankind" to be synonyms and interchangeable phrases (Zhao, 2009), the author disagrees. Should the two terms be equal, the Moon Agreement would have chosen a single term consistently rather than two distinct ones in the various clauses. These two ideas taken together might be understood as follows: While the Moon Agreement acknowledges that the Moon and its resources are a shared inheritance of humanity, the provinces of all mankind principle must guide the management of the Moon's exploration and utilisation. In other words, it implies that the "province of all mankind" notion is an extension of the "common heritage of mankind,"

which further calls for a fair benefit sharing and the creation of a legislative framework to control Moon exploitation. Therefore, an intellectual product coming from space exploration may be safeguarded and the benefits of their investment may only be enjoyed by the contributing nations. Application of the province and common heritage concepts also conforms to the exclusive private rights resulting from intellectual property protection regimes. Nevertheless, it appears that the UN conventions do not deal with emerging issues like flags of convenience or orbital appropriation. Their particular language and the fact that they are instruments of international law are the causes of this incapacity. Future commercial growth and intellectual property into space cannot depend on a legal system that is unable to adjust to and overcome new obstacles because of its omissions, outmoded practices, and nearly unchangeable character. Applying such a structure without a critical filter runs the danger of impeding development, making it more difficult for nations to establish or enforce dispute resolution, and encouraging dishonest commercial practices. Though many see rewriting the UN Treaties as the best course of action, the answer rarely fully solves all the issues. As the severe requirements of the Treaties demonstrate, putting intellectual property and commercial expansion in space under antiquated international regulations may actually hinder their progress.

Patent Protection in Outer Space

Because they are territorial in character, patents must be filed in every nation where protection is sought. Activities carried out outside the US, for example, are not covered by a US patent. The geographical character of patent law is presented with special difficulties by human efforts in space, such as the International Space Station where scientists are doing research and discovering discoveries. These problems offer companies looking to engage in space complicated and unsettling situations (Winston, 2015). Greater study into the creation of new space-related markets has resulted in industrial manufacturing in outer space with the entrance of private companies into markets like remote sensing and space launch services (Reynolds & Merges, 1989). The US Congress enacted the Patents in Space Act, giving companies more assurance that US patent laws are applicable in space, in order to encourage commercial space activities. i. First, if the space object is unregistered but under the jurisdiction and control of the United States; ii. Second, if the space object is registered to the United States, an activity connected to the space object is subject to United States patent law; and iii. Third, the statute provides that an activity connected to the space object occurs within the United States if the object is registered to a foreign country, but there is an agreement between the

foreign country and the United States that the object is made, used, or sold within the United States.

The Patents in Space Act sought to clear up any jurisdictional confusion regarding the applicable patent law system for US-owned space objects. The intention was that by raising the level of certainty surrounding intellectual property rights, private sector space investment would gain appeal. But problems essential to a functioning system of patent law are not adequately addressed by the condition of outer space patent law today. Part of the reason for this is the disorganised set of state regulations controlling international space activities. A weakness this patchwork produces is the absence of strong patent protection in space. Moreover, extraterritorial jurisdiction applied to the outer space setting by national-level patent law results in jurisdictional ambiguity and even competing jurisdictions. In international outer space projects, weak patent protection and uncertainty about which jurisdiction applies restrict private investment.

Outer Space *vis-à-vis* Patent Law: Issues and Challenges

The following problems and obstacles are pointed out by the author under the current patent law system with reference to space exploration:

1. Insufficient Patent Protection in Space:

Patent laws are meant to give a company more assurance to spend money on cutting-edge, novel technologies without worrying that a rival may take advantage of it by copying and selling the just created technology (Morris, 2012). But the special features of human activity in space pose fresh difficulties for conventional patent laws created for human activity on Earth. By definition, outer space crosses national borders and usually entails international projects. As such, compared to Earth, patent infringement is more easily avoided in space.

Furthermore, there is no international court to resolve conflicts and carry out legally enforceable rulings on infringement cases (Meller, 2001). If an international ADR process is not feasible, parties to such issues have to file lawsuits in each national court system of the nations where the infringement occurred (McEniery, 2016). Costly, labour-intensive, and intricate is this procedure. A company looking to invest in space operations would probably find this procedure to be inconvenient and less inclined to follow its space-related interests.

2. Conflicting and ambiguous Jurisdictional Problems:

Laws to extend patent protection into space have been resisted by several nations since they may cause conflicts with other national and international legal systems (Burk, 1993). To broaden United States' jurisdiction, for example, case law like *Decca Ltd. v. United States* decision and legislation laws like the Patents in Space Act employ extraterritorial jurisdiction concepts. These rules provide situations of competing claims of jurisdiction between different countries, even if they in some ways give companies interested in space projects more assurance. Technology based on space that cut over national boundaries make it possible for competing jurisdictions to develop.

The transcendental and more multinational character of outer space is therefore not supported by the patent law system in place now. As things are, the legislation governing patents in space does not offer a degree of protection strong enough to encourage investment in space projects. Furthermore, undermining the confidence and clarity with which a nation's patent law applies are jurisdictional ambiguities. It will take both short- and long-term solutions to get past these drawbacks that discourage private space investment.

Conclusion

The commercial sector is starting to seize more and more of the numerous prospects presented by space. One key and encouraging result of this is that big technological developments that will propel civilization towards a better future are probably going to result from the enormous resources and ongoing creativity of the commercial sector in space. But the way outer space patent law is now written, it makes things difficult and discourages private sector involvement in space (Pannell 2016). Short term, the world community should enact legislation restricting the ease with which patent infringement in space can be avoided in order to immediately increase the trust of the private sector to fund space exploration projects. Still, the greatest way to increase the confidence of the private sector to fund space projects is to have a single system of outer space patent law that cuts over national jurisdictional lines. Though society's outer space patent law system should make sense to you, American physicist Neil deGrasse Tyson once said, "The universe is under no obligation to make sense to you" (Tyson 2017).

Thus, commercial investment in space will be encouraged by an efficient system of patent law. In light of this, the author suggests that a desirable outer space patent law system will provide innovators strong patent protection and jurisdictional certainty in the setting of intricate international projects, hence boosting confidence in commercial enterprises.

The author makes the subsequent recommendations for integrating patent law protection in the context of space:

1. Make Evading Patent Infringement in Outer Space More Difficult

Short-term actions by the international community can give companies looking to engage in space projects more assurance that their patent rights won't be violated. These would be rather simple to put into practice, such laws that increase the difficulty for companies to avoid patent infringement by abusing the flags of convenience principle. Put into practice, these steps will give commercial firms more patent protection.

2. Implement a Unified System of Outer Space Patent Law

An efficient outer space patent law system would allow inventors a straightforward and affordable route to strong patent rights over all of space, independent of any jurisdiction they may be under at any one moment. This aim requires a unified system of patent law for space (Lyall & Laresen 2009). It would be an enormous task to put in place a consistent system of space patent law, nevertheless. The main issue with this option is that nations have always opposed giving up their sovereignty to multinational organisations. Examining the European Patent Convention, which permits inventors to file a single patent that gives them patent rights in nearly every member state of the convention, provides assistance on how to put such a system into place. Still, the following problems need to be resolved before a uniform system of outer space patent law is put into place:

- (i) Defining a uniform set of rules to govern the unified system of outer space patent law; and
- (ii) Creating an international court with jurisdiction over the unified system of outer space patent law.

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