

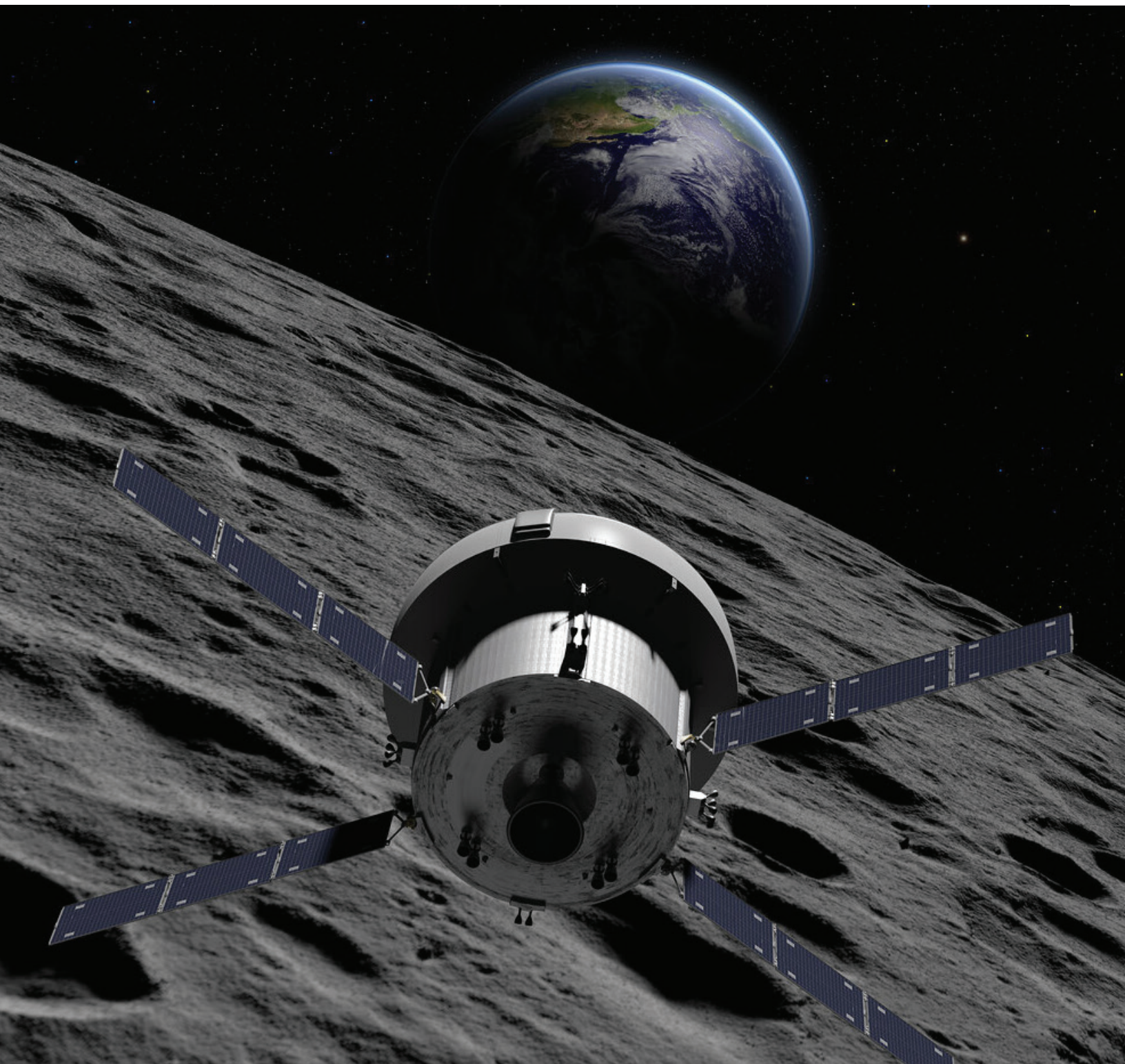


THE SPACE REPORT

THE AUTHORITATIVE GUIDE
TO GLOBAL SPACE ACTIVITY

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LEO BROADBAND | Cislunar Space | Intellectual Property Rights in Space



By Jack Stuart

The Role Of Intellectual Property In Space Innovation

Introduction

As the exponential growth of commercial space looms, this is a good time to survey several critical aspects of intellectual property (IP) as an enabler of innovation in commercial space. This article begins with a review of the vital role of IP in promoting innovation and an overview of the field of intellectual property law. The discussion then turns to the inherent tension between traditional IP law and space law and the impact commercial space innovation has had on that tension.

This analysis examines a few practical strategies for how to avoid becoming a “tech philanthropist” in commercial space, and finally, it speculates on how the legal regime for IP rights in space must change to better incentivize investment in commercial space innovation.

Early and Often

Everyone knows the name Mark Zuckerberg. But apart from those who viewed the 2010 movie *The Social Network*, very few know the names Cameron and Tyler Winklevoss. Why? Because the Winklevoss twins failed to proactively protect their intellectual property (IP). When they engaged Zuckerberg’s services, they likely thought they would simply be using a “coder” to code the Harvard Connection, their proposed social app. But that coder retained and protected his IP rights in what would ultimately become Facebook.

The lesson: Protect IP early and often. By the time an IP asset is widely recognized as being valuable, the window to act has likely long since passed. The common phrase describing this error is, “Hindsight is 20/20.” But entrepreneurs simply can’t afford for this consolation catchphrase to be their motto: Protecting IP from the start is critical. This reality is especially true in the arena of outer space, whose billions-a-pop ventures are bet-the-company big for many companies. As monumental as these ventures are, budgets are not these companies’ biggest problem.

Indeed, whatever visions of tomorrow entrepreneurs may have for so-called commercial space — that is, commercial endeavors in or through outer space — none of these visions will see the light of day without solid intellectual property rights. Such rights are the lifeblood of research, development and innovation; they incentivize risks of time and capital in the hope of strong returns on investments. And while “tech philanthropy” may sound laudable at first blush, in the dog-eat-dog reality of the exceedingly expensive world of commercial space, the phrase more accurately — and sarcastically — refers to a company that has failed to secure its intellectual property rights and has thus “donated” its competitive advantage to the market.

The Fuel Of Interest: Intellectual Property

The Importance of Intellectual Property Rights

Space is poised to be an entrepreneurial frontier, analogously positioned for an explosion in IP creation in the same manner as aviation. Innovations in aviation took off — literally and figuratively — at the dawn of the 20th century. But an explosion of IP in space will not happen spontaneously; such exponential growth requires opportunity and incentive for invention.

Commenting on the preconditions for technical innovation, President Abraham Lincoln cited the introduction of patent laws as one of the three greatest innovations in world history — along with reading and writing, and the discovery of America. These three innovations facilitated “all other inventions and discoveries”.¹ As the only U.S. president to be issued a patent, Lincoln had more than a passing interest in intellectual property; his invention, “Buoying Vessels Over Shoals”, received a patent in 1849,² so his views on the subject were clearly credible and informed. Referring specifically to patent laws, Lincoln remarked:



Next came the Patent laws. These began in England in 1624 and in this country with the adoption of our constitution. Before then any man might instantly use what another had invented; so that the inventor had no special advantage from his own invention. The patent system changed this; secured to the inventor, for a limited time, the exclusive use of his invention; and thereby added the *fuel of interest* to the *fire of genius*, in the discovery and production of new and useful things.³ (emphasis added).

This fuel requirement is even more pronounced in the realm of space, where innovation costs are measured not incrementally, but in orders of magnitude. As Lincoln noted, the most effective way man has yet devised to provide that fuel is through the advent of patent laws — or, more generally, intellectual property law, which has continued to develop since Lincoln’s day. Robust IP law has enabled this “fuel of interest” to span well beyond patents to support other IP fields, discussed below, in which the “fire of genius” further thrives. This raises the question, then: What *is* intellectual property?

As used in this discussion, intellectual property means any legally protectable property created from and resident in the human brain. That is, intellectual property is an abstraction of the human mind, an artificial legal construct created within only the past few hundred years. It’s called “intellectual” because it’s intangible: it can’t be touched or sensed, but it exists nonetheless. The “property” predicate alludes to the fact that while IP is intangible, it *can* be identified, secured and maintained — just as can be done for any other form of property. IP is broadly comprised of the subcategories of trademarks, trade secrets, licensing agreements, patents, and copyrights. (For background on key legal concepts, see sidebars next three pages.)

While the basic tenets of IP law are widely understood by all nations with operative IP statutes and rules, their applications vary by country. Notably, several international agreements have been ratified to harmonize certain aspects of IP law globally — such as the *Patent Cooperation Treaty* (for patents)⁴ and the *Madrid Protocol* (for trademarks).⁵ At its core, though, IP law is nation-specific: it is not, fundamentally, international. Rather, it is a mottled patchwork woven from the legal conventions of various countries. Some of these conventions have impacted the way other countries treat IP law. A good example of this is the “first-inventor-to-file” patent date priority system, which the rest of the world had adopted well before 2011 — the year the U.S. finally aligned its laws with the global standard through the passage of the *American Invents Act*.⁶ Even so, IP law is essentially territorial — not international. In contrast, space law developed from day one as a creature of international law — and has fundamentally different philosophical foundations.

The Fuel Of Interest: Intellectual Property

The precursors of modern IP law existed at least as far back as the Venetian Act of 1474.⁷ In contrast, space law developed only starting in the mid-20th century, during the Cold War, when the primary concern of space-related treaties and conventions was avoiding global nuclear war. Given that threat, establishing space-related IP rules was not even a distant-second priority. While the topology of space-related activities has changed dramatically since these space treaties were ratified, space law has not evolved to match it.

Subcategories of IP Rights

Trademarks

A trademark or service mark identifies a company with its product or service, respectively, and serves to protect a company’s brand. The trademark can be a logo (e.g. the Starbucks mermaid, Nike’s swoosh) or a word or phrase (e.g. Google, Hard Rock Cafe). A trademark can be a company’s most valuable asset, associating its brand with its reputation in the marketplace. Unlike other forms of IP, trademarks can be either an asset or a liability, depending on the company’s reputation — because in the mind of the public, the brand is a proxy for the company. Think of the perception associated with a popular brand known for its high quality. This perception acts as a market multiplier for the company owning that brand: namely, the expectation of continued high quality. The converse is also true. Enron and Edsel are two examples of brands whose negative public perceptions contributed to lowered company market values. In short, the value of a trademark is directly proportional to its fame or infamy, and as such, trademarks are a very public form of IP. In contrast, trade secrets are a very private form of IP.



Space Law Precepts

To understand the inherent conflict that has continued to develop between IP law and space law, it's important to understand the fundamentals of both bodies of jurisprudence. Understanding the foundational, philosophical differences between IP law and space law — as well as the history behind those differences — is necessary to gain an appreciation for the resulting disconnects and their potential solutions. For the purposes of this article, space law means the Outer Space Treaty and its progeny treaties, which were all drafted during the 1960s and 1970s, and the corpus of international law that has developed in the wake of these agreements.⁸ These form the heart of the international body of law referred to as space law, both colloquially and within this article.

Amid the Cold War, the U.S. and the former U.S.S.R. — the prime movers behind the Outer Space Treaty (OST)⁹ — were concerned about the very real potential of a nuclear-weaponized space. OST addressed this very pressing issue and the use of space, generally. The foundational tenet underlying this cornerstone treaty — and thus all of space law — is that the exploration and use of outer space is for the benefit of all mankind.¹⁰ This means that no one (either a state or an organization) can claim space — either celestial bodies in space or space itself — as their property. Among the other major principles of these space treaties is the prohibition of nuclear weapons (or other weapons of mass destruction) in orbit or otherwise stationed in space, as well as the precept that the Moon and other celestial bodies shall be used for peaceful purposes only. Finally, nations are responsible for their space activities — whether carried out by governmental or non-governmental entities — and are also thus responsible for any damage caused by their space objects. The “responsible” nation is the one from which the object was launched or from which the launch was procured.

The preceding list of space law principles is by no means all-inclusive, nor is this brief treatment of the field meant to address the totality of space law. Rather, it is meant to survey the philosophical topology of space law sufficient for the discussion that follows. This model — that the national laws of the registering state apply to the celestial object — works great when only one object and one nation are involved. Problems arise, however, with multiple nations and multiple objects.

The Discord Between IP Law and Space Law

In contrast to space law, IP laws were developed over the course of centuries, through the lens of the *individual's* property rights — to the exclusion of all others — and under the laws of individual nations, not as agreements among many nations. Hence, an inherent tension exists between these two legal regimes. Further, under space law, the law applicable to a space object is the national law of the country under which the object is registered. This of course includes IP laws — particularly laws governing inventions (i.e. patent laws).

But how are such IP laws applied in multinational ventures? Who owns what? Which nation's law applies, if any? And how — if at all — are these laws enforced? These questions first surfaced in the early days of the International Space Station (ISS). The ISS is a multinational, multi-registered space object comprising multiple patent law regimes. Negotiations regarding inventions used, made or sold on the station yielded little more than nation-based IP balkanization of the ISS.¹¹ Specifically, the patent rules governing a particular invention depend on the section of the ISS in which the invention is made. For instance, the patent laws of Russia apply while in the Russian module, while the patent laws of the U.S., the European Union, or Japan apply in their respective modules. But this is just the beginning of complications. What happens, for instance,

Trade Secrets

A trade secret is a confidential, proprietary IP asset. As the name implies, a trade secret must be maintained as a secret by — and provide an economic benefit to — its owner. Think of a trade secret as the “secret sauce” a company would not want to share with its competitors. Examples of trade-secret-eligible information include proprietary manufacturing methods, corporate profit margins, client lists, training methods, business development methods, and a host of other proprietary information. Like trademarks, trade secrets can be very valuable: Coca-Cola's secret formula, Kentucky Fried Chicken's spice recipe and WD-40's formula are examples of closely guarded trade secrets. Intellectual property that can be reverse-engineered or otherwise easily discovered should not be protected as a trade secret: once disclosed, it's no longer secret — anyone can use it. Thus, trade secrets exist at one end of the “disclosure spectrum”; at the opposite end are patents, which require full disclosure of an invention.



when a multinational consortium launches from a sea-based platform into space? Whose laws govern, then? How is patent protection obtained in such a case — let alone enforced?

And what about so-called process patents? For instance, what happens when one or two steps in a process must occur in the microgravity manufacturing environment of space? Is the patent still valid under a patenting nation's laws if the facilitating space object isn't registered by that nation? Prevailing international patent scholar wisdom is no help, spanning a gamut of what-if opinions. But these and other gray areas will become a lot more black-and-white as first-movers establish new topographies at the intersection of space law and IP rights. Ultimately, the question isn't simply, "Who owns the IP?," but rather: who has an IP *right*, where is that right valid and how can it be enforced?

The issue is further compounded, of course, by the fact that space law itself is still far from being settled. For example, while space law addresses celestial bodies, it is silent about mining activities and other property-related rights. Is extracting a resource from a celestial body and then exploiting it for commercial gain the same as a claim of ownership to that celestial body? The unsatisfying answer is that we don't yet know. The signatories to the OST hold a wide spectrum of opinions on this topic, so the resulting international law is very unclear. The U.S., which lies at one end of this spectrum, passed the SPACE (*Spurring Private Aerospace Competitiveness and Entrepreneurship*) Act of 2015,¹² clearing the way for space-mining and other exploitation of celestial bodies short of ownership claims over those bodies. In contrast, Russia considers *all* space-mining activities to violate the principles of OST — explicit claims of ownership or not. The point: Space law isn't settled even within its own right, let alone settled well enough to address all other fields of law, especially very complex fields — like IP law.

Nevertheless, certain attempts have been made to address problems with space-related IP law — albeit with limited effectiveness. For example, the U.S. enacted *The Patents in Space Act of 1990* to address issues related to inventions made in or through space on U.S.-registered space objects. This statute effectively establishes that a space object under the jurisdiction of the U.S. has the same status as that of any other U.S. sovereign territory, as far as patents are concerned. Namely, U.S. patent law applies to inventions made, used or sold on such space objects. But this law does not apply to space objects under an international agreement to which the U.S. is a party. In such a case, U.S. IP law defers to space law under the international legal principle that no nation's laws should preempt those of another sovereign nation — a gap primed to be exploited under the present rules of space.

The Impact of Commercial Space Ventures

Before the proliferation of commercial space activities, nations had to worry solely about government-sponsored space endeavors. A major space vendor — Boeing, for instance — might be involved in a certain nation's space activities, but it was the nation, not the vendor, that was the primary actor in the enterprise. In the U.S., for instance, with the government backing virtually all space innovations, IP was not a major concern: The U.S. government owned it, or at least owned sufficient IP rights to grant the rights needed to whomever it chose. No "fight" over IP existed because, practically speaking, there was no IP to fight over. Claims of exclusive IP ownership were thus immediately frustrated by federal government awards to the "next" vendor — along with the IP rights necessary to perform the task.

That all changed with the rise of space entrepreneurship. The world's first commercial launch, by Arianespace in 1980, ignited the explosion of commercial space. That explosion has since greatly exacerbated the tension between IP law and space law. While governments are still responsible under space law for these commercial launches and activities, they no longer hold sway over all aspects of nongovernmental ventures. And "forum-shopping" among governments is now possible, which enables commercial agreements to be drafted to intentionally avoid clear jurisdictional lines. Why would such agreements be desirable? To *avoid* liability for patent infringement, as one possibility.

Licenses

A "license" is a contractual agreement that enables the commercial sharing or transfer of specific rights. Thus, an IP license is a legal grant of particular IP rights by the owner to another entity. Licenses can be exclusive or nonexclusive; they can vary according to geographic region or sector of commerce; they can impose restrictions or be unrestricted; and they can be adapted to address a host of other factors. That is, the grant of IP rights conveyed through a license agreement is restricted only by the imaginations of the contracting parties..



This is the specter of so-called “flags of convenience”. The term refers to the practice of evading the nettlesome regulations of one nation by registering through — and thus falling under — those of another nation, one with more favorable rules. This problem has plagued the maritime industry — albeit in a completely different manner — for the better part of a century. But flags-of-convenience problems in space would be substantially more complex. There, would-be IP infringers could effectively evade the jurisdictions of nations whose IP owners would be harmed by such evasions. For example, it would be legal to register a spacecraft in Country A and to make, use or sell an invention on that spacecraft that is protected by the patent laws of Country B. Those activities would not infringe the patent, assuming the two nations had no agreement covering IP on the spacecraft.¹⁴ Adopting a flag of convenience in a commercial space context is especially tempting for those wishing to escape infringement liability in countries that have granted millions of patents, such as the U.S.¹⁵ And with ocean-based space launch capabilities having been amply demonstrated,¹⁶ options to register in still “spacefaring” countries will no doubt multiply.

The commercial space industry is relatively nascent and barriers to entry are very high, so “IP loopholes in space law” (such as flags-of-convenience, jurisdictional evasions) may not appear to be an imminent problem. But the volume of commercial space activities is increasing exponentially, so the dilemma is likely closer than many think.¹⁷ Additionally, if the costs to access space continue to drop inversely-proportionally, then the barriers to commercial space are poised to fall dramatically. These events will, in turn, enable myriad smaller entities to participate — and to register in virtually any nation they wish. In such an environment, flags-of-convenience and similar IP loopholes will pose substantial obstacles to protecting IP in space — particularly for inventions made or used in space.

Practical Guidance for Today and a View Toward the Future of IP in Space

Undermining intellectual property rights also undermines incentives for the commercial development of space. The rationale is simple: the innovations needed for such development require large capital investments, and prospective investors must be certain that their investments will be rewarded. This certainty is at least in part realized through IP protection. But with loopholes that take advantage of the current dissonance between IP law and space law, what can be done? For the short term, commercial venturers must understand where the disconnects lie and gain a working knowledge of the legal tools currently available for bridging those disconnects. For the longer term, space law must be adapted to address the realities of and incentives for IP ownership. The following sections provide practical advice to inventors who wish to engage in commercial space markets, as well as several thoughts on how space law might be adapted to accommodate IP law.

Current Best Practices for Securing IP Rights in Space

Clearly, IP law in space is very much unsettled; nevertheless, certain fundamentals — let’s call these the “old rules” — still apply. Among these old rules are these basic requirements: developing and maintaining an effective IP strategy; understanding IP protection in the context of existing, non-space-related transnational frameworks; wielding international cooperative instruments effectively; controlling disclosures; understanding first-to-file implications on transnational filings; and marking IP with notice-markings. These requirements are all examined in the following sections.

Patents

A patent can be thought of as the legal right to exclude others from making, using, selling, offering to sell, or importing a particular invention. Like most other patent systems in the world, the U.S. patent system developed under so-called “social contract” theory. The basic idea of patents is that “We the People” give “you” (the inventor) this “right to exclude” for a defined period — usually twenty years from the date of application. In exchange, the inventor must disclose everything they know about how to make and use the invention. This right to exclude is held by the patent owner, with the exact parameters of the exclusion prescribed by the patent’s claims. Analogous to a physical fence around a house and its yard, claims are the legal “fence” around an invention, putting others on notice as to what the inventor regards as their property. A trespass beyond that fence would be an infringement of one or more of the patent’s claims, for which the owner can seek redress in a federal court. A patent protects only the function of a thing — i.e. how it works. Another way to think of a patent is that it protects an idea that can be turned into either a method of doing something or a practical, working example: a “widget” (i.e. a machine or something manufactured). However, patents do not protect expressive works; for that kind of protection, a copyright is needed.



Start with a Plan

Mistakes in IP protection can be bet-the-company costly — especially in space — so protecting IP from day one is critical. The general saying “forewarned is forearmed” is very true. Another apt saying is more IP-specific — and certainly more foreboding: “Innovation without protection is charity”... and space charity is very likely to put its donor out of business. Early IP protection means having a plan before disclosing anything, to anyone. As a minimum, a company should take the following three steps: 1) Engage the company’s general counsel early on to harmonize IP-related goals within the company’s technical and business development branches; 2) Consult IP counsel, whether in-house or external, as early as possible for technical legal expertise in the applicable IP field; 3) Prioritize regular monitoring and updating of the company’s IP goals.

Protect IP from the Beginning

Worldwide, small companies originate and sustain most innovation. These small companies typically have very tight budgets and very limited resources — and small companies in space commerce are no exception. Although the “big players” bankroll the prohibitively expensive elements of commercial space activities, they rely on smaller innovators for critically needed technologies. The dilemma each of these smaller innovators faces is the problem of “keeping the lights on” while also protecting the company’s IP. Unfortunately, many companies do not recognize that these two drivers are tightly interwoven — especially in fields like space, where the IP is so cutting-edge that its relinquishment means almost certain death to its startup innovator. The problem thus boils down to how to “keep the lights on” without “giving away the store”.

So what’s the solution? Well, a good start is realizing that IP protection begins with knowing what to protect. That means being able to define “IP” in a sense that is practically useful. One effective way to identify valuable IP is to ask this question: “As a company, what do we — and only we — have that our customers and/or competitors want?” Whatever the answer, the company’s IP is likely central to it. For example, the company’s good name and brand; its secret method for fixing a problem or providing a service; its innovative process, machine or application; its cost margins and client lists; its training manuals; its general body of know-how; etc. — all of these are forms of IP that the company can and should protect. The only requirements for this audit are a pen, paper, and time — but that will be time well-spent: its results will establish the company’s IP inventory. Once brainstormed, the company’s general IP portfolio can be sorted according to IP categories — trademarks, patents, copyrights, trade secrets, and licenses (either owned or granted). This will provide a better picture of the specific type of IP protection needed for each item or group in the IP portfolio.

Recall that “IP protection”, generally, is analogous to a fence around a house and its surrounding real estate. Some houses are inexpensive or remotely located and don’t even need a fence. Others are very expensive and in densely-populated areas, requiring not only very good fences but also security and other protective measures. In a similar vein, levels of IP protection vary. For example, when an innovation is immature and its eventual worth is not yet known, filing a provisional patent application is an inexpensive

Copyrights

A copyright protects “original works of authorship fixed in any tangible medium of expression”.²³ That last phrase simply means the work can be written on paper, electronically stored, or otherwise stored in a manner readily and reliably reproducible. Copyrights protect “expressive works”, such as paintings, writings, songs, movies, architectural designs and other authored works. Another example of copyrightable IP is the expressive part of computer software – that is, the way the coder writes, or codes, the software. In contrast, the functionality of the software, or the what-it-does piece, can only be protected by a patent (or possibly a trade secret, assuming the functionality can’t be reverse-engineered). A useful way to understand a copyright is to distinguish it from a patent, using a brief illustration. Imagine that two people both express the same idea for a new rocket engine in two separate drawings. Each would then have a copyright to their respective drawing. However, only one could get a patent on the way to make and use the actual, functioning rocket engine. Under the global, “first-inventor-to-file” standard, the first inventor to reach the patent office of a given country is the first – and thus, only – inventor to be entitled to a patent on that invention, in that country. Further, a patent is issued only for an invention not already known (or not viewed as a common-sense variant) within its field of art. This field of “prior art” (from which derives the widely-used phrase, “state of the art”) is comprised of related inventions existing worldwide at the time a patent application is filed with a given country’s patent office. The rights conferred by a patent — or any of the other types of IP — are held by the owner. But what if the owner wishes to convey certain of those rights? They can do so with a license.



means to temporarily protect the invention. A nonprovisional, or “normal”, patent application will cost considerably more, but will also provide much longer and more robust protection. For even broader protection, an application can be filed under the *Patent Cooperation Treaty* (PCT), which is essentially a multinational application — more on this, later.

In all cases, however, the protection must begin at the beginning, using basic IP precautions. Let’s use, as an example, an invention having no IP protection. Depending upon the circumstances, disclosing the details of this invention could result in effectively giving away or losing the ability to obtain a patent on the technology. Likewise is the case with copyrights, where failure to provide copyright notice markings could result in the partial or total loss of copyright protection. Knowing the bare-bones of IP protection will not fully guard a company’s IP, but some protection is better than none.

Among these basic protection measures are notices, nondisclosure agreements and preliminary filings. Notices — in the form of copyright and trademark notice markings — put others on notice of the owner’s intent to claim these IP rights. Nondisclosure agreements provide some protection against public disclosures that would otherwise reduce or eliminate patent or trade secret rights. And preliminary filings — that is, provisional or PCT patent applications — provide foundational protection for inventions. All of these measures are inexpensive, but none of them is perfect. For example, while a copyright notice may be very helpful in the U.S. — especially if made in conjunction with federal registration of the copyright — it may be completely useless in a country whose copyright laws are weak or nonexistent. This reasoning also applies to all other forms of IP, which is why innovators should adopt an international perspective toward IP protection, rather than country-specific outlooks.

Protect IP Using an International Mindset

While the idea of protecting IP in space is relatively new, the concept of protecting IP internationally is not. This protection hinges on three factors: the target market, the markets of competitors, and the context of IP rights enforcement. An evaluation of the first two factors will render a list of nations; the last factor frames the laws to be applied and the process by which to apply them. The IP laws of each country on the list must be evaluated to determine where, if at all, IP enforcement is likely to be successful. The resultant, narrowed list must be further tailored to yield the best venue for the IP protection desired. For example, China has strong trademark laws, but relatively weak patent laws — though they have gained much strength in recent years. Companies must also assess which activities are likely to constitute IP infringement. These tell-tale activities will depend on the IP type. For example, for inventions (IP type: patents), the easily identified activities are making, selling and importing; for expressive works (IP type: copyrights), the primary triggers are production, distribution and use. Knowing the most likely IP infringement paths will facilitate the best enforcement responses. Optimizing IP protection for each asset requires holistically evaluating each of the above factors to determine the best strategy for successful enforcement, should the need arise.

Beyond multinational IP strategies, as discussed earlier, IP is only partially protectable under various international legal schemas; in short, there is no international patent, global copyright, universal trademark, etc. Even so, certain limited protections are available through multinational applications, such as PCT filings (patents), filings under the *Madrid Protocol* (trademarks), or filings under the *Berne Convention* (copyrights).¹⁸ Each of these international IP protection frameworks has significant limitations, the scope of which is beyond this brief treatment, but to the extent that protection is provided by one or more of these frameworks, that framework should be engaged.

An interesting dynamic also exists in patents, particularly, because of a concept known as absolute novelty. Under this standard, a patent will be issued only for inventions for which no disclosure has been made prior to the filing of an application. Most nations have adopted this standard. The U.S. is unique in its extension of a so-called grace period to its patents: A one-year period is permitted between a public disclosure of an invention and the filing of its patent (or provisional patent) application. Thus, for international filings, a crucial precaution imposed by the absolute novelty doctrine is to keep a tight lid on any disclosures prior to filing — whether at a symposium, on a social media site, or on the company’s website. This precaution further implies that companies must implement policies to educate personnel on the “why” behind such measures. Another result of absolute novelty, however, is that — if patent protection is not desired — innovators can engage in defensively publishing (i.e. publicly disclosing enough details of the invention so that others can make and use



it). This practice can provide low-cost protection against patent infringement suits that, in the absence of patent protection or defensive publication, might otherwise be brought by competitors who have staked out related, patent-based market exclusion zones. This is especially useful when a company desires the freedom to operate in areas other than those of its core technologies and market.

The Future of IP Law in Space

As previously shown, the law governing IP rights in space has yet to be brought into harmony with space law itself — let alone to be codified into practically useful, international instruments through treaties or other multinational agreements. Nevertheless, the conflict between space law and IP law must be settled eventually, if commercial space is to become a reality — that is, a reality beyond the few multi-multi-billion-dollar players currently on the stage. A number of solutions have been proposed, and the following is not an exhaustive list of those proposals — nor is any proposed solution exhaustively evaluated, here. Rather, these are presented to spur further thought on potential harmonization paths between IP law and space law.

One seemingly obvious path is simply to expand the scope of the existing international treaties mentioned above — the *Patent Cooperation Treaty*, the *Madrid Protocol*, and the *Berne Convention*. The problem with this solution is that it isn't simple and it isn't one solution. Rather, it is a set of complex solutions, each requiring either the major overhaul or the complete scrapping of the international legal regime already in place. Each of these regimes recognizes the sovereignty of individual nations and each has its own limitations. For example, the *Berne Convention* permits a great deal of diversity among the laws of its member nations. Notwithstanding its seemingly strong, pro-author copyright rules, and despite additional pressure exerted by World Trade Organization¹⁹ agreements,²⁰ countries vary dramatically in their ability and desire to enforce copyright laws — and such variation is perfectly permissible under this convention. Meanwhile, both the *Patent Cooperation Treaty* and the *Madrid Protocol* are treaties that address priority dates and filing — only — not substantive harmonization of patent or trademark laws. Clearly, then, upgrading these systems to standardize international space IP law would first require addressing these types of shortfalls. This is a challenge unlikely to be taken up in the foreseeable future by the members of these current systems. Thus, as seemingly straightforward as this path might appear at first blush, a closer examination reveals this solution to be unworkable.

Another proposed solution is to establish space as a territory of sorts, with IP governed solely by the international rules established within this outer space jurisdiction.²¹ This would indeed eliminate the IP legal patchwork that exists among spacefaring nations. But it would come at the cost of national sovereignty in space activities, at least as far as IP is concerned. This is highly unlikely to happen without some strong forcing function to apply sufficient pressure for would-be member nations to accede to such a construct. Such pressure may ultimately come to bear, as commercial space ventures proliferate and the need for a standardized, reliable system for space-related IP rights becomes more pronounced over time. Currently, however, no major international movements along these lines are observable, beyond white papers and academic discussions. A more tenable and more feasible subset of the above solution is for commercial spacefaring nations to enter into limited pacts that establish rules governing intellectual property — particularly inventions. The ISS Agreement is one such pact that was successfully established, in 1998.²² If commercial space activities continue to grow exponentially, such pacts are likely to proliferate, and may one day lead to an international regime of the type described in the previous paragraph. As things stand, though, few treaties of this sort loom on the horizon. In any case, however far in the future such pacts lie, they are still the most likely inroads into a global space IP rights framework of the type described above.

We can only speculate on the future framework of IP rights in space; however, we can state with confidence that the issue must eventually be addressed, if commercial space is to flourish. Even so, to the extent commercial space continues on its present trajectory, so will the pressures shaping the existing space IP frameworks. For now, however, IP rights largely remain territorially determined — whether on Earth or in space.



Conclusion

Intellectual property rights play a fundamental role in the growth of every market, and this reality is no less true in commercial space. These rights incentivize innovation by commercial enterprises, which are often backed by savvy investors looking for sizable rewards from their investments. Investment diminishes when the paths to those rewards become clouded by uncertainty — such as the uncertainty posed by the ongoing collision of the legal regimes of IP law and space law. This uncharted legal topology will likely endure until the collective, worldwide commercial space enterprise compels clarifications to and confidence in space IP rights. And while it is likely that the current first-movers in commercial space will eventually set the long-term rules of engagement to establish that framework, anyone else wishing to enter this exploding market will need to know the current IP landscape and be able to traverse it.

IP rights in the global commons of space will see dramatic changes in the coming years. However, these rights must undergo further refinement, strengthening and clarification if we are to see continued innovation to reach, explore and develop space. And for commercial space activities to become routine, these changes must arrive sooner rather than later. The pressure driving such acceleration will likely build as a function of the exponential growth of commercial space activities — much like the rise of the automobile industry, in the wake of Henry Ford's mass-production auto plants. Before that time, the automobile was a relative anomaly among the horses and horse-drawn carriages of the day. Ford's introduction of the mass-produced automobile revolutionized earthbound travel and the exploration and development of the Earth. Given the acceleration of innovation seen just since Ford's day, it seems likely that we'll see a similar revolution in space development, exploration and travel — as a result of commercial space activities. And intellectual property will undoubtedly be at the core of the fuel of interest and fire of genius that will propel those activities.

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The Role Of Intellectual Property In Space Innovation

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- 5 "The Protocol Relating to the Madrid Agreement Concerning the International Registration of Marks" is actually the result of previous failed treaty attempts to create an international trademark registration system. As the U.S. Patent and Trademark Office notes, "The protocol is a filing treaty and not a substantive harmonization treaty." That is, although it does offer a means for the filing of an "international" trademark application, each nation has the right to determine its own protection rights to be granted by the



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