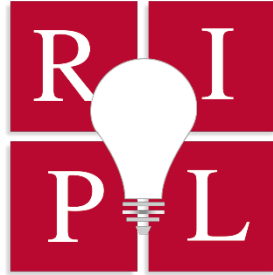


UIC REVIEW OF INTELLECTUAL PROPERTY LAW



PATENTS 254 MILES UP: JURISDICTIONAL ISSUES ONBOARD THE INTERNATIONAL SPACE STATION

BILL WARNERS

ABSTRACT

Over the past few decades, the emergence of private companies pursuing space exploration proves that venturing into the final frontier is no longer exclusive to government-run operations. From satellites to rocket boosters, billions of dollars worth of private property flies into space every year. However, the expansion of these private companies creates unique jurisdictional challenges for patenting private inventions and processes in outer space. This comment examines what jurisdictional claims and remedies arise when a private third-party commits patent infringement in an outer space jurisdiction that did not issue the patent.

**UIC JOHN MARSHALL
LAW SCHOOL**



Cite as Bill Warners, Patents 254 Miles Up: Jurisdictional Issues Onboard the International Space Station, 19 UIC REV. INTELL. PROP. L. 365 (2020).

PATENTS 254 MILES UP: JURISDICTIONAL ISSUES ONBOARD THE
INTERNATIONAL SPACE STATION

BILL WARNERS

I. INTRODUCTION	365
II. BACKGROUND	365
III. ANALYSIS.....	371
IV. PROPOSAL.....	376
V. CONCLUSION	380

PATENTS 254 MILES UP: JURISDICTIONAL ISSUES ONBOARD THE
INTERNATIONAL SPACE STATION

BILL WARNERS*

I. INTRODUCTION

In the year 2020, a private American space company spends millions of dollars of research and development on a more efficient pressurizing method for lab modules on the International Space Station (“ISS”). The new pressurizing system allows oxygen to flow faster through the lab module making it safer for individuals onboard to travel through ISS compartments. After its demonstrated success, the space company patents their process before marketing it to various space-faring nations through a vigorous bidding process. After some haggling, the U.S. government agrees to pay the company to use the process on their section of the ISS. Several months later, the space company travels into space and institutes the method on the U.S. section of the ISS. A year later, the Russian government requests that the same pressurizing method be performed on their ISS section. However, the Russian government and the American space company fails to negotiate on a price for the procedure. Instead, a private Russian space company performs the same pressurizing method on the Russian section of the ISS. Upon learning of this mission, the U.S. space company wants to sue the Russian space company for patent infringement but are unsure if they can present a sufficient patent infringement claim.

This comment will explore what jurisdictional claims and remedies arise when a private third-party commits patent infringement in an outer space jurisdiction that did not issue the patent. Part II presents an analysis of current patent protections and remedies available in outer space infringement. This framework includes a description of the relationship between outer space international agreements and patent infringement concerns. Part III will discuss a possible outcome when applying the legal framework to a process patent infringement in outer space. Part IV will suggest that a new regulatory framework is necessary to protect private patent rights in outer space because existing international treaties and agreements are inadequate.

II. BACKGROUND

A patent is a simple legal guarantee.¹ This guarantee grants the right to “exclude others from making using, offering for sale, or selling the invention throughout the United States or importing the invention into the United States.”² If the patent holder has patented a process, the patent guarantees them the right to exclude unauthorized individuals from using the patented item or process.³

* © Bill Warners 2020. Juris Doctorate Candidate, May 2021, at UIC John Marshall Law School; B.A. in History, Calvin University (2017).

¹ John M. Golden, *Patent Trolls and Patent Remedies*, 85 TEX. L. REV. 2111, 2118 (2007).

² Leahy-Smith America Invents Act, 35 U.S.C. § 154 (2013).

³ *Gottschalk v. Benson*, 409 U.S. 63, 69–71 (1972).

What inventions or processes a patent covers are as equally as important as what entity guarantees the right of exclusion to the patent holder. French patents are guaranteed by the French government, German patents by the German government, and U.S. patents are guaranteed by the U.S. government.⁴ This guarantee is so fundamental that the U.S. Constitution specifically mentions the establishment of a patent system.⁵ The U.S. government also guarantees protection if an outside party explicitly breaches the rights of the patent holder. A patent holders' rights are infringed if anyone "without authority makes, uses, offers to sell or sells" a patented invention.⁶ A patent holders' rights of exclusivity are similarly infringed if a party imports a patented invention into the U.S.⁷ However, U.S. courts assert that unauthorized use of patented inventions do not need to be an exact copy of the original patent to be considered patent infringement.⁸

If a patentholder cannot prove literal patent infringement, they may still be able to recover under the doctrine of equivalents. In the landmark case *Graver Tank & Manufacturing Company v. Linde Air Prods., Inc.*, two competing companies produced two welding compositions that were almost identical with only one of them being patented.⁹ The only difference between the patented and non-patented welding composition was that the non-patented composition used two different silicates.¹⁰ As a result, the Supreme Court had to determine whether the slight compositional change was a recognizable patent infringement.¹¹ The Court held that since the alleged infringing process "performs the same or a similar function in a substantially different way" it could still be counted as infringing on the original patent.¹²

Though patent holders have options of pursuing patent infringement claims, their remedies are quickly curtailed outside domestic borders.¹³ Though there are some laws combining international jurisdiction with U.S. laws, U.S. held patents are difficult to

⁴ Consolidated Appropriations Act, 35 U.S.C. § 1 (1999).

⁵ U.S. CONST. art. I, § 8, cl.8. ("To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.").

⁶ Leahy-Smith America Invents Act, 35 U.S.C. § 154 (2013).

⁷ See Ronald D. Hantman, *Patent Infringement*, 72 J. PAT. & TRADEMARK OFF. SOC'Y 454, 459 (1990); see also *Carbice Corp. of Am. v. Am. Patents Dev. Corp.*, 283 U.S. 27, 33 (1931) ("Infringement, whether direct or contributory, is essentially a tort, and implies invasion of some right of the patentee."). But see Megan M. La Belle, *Patent Litigation, Personal Jurisdiction, and the Public Good*, 18 GEO. MASON L. REV. 43, 47 (2010).

⁸ *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 28 (1997); see also *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 737 (2002) (holding that patent claim amendments do not preclude a patent holder from making a claim under the doctrine of equivalents). See generally John G. Rauch, *The Realities of Our Times: The Semiconductor Chip Protection Act of 1984 and the Evolution of the Semiconductor Industry*, 3 FORDHAM ENT. MEDIA & INTELL. PROP. L.F. 403, 406 (1993) (identifying that patenting processes for emerging technologies is risky considering competitors).

⁹ *Graver Tank & Manufacturing Co. v. Linde Air Products Co.*, 339 U.S. 605, 610 (1950).

¹⁰ *Id.*

¹¹ *Id.*

¹² *Id.* at 608.

¹³ See generally Michael Farbiarz, *Extraterritorial Criminal Jurisdiction*, 114 MICH. L. REV. 507, 514 (2016) ("[F]or all the attention paid to jurisdiction, its domains have not been fully mapped.").

protect outside the U.S. due to international territorial issues.¹⁴ For example, imagine that in *Graver Tank & Manufacturing Company v. Linde Air Prods., Inc.*, the company that held the patented welding composition was in the U.S., but the infringing company was a Chinese company.¹⁵ Even if the Supreme Court ruled the exact same way, the Chinese government is not bound by the authority of a U.S. court. Though there are some instances where extraterritorial jurisdiction is permitted, these instances are typically outliers and focused more on “activities that impact currency, immigration and economic interests.”¹⁶

A simple way to procure patent protection in a foreign country or region is to apply and receive a patent in that country.¹⁷ Regional patent offices allow regional patent applications to cover a specific geographic area instead of a singular country.¹⁸ Patents in each of these regional organizations provide patent protection in each country that is a member.

In addition to direct and regional applications, international treaties also provide patent filing rights to its member countries. For example, the Paris Convention for the Protection of Industrial Property (“Paris Convention”) provides an international

¹⁴ *E.g.*, Timothy R. Holbrook, *What Counts as Extraterritorial in Patent Law*, 25 B. U. J. SCI. & TECH. L. 291, 296 (2019) (“Many foreign activities qualify as prior art for determining the validity of U.S. patents.”); *see also* Foreign Corrupt Practices Act, 15 U.S.C. § 78dd-1 (2012) (stating that in some instances, U.S. companies may be criminally or civilly liable if they bribe foreign officials). *See generally* *Hilton v. Guyot*, 159 U.S. 113, 164 (1895) (“[I]t is the recognition which one nation allows within its territory to the legislative, executive or judicial acts of another nation, having due regard both to international duty and convenience, and to the rights of its own citizens, or of other persons who are under the protection of its laws.”).

¹⁵ *Protecting Intellectual Property Rights (IPR) Overseas*, USPTO.GOV, <https://www.uspto.gov/patents-getting-started/international-protection/protecting-intellectual-property-rights-ipr> (last modified Nov. 1 2019, 1:40 PM) (suggesting that even if the infringement was purposefully stolen, U.S. patentholders do not automatically have a claim against foreign infringement the same way they do against domestic infringement); *see, e.g.*, *Smith v. United States*, 507 U.S. 197, 204 (1993) (“[W]e hold that the FTCA’s waiver of sovereign immunity does not apply to tort claims arising in Antarctica.”); *see also* *Brown v. Duchesne*, 60 U.S. 183, 190 (1856) (“The private right of every patentee is subject to the public right of the Government, to admit into the ports of the United States any foreign vessel, free from any private or public charges, tolls, or burdens, other than those imposed by treaty or by the laws of nations.”). *See generally* *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 531 (1972) (“The statute makes it clear that it is not an infringement to make or use a patented product outside of the United States.”).

¹⁶ Dariush Keyhani, *U.S. Patent Law and Extraterritorial Reach*, 7 TUL. J. TECH. & INTELL. PROP. 51, 65 (2005).

¹⁷ Masaaki Kotabe, *Evolving Intellectual Property Protection in the World: Promises and Limitations*, 1 U. PUERTO RICO BUS. L.J. 12, 14 (2010).

¹⁸ *Directory of Intellectual Property Offices*, WIPO, <https://www.wipo.int/directory/en/urls.jsp> (last visited Oct. 6, 2019); *see* Josephine Asmah, *Historical Threads: Intellectual Property Protection of Traditional Textile Designs: The Ghanaian Experience and African Perspectives*, 15 IJCP 271, 283 (2008); *see also* *Patents-OAPI*, SPOOR FISHER, <https://www.spoor.com/en/africa-ip-expertise/oapi-patents/> (last visited Dec. 2, 2019) (“OAPI registrations afford protection in: Benin, Burkina-Faso, Cameroon, Central African Republic, Chad, Congo (Republic of), Comoros, Equatorial Guinea, Gabon, Guinea, Guinea-Bissau, Ivory Coast, Mali, Mauritania, Niger, Senegal and Togo. All OAPI States have ratified the Patent Co-operation Treaty. Therefore, an OAPI Regional Phase of a PCT International Application will automatically include all member states.”). *See generally* Tshimanga Kongolo, *The New OAPI Agreement as Revised in February 1999: Complying with TRIPS*, 3 J. WORLD INTELL. PROP. 717, 721 (2000) (emphasizing that the 1999 OAPI Agreement extrapolated from TRIPS and offers significant protections to patent holders by offering both civil and criminal remedies for instances of infringement).

framework for patent reciprocity that covers rights granted to foreign nationals, the guarantee of propriety interest in patent applications, and common rules of application.¹⁹ Most importantly, the Paris Convention extends a type of tangential citizenship to patent applicants and promises that they will be treated like the citizens of that host country.²⁰

International patent rights are also available through the Patent Cooperation Treaty (“PCT”) which allows States who have signed the Paris Convention to become signatories.²¹ The PCT allows a nation or resident of a member State to file one application as opposed to filing multiple patent applications in different States or regions.²²

Similarly, the World Trade Organization (“WTO”) chose to extend trade protections through The Agreement on Trade-Related Aspects of Intellectual Property Rights (“TRIPS”).²³ Though TRIPS was a controversial agreement at the time, its continued enforcement represents an attempt to use trade as a vehicle to protect intellectual property rights.²⁴ Most importantly, TRIPS establishes minimum standards that governments must follow to protect and enforce the intellectual property of other member States.²⁵ TRIPS promises that the offending member State is liable for the unauthorized use of the patented item and that the patent holder will

¹⁹ Convention of Paris for the Protection of Industrial Property art. 2-4, Oct. 31, 1958, 21 U.S.T. 1583, 828 U.N.T.S. 107 [hereinafter Paris Convention]. See generally Alfredo C. Jr. Robles, History of the Paris Convention, 15 WORLD BULL. 1, 6 (1999) (arguing that the Paris Convention curtailed filing patents in multiple countries).

²⁰ See Donald G. Daus, *Paris Convention Priority*, 77 J. PAT. & TRADEMARK OFF. SOC’Y 138, 138 (1995) (“It is no longer enough for the priority application to disclose only so much of the claimed invention as is disclosed in the intervening reference: the claim must be *completely described* in the Convention document.”); see also Paris Convention, *supra* note 19, at arts. 2-4 (stating that foreign nationals must be protected the same way as the signatory state would protect its own citizens).

²¹ Patent Cooperation Treaty, Preamble, June 19, 1970, 28 U.S.T. 7645, 9 I.L.M. 978.

²² *Id.*

²³ Agreement on Trade-Related Aspects of Intellectual Property Rights arts. 27-34, Apr. 15, 1994, 1869 U.N.T.S. 299 [hereinafter TRIPS].

²⁴ See Edward Lee, *Measuring TRIPs Compliance and Defiance: The WTO Compliance Scorecard*, 18 J. INTELL. PROP. L. 401, 405 (2011) (“For the first time in history, countries recognized an international institution that had enforcement power—putatively with teeth—to help ensure countries complied with their international obligations regarding the minimum standards of IP protection.”). *Contra* Susan K. Sell, *TRIPs Was Never Enough: Vertical Forum Shifting, FTAS, ACTA, and TPP*, 18 J. INTELL. PROP. L. 447, 475 (2011); but see Peter K. Yu, *TRIPs and Its Achilles’ Heel*, 18 J. INTELL. PROP. L. 479, 499 (2011). See generally Amir Attaran, *The Doha Declaration on the TRIPS Agreement and Public Health, Access to Pharmaceuticals, and Options under WTO Law*, 12 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 859, 860 (2002) (arguing that the comprehensive and expanding reach of WTO’s influence into intellectual property may cause tension when considering how to properly protect trade goods in developing TRIPS member countries).

²⁵ TRIPS, *supra* note 23, at art. 27 (“[P]atents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application.”); see also Emir Aly Crowne, *Fishing TRIPS: A Look at the History of the Agreement on Trade-Related Aspects of Intellectual Property*, 2 CREIGHTON INT’L & COMP. L.J. 77, 89 (2011) (“The [TRIPS] proposals detailed the acquisition and enforcement of intellectual property rights and the application of basic principles such as national treatment and most-favored nation.”). See generally John Linarelli, *Trade-Related Aspects of Intellectual Property Rights and Biotechnology: European Aspects*, 6 SING. J. INT’L & COMP. L. 406, 410 (2002) (arguing that TRIPS was reluctantly adopted by developing countries due to disagreements on how to implement certain rigorous standard aspects combined with WTO obligations).

be compensated.²⁶ The complexity of intergovernmental agreements and international treaties demonstrates how jurisdictional issues extend to property rights in outer space.²⁷

On October 5th, 1957, the Soviet Union launched the first artificial satellite named “Sputnik” into low earth orbit.²⁸ Two years after Sputnik’s launch, the United Nations (“UN”) formally established the United Nations Committee on the Peaceful Uses of Outer Space (“COPUOS”).²⁹ COPUOS, which still exists today, represented a formalized international approach to outer space activity.³⁰ Ten years later, the U.N. adopted a resolution which created an outer space treaty called the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (“Outer Space Treaty”).³¹ The Outer Space Treaty requires that all signatories of the treaty “bear international responsibility for national activities in outer space.”³² This international responsibility in space translated into extending the jurisdiction of the signatory State that launched the space object.³³

²⁶ TRIPS, *supra* note 23, at art. 31.

²⁷ *E.g.*, Patents in Space Act, 35 U.S.C. § 105 (1990); *see also* Jocelyn H. Shoemaker, *The Patents in Space Act: Jedi Mind Trick or Real Protection for American Inventors on the International Space Station*, 6 J. INTELL. PROP. L. 395, 398 (1999) (“The Act is, therefore, meant to encourage private investment in space science and commercial activities by ensuring that the investments of United States’ inventors will be protected. The Act purports to do this by extending United States jurisdiction to its space objects, thus making the objects themselves, and any activities carried out within the objects, subject to the laws of the United States.”). *See* Glenn H. Reynolds, *Patents in Space Act*, 3 HARV. J. L. & TECH. 13, 16 (1990). *See generally* Dave Baiocchi & William IV Welsner, *The Democratization of Space*, 94 FOREIGN AFF. 98, 100 (2015) (arguing that in the future outer space private activities could extend to billionaires, juntas, and criminal organizations).

²⁸ Vladimir Isachenkov, *Sputnik at 50*, ORANGE COUNTY REGISTER (Oct. 1, 2007, 3:00AM), <https://www.ocregister.com/2007/10/01/sputnik-at-50/>.

²⁹ G.A. Res. 1472(XIV), at 1 (Dec. 12, 1959).

³⁰ F. Kenneth Schwetje, *The Development of Space Law and a Federal Space Law Bar*, 35 FED. B. NEWS & J. 316, 316 (1988); *accord* Tare C. Brisibe, *An Introduction to United Nations COPUOS Recommendations on National Legislation Relevant to the Peaceful Exploration and Use of Outer Space*, 62 ZLW 729, 732 (2013); *see* Dan L. Burk, *Protection of Trade Secrets in Outer Space Activity: A Study in Federal Preemption*, 23 SETON HALL L. REV. 560, 566 (1993).

³¹ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. 1, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

³² Outer Space Treaty, *supra* note 31, at art. 7.

³³ Outer Space Treaty, *supra* note 31, at art. 8 (“A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body.”); *see* Peter Lykke Hessellund-Jensen, *Some Problems concerning the Creation and Implementation of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, 38 NORDISK TIDSSKRIFT INT’L RET 97, 100 (1968); *see also* Kurt G. Hammerle & Theodore U. Ro, *The Extra-Territorial Reach of U.S. Patent Law on Space-Related Activities: Does the International Shoe Fit as We Reach for the Stars*, 34 J. SPACE L. 241, 275 (2008) (“[T]he relative proximity of space objects, registered under different nations, has the potential to strain existing patent law and the territorial nature to which it is based upon.”). *See generally* Dan L. Burk, *Application of United States Patent Law to Commercial Activity in Outer Space*, 6 SANTA CLARA COMPUTER & HIGH TECH. L. J. 295, 354 (1990) (“[A] colorable argument can be made that United States patent jurisdiction already extends to the activity aboard United States spacecraft, continued private investment in space ventures requires the certainty of congressional action.”).

The international community established another legal framework for outer space activity and passed the Convention on International Liability for Damage Caused by Space Objects (“Liability Convention”).³⁴ The Liability Convention includes territorial aspects that hold states liable for any type of space object launched from their jurisdiction.³⁵ If the space object causes damage to other space property, then the State that owned the object is held liable for the damage caused.³⁶ Additionally, if multiple States jointly launch a space object, the Liability Convention holds them jointly and severally liable for any damage caused by the object.³⁷ Even though the Liability Convention does not extend State liability to private citizens, it does extend protections if their property is damaged.³⁸

Near the end of the twentieth century, spacefaring countries shifted their focus from traveling into space to staying in space and built the International Space Station (“ISS”).³⁹ However, constructing and maintaining a human habitat orbiting the planet presented potential jurisdictional management issues.⁴⁰ A multinational research station means a convergence of multiple overlapping jurisdictions within close proximity to each other.⁴¹ As a result of the complex jurisdictional issues, multiple spacefaring international partners created a legal framework to operate the ISS called the 1998 International Space Station Agreement (“ISS Agreement”).⁴² The ISS Agreement specifically provides its signatories protection for any type of intellectual property issue arising out of an activity on, in, or in transit to the ISS.⁴³ Even though modern space travel is typically internationally cooperative, there is still national tension between signatories of the ISS Agreement.⁴⁴ The ISS Agreement also allows

³⁴ Convention on the International Liability for Damage Caused by Space Objects art.1, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

³⁵ *Id.*

³⁶ W. F. Foster, *The Convention on International Liability for Damage Caused by Space Objects*, 10 CAN. Y.B. INT’L L. 137, 139 (1972); see Carl Q. Christol, *International Liability for Damage Caused by Space Objects*, 74 AM. J. INT’L L. 346, 350 (1980).

³⁷ Foster, *supra* note 36, at 139.

³⁸ *Id.*

³⁹ Ken Pedersen, *Space Station: Risks and Vision*, 14 J. SPACE L. 1, 4 (1986).

⁴⁰ See John E. O’Brien, *The U.S./International Space Station*, 15 J. SPACE L. 35, 37 (1987).

⁴¹ See generally U.S. Dep’t of Justice, Office of Legal Counsel, Opinion Letter on Unconstitutional Restrictions on Activities of the Office of Science and Technology Policy (Sept. 19, 2011) (opining that Congressional appropriations act preventing the White House Office of Science and Technology from cooperating with the Chinese government at U.S. space facilities violated the President’s article II constitutional authority to operate foreign relations of the U.S.).

⁴² Agreement Among the Government of Canada, Governments of the Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station, art. 1-4, ¶1, Jan. 29, 1998, 1 U.S.T. 113 [hereinafter ISS Agreement].

⁴³ *Id.* at art. 21.

⁴⁴ R. Oosterlinck, *The Intergovernmental Space Station Agreement and Intellectual Property Rights*, 17 J. SPACE L. 23, 27 (1989) (considering patent issues if an invention is made on the space station by multiple inventors of different nationalities); see George Paul Sloup, *Conflict Resolution for Space Station Crew Members – The Space Station Intergovernmental Agreement and Beyond*, 32 PROC. ON L. OUTER SPACE 404, 410 (1989); see also Andre Farand, *Space Station Cooperation*, 22 ANNALS AIR & SPACE L. 441, 445 (1997) (“The Partners have nevertheless laid strong emphasis on the need for the closest possible adherence to the philosophy of an integrated space station.”). See generally Hans P. Sinha, *Criminal Jurisdiction on the International Space Station*, 30 J. SPACE L. 85, 90 (2004)

its signatories to withdraw from the agreement when all the signatories reach a decision concerning the withdrawal conditions.⁴⁵ Regardless of a signatories' actions, the ISS Agreement is limited to the national entities who signed the agreement or private parties invited by its signatories.

III. ANALYSIS

Signatory countries in international agreements identify what rights they want to protect, the scope of that protection, and the necessary enforcement and punitive measures. This identification and subsequent enforcement creates legal territorial boundaries to supplement actual geographic borders.⁴⁶ Like many other international treaties, treaties regarding space activity follow the same method of identifying rights and offering protections.⁴⁷ This method is used in international agreements such as the Outer Space Treaty, the Registration Convention, the Liability Convention, and the 1998 ISS Agreement. However, rights identified in the current outer space treaties and agreements reveal gaps in the rights and protections of patents in outer space.⁴⁸

For instance, the Outer Space Treaty broadly protects space objects, pieces of space objects, space vehicles, and the people of the signatory nations in outer space.⁴⁹ The Outer Space Treaty emphasizes an imprecise desire to “contribute to broad international co-operation in . . . the legal aspects of the exploration and use of outer space for peaceful purposes.”⁵⁰ After that general statement, the rest of the treaty focuses on broad principles of national sovereignty and jurisdiction.⁵¹ However, the

(“[T]he mere fact that the ISS Partners have agreed on a framework for exerting their criminal jurisdiction over acts which might occur on the ISS, does not mean that those acts have to be judged according to each Partner’s municipal criminal code.”).

⁴⁵ ISS Agreement, *supra* note 42, at art. 28.

⁴⁶ See Stephen Gorove, *The Growth of Domestic Space Law: A U.S. Example*, 18 J. SPACE L. 99, 101 (1990) (demonstrating that “[I]nternational customary law as well as international treaty law concluded by the United States, is a part of United States law. Under the federal constitution treaties are the supreme law of the land and no less binding on the courts than federal statutes.”).

⁴⁷ See Eng Teong See, *Commercialization of Space Activities - The Laws and Implications*, 82 J. AIR L. & COM. 145, 148 (2017) (asserting that “[w]hether the international legal framework is sufficient to deal with commercialization of space activities would prima facie depend on the nature of the activity concerned and the international law, if any, that applies to it.”).

⁴⁸ See generally Paul Stephen Dempsey, *National Laws Governing Commercial Space Activities: Legislation, Regulation, & Enforcement*, 36 NW. J. INT’L L. & BUS. 1, 14 (2016) (arguing that “neither the Outer Space Treaty nor any of the other space conventions identify the contours of any particular licensing regime”).

⁴⁹ Outer Space Treaty, *supra* note 31, at arts. 5-9. See generally Ram Jakhu, *Legal Issues Relating to the Global Public Interest in Outer Space*, 32 J. SPACE L. 31, 34 (2006) (arguing that “[t]he Outer Space Treaty is not a collection of idealistic goals without legal implications . . . The Treaty’s principles must be interpreted as legally authoritative norms that govern international relations in all matters relating to outer space.”).

⁵⁰ Outer Space Treaty, *supra* note 31, at art. 2.

⁵¹ He Qizhi, *The Outer Space Treaty in Perspective*, 25 J. SPACE L. 93, 97 (1997); see also Mitchell M. Hsieh, *The Work of the Committee on the Peaceful Uses of Outer Space (COPUOS)*, 23 ANNALS AIR & SPACE L. 293, 298 (1998) (“[D]elegations agreed that with the rapid evolution of technology and organization of space activities, the Legal Subcommittee must maintain its leading role in developing legal principles, by identifying desirable improvements to existing legal principles and instruments governing the peaceful use of outer space.”).

Outer Space Treaty does not clearly define the term “legal aspects” much less what legal enforcement measures exist for signatory nations.⁵² Furthermore, the Outer Space Treaty does not explicitly mention protections granted to intellectual property.⁵³

The Outer Space Treaty does not define the actions of non-state actors or their outer space activities.⁵⁴ The treaty states that “activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty.”⁵⁵ This statement seems to suggest that private parties are regulated by their launching nations—if the nations are signatories to the treaty. However, the treaty never defines what “non-governmental entities” are nor what rights they have. Furthermore, the treaty is “open to all States,” not non-state private spacefaring organizations.⁵⁶ Finally, the Outer Space Treaty never addresses the actions of non-signatory nations in outer space or nations who are nonmembers of the United Nations entirely.⁵⁷

Like the Outer Space Treaty, the Registration Convention focuses on the ownership of space objects rather than intellectual property claims.⁵⁸ Under the Registration Convention, signatory nations must register any space object with the United Nations so that the object is identifiable.⁵⁹ The purpose for identification is so that the launching State’s space object is readily identifiable by the international

⁵² See Pablo M.J. Mendes de Leon, *A Tour d’Horizon of Contemporary Issues in Air and Space Law*, 8 ISSUES AVIATION L. & POL’Y 135, 139 (2009) (“There are no specific international rules regulating the commercial use of outer space. Liability for activities carried out in outer space and for journeys from and to outer space is regulated in a rudimentary fashion only, and only provides for state liability.”).

⁵³ David Tan, *Towards a New Regime for the Protection of Outer Space as the Province of All Mankind*, 25 YALE J. INT’L L. 145, 165 (2000) (positing that “[w]here a treaty provides only for general goals and statements of policy, it is itself “soft” and is devoid of any significant legal content”).

⁵⁴ See Andrzej Gorbiel, *Orbiting Inhabited Space Stations: Selected International Legal Aspects*, 7 HASTINGS INT’L & COMP. L. REV. 509, 510 (1984) (highlighting that treaties like the Outer Space Treaty also “do not define such pivotal notions as “outer space,” “space activities” and “celestial body,” although the instruments make frequent use of these terms”).

⁵⁵ Outer Space Treaty, *supra* note 31, at art. 2.

⁵⁶ See P. J. Blount, *Renovating Space: The Future of International Space Law*, 40 DENV. J. INT’L L. & POL’Y 515, 518 (2011) (asserting that “[w]hile future commercial activities were to a small extent envisioned, international space law was built on the principle that space activities are uniquely state controlled activities. To this end the negotiators sought to control state actions as opposed to those private actors.”).

⁵⁷ See generally *Non-member states*, UNITED NATIONS, <https://www.un.org/en/sections/member-states/non-member-states/index.html> (last visited Oct. 24, 2019) (stating that “[n]on-member States having received a standing invitation to participate as observers in the sessions and the work of the General Assembly and maintaining permanent observer missions at Headquarters”).

⁵⁸ See generally Karl-Heinz Bockstiegel, *Settlement of Disputes Regarding Space Activities*, 21 J. SPACE L. 1, 12 (1993) (emphasizing that the term “space object” has a broad definition which “leaves the fundamental issue of what is or is not a space object or under what circumstances an object becomes or ceases to be a ‘space object’”).

⁵⁹ Convention on Registration of Objects Launched into Outer Space art 5., 14 I.L.M. 43 (1975) [hereinafter *Registration Convention*]; see, e.g., Charles Dalfen, *Towards an International Convention on the Registration of Space Objects: The Gestation Process*, 9 CAN. Y.B. INT’L L. 252, 255 (1971).

community in case of an accident.⁶⁰ Like the Outer Space Treaty, the Registration Convention does not mention private third-parties and emphasizes that the registration is for nations to “bear international responsibility for their national activities and outer space.”⁶¹

Additionally, although the Registration Convention defines the term “space object”, it similarly fails to address jurisdiction issues of component parts of space objects. In part, this likely occurred because few countries in 1972 could manufacture space objects, and those who could did not want to share their manufacturing secrets.⁶² However, almost fifty years later, space objects are manufactured and tested by multiple organizations before they get sent into space.⁶³ As a result, it is unclear how to apply the Registration Convention to a space object which has multiple component parts registered to different countries.⁶⁴

This responsibility for launching a State’s space objects similarly extends into the Liability Convention.⁶⁵ The crucial difference between the Liability Convention, the Outer Space Treaty, and the Registration Convention is that in the Liability Convention, non-state actors are identified.⁶⁶ The Liability Convention states that the provision of the agreement does not apply to damage caused to a space object from a launching State to “nationals of that launching state.”⁶⁷ However, even though the Liability Convention broadly defines damage, launching States cannot recover for patent infringement.⁶⁸ Under the Liability Convention, damage is defined as “loss of

⁶⁰ Registration Convention, *supra* note 59, at arts. 5-6; *see also* Thomas Beer, *Specific Risks Associated with Collisions in Outer Space and the Return to Earth of Space Objects - The Legal Perspective*, 25 AIR & SPACE L. 42, 47 (2000) (arguing that the Registration Convention has a limited application since it only requires minimal information from member states and some space objects with military applications are not covered under the convention).

⁶¹ Registration Convention, *supra* note 59, at pmbl.

⁶² *See generally* Klaus Knorr, *On the International Implications of Outer Space*, 12 WORLD POL. 564, 566 (1960) (predicting that “[i]n the competitive cold-war situation, military and prestige considerations will impel both nations to press ahead with space activities, with neither being able to afford quitting the race”).

⁶³ Garrett Shea, *2019 Deep Space Exploration Systems Supplier Locations*, NASA, <https://www.nasa.gov/specials/ESDSuppliersMap/> (last updated Feb. 5, 2020) (For example, for the deep space Orion program, NASA used over two thousand suppliers from over twenty different states in the U.S. alone); *see Satellite Manufacturers and Subcontractors*, SPACE CAREERS, <https://www.space-careers.com/manufacturers.html> (last visited, Oct. 21, 2019).

⁶⁴ Wybo P. Heere, *Problems of Jurisdiction in Air and Outer Space*, 24 AIR & SPACE L. 70, 79 (1999).

⁶⁵ Liability Convention, *supra* note 34, at art. 7; *see* Andre G. Debusschere, *Liability for Damage Caused by Space Objects*, 3 J. INT’L L. & PRAC. 97, 100 (1994). *See generally* Ricky J. Lee, *The Australian Space Activities Act: Creating a Regulatory Regime for Space Activities*, 25 AIR & SPACE L. 57, 57 (2000) (stating that a Soviet Union nuclear satellite crashed in Canada and was settled between the Soviet Union and Canada without the use of the Liability Convention).

⁶⁶ Liability Convention, *supra* note 34, at art. 7.

⁶⁷ *Id.* (stating that the same provision applies to “foreign nationals during such time as they are participating in the operation of that space object from the time of its launching or at any stage thereafter until its descent, or during such time as they are in the immediate vicinity of a planned launching or recovery area as the result of an invitation by that launching State”).

⁶⁸ *See generally* Steven Freeland, *There’s a Satellite in My Backyard - Mir and the Convention on International Liability for Damage Caused by Space Objects*, 24 U.N.S.W.L.J. 462, 465 (2001) (arguing that the general principles of the treaty fails to provide adequate recovery because the formal dispute resolution provision is based on the good faith of both parties participating instead of a more formal system).

life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations.”⁶⁹ Even though this definition could possibly cover patent infringement, the Liability Convention does not apply to private third-party patent infringement. As a result, the Liability Convention could not adequately protect against third-party patent infringement.

In contrast, the ISS Agreement provides a more comprehensive patent protection framework in outer space than the aforementioned treaties.⁷⁰ The ISS Agreement acknowledges that the operation and maintenance of the ISS requires international cooperation and private party involvement.⁷¹ Under the ISS Agreement, this cooperation requires authorized transfers of “technical data and goods by persons or entities other than the Partners or their Cooperating Agencies (for example, company-to-company exchanges which are likely to develop).”⁷²

The ISS Agreement assures its members that they are not required to make a transfer of data or goods if another member does not grant patent protection.⁷³ In addition, offering patent protection during international exchanges, the ISS Agreement also prioritizes patent protection in an article exclusively dedicated to intellectual property.⁷⁴ The ISS agreement first extends the territorial jurisdiction of its member countries so extensively that any “activity occurring in or on a Space Station flight element shall be deemed to have occurred in the territory of the Partner State of that element.”⁷⁵ Additionally, the ISS Agreement stipulates that the temporary presence in a different jurisdiction on the ISS or in transit to the ISS is not grounds alone for patent infringement.⁷⁶

Furthermore, the ISS Agreement provides strict guidelines to member States for interacting with private spacefaring entities.⁷⁷ Private entities may not own any equipment or pieces of equipment without the prior authorization of the other members.⁷⁸ Members also may not use private elements that have not been approved

⁶⁹ Liability Convention, *supra* note 34, at art. 1.

⁷⁰ ISS Agreement, *supra* note 42, arts. 1-4; see Lara L. Manzione, *Multinational Investment in the Space Station: An Outer Space Model for International Cooperation*, 18 AM. U. INT’L L. REV. 507, 510 (2002).

⁷¹ ISS Agreement, *supra* note 42, at art. 19.

⁷² *Id.*

⁷³ *Id.*

⁷⁴ *Id.* at art. 21; see also Convention Establishing the World Intellectual Property Organization art 2., July 14, 1967, 21 U.S.T. 1749, 828 U.N.T.S. 3 (defining intellectual property as “rights relating to: literary, artistic and scientific works, performances of performing artists, phonograms, and broadcasts, inventions in all fields of human endeavor, scientific discoveries, industrial designs, trademarks, service marks, and commercial names and designations, protection against unfair competition, and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields”).

⁷⁵ ISS Agreement, *supra* note 42, at art. 21.

⁷⁶ *Id.*

⁷⁷ *Id.*

⁷⁸ *Id.* at art. 6.

of by other members.⁷⁹ As a result of these stringent guidelines, private entities only operate on the ISS if they are sanctioned by all the members of the ISS Agreement.⁸⁰

Finally, the ISS Agreement identifies legal damages that include intellectual property claims through its “Cross-Waiver of Liability” in Article 16.⁸¹ In addition to physical damages, the ISS Agreement defines damages as “loss of revenue or profits” or “other direct, indirect or consequential damage[s].”⁸² Pursuant to Article 16, each Partner of the ISS Agreement waives their rights to specific activities conducted on the ISS which applies to all damage claims “whatever the legal basis for such claims” are.⁸³ This cross-waiver includes all intellectual property damage claims against ISS Partners and disclaims responsibility for entities related to ISS partners.⁸⁴ This language suggests that even though the ISS agreement recognizes patent protections, ISS Partners or entities affiliated with ISS Partners are not liable for patent infringement damages.⁸⁵ However, The ISS Agreement does not define how an entity is considered to be affiliated with an ISS partner. As a result, this could mean private nonstate actors or international space organizations. Besides, the cross-waiver does not address whether a private nonstate actor is liable for infringing upon the patents of another private nonstate actor.

Therefore, a petitioner seeking relief for process patent infringement on the ISS is unlikely to recover.⁸⁶ The vagueness and gaps within the aforementioned outer space treaties demonstrate that attempting to find relief within their legal framework is

⁷⁹ ISS Agreement, *supra* note 42, at art. 21.

⁸⁰ *But cf.* Rochus Moenter, *The International Space Station: Legal Framework and Current Status*, 64 J. AIR L. & COM. 1033, 1041 (1999) (arguing that “[i]t can be safely argued that there can be many State Parties involved in a given space activity and it will then be up to the States involved to designate one State to exercise authority and Supervision or even entrust the control to the State of registry”). *See generally* Yan Ling, *Prevention of Outer Space Weaponization under International Law: A Chinese Lawyer's Perspective*, 4 J. E. ASIA & INT’L L. 271, 274 (2011) (proposing that the Chinese and U.S. governmental interests for space activity may be at cross-purposes which may result in the weaponization of outer space).

⁸¹ ISS Agreement, *supra* note 42, at art. 16; *see also* Mary Catherine Devlin & William G. Schmidt, *Legal Issues Continue to Surround the International Space Station*, 8 U.S. A.F. ACAD. J. LEGAL STUD. 237, 246 (1997-1998) (“Article 16 recognizes that other nations besides the Partner States may be offered the opportunity to send astronauts to and conduct experiments on the Space Station. For example, due to the fact that the Russians do not have enough money, there is talk about the Ukraine building one of the Russian modules for the ISS. In this case, liability can be waived for all claims against the Ukraine.”). *See generally* J. Michael Low, *It's The End Of The World As We Know It . . . And I Feel Fine: The New Rules For Drafting Liability Waivers In Arizona*, 16 FEDERATION OF REGULATORY COUNSEL JOURNAL 1, 1 (2005) (“The purpose of these waivers is twofold: (1) to inform customers about the potential risks of a particular activity, and (2) to show that the customer understand and voluntarily assumes those risks.”).

⁸² ISS Agreement, *supra* note 42, at art. 16.

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *See also* A. M. Balsano, *Space Technology and International Cooperation - The Role of Intellectual Property*, 20 AIR & SPACE L. 177, 182 (1995) (hypothesizing that the “space station is likely to result in a more significant demand for legal protection of products invented in outer space or patented products used for experimentation and production in outer space”).

⁸⁶ Mark A. Lemley, *Inducing Patent Infringement*, 39 U.C. DAVIS L. REV. 225, 226 (2005) (“It is a fundamental principle of patent law that no one infringes a patent unless he practices the complete invention.”).

unlikely.⁸⁷ The international treaties and agreements focus on more scientific remedies instead of addressing intellectual property issues. A private patent holding entity, like the hypothetical American company, would not find relief under the Outer Space Treaty since the entity is a nonstate actor. As a nonstate actor the private entity would not be considered a “state” under the Outer Space Treaty.

Also, it is unlikely that a private patent holding entity would find relief through the Liability Convention. Unlike the Outer Space Treaty and the Registration Convention, the Liability Convention identifies recoverable damages. However, since the Liability Convention expressly does not apply to private entities, the patent infringement would only apply to private entities who shared a patent with their signatory government.

In contrast, the ISS Agreement provides a better patent protection framework for private patent holding entities.⁸⁸ Unlike the previous international treaties, the ISS Agreement specifically identifies patent protections for its signatories. Moreover, the ISS Agreement extends the territory of its Partners, meaning that a private patentholder would be protected by the country that their invention is patented in. For example, if the American companies’ pressurizing method was patented in the United States, then under the ISS agreement, the patent would still be protected on the ISS. Inversely, if the American company invented the pressurizing method on the ISS, the method would still be protected under the extraterritorial provision of the ISS agreement. Though the patent holding company would have their patents identified through the extraterritorial application of the ISS Agreement, acquiring damages is unlikely. Partners to the agreement disclaim all liability for damages occurring on the ISS through their actions or the actions of their affiliates. Which means that if the Russian government infringed, a private American patent holding company would not have an actionable patent claim. Correspondingly, a privately-owned Russian company that infringed upon the patent rights of a privately-owned American company could not be held liable.

IV. PROPOSAL

The ISS IGA needs a comprehensive patent regime to clearly identify and protect private nonstate third parties from process patent infringement onboard the ISS. This patent regime would ensure that private outer space companies could rely on having outer space discoveries and inventions protected under patents.⁸⁹

⁸⁷ Michael Smirnoff, *The Problem of Security in Outer Space in Light of the Recently Adopted International Convention on Liability in Outer Space*, 1 J. SPACE L. 121, 127 (1973).

⁸⁸ Glenn Harlan Reynolds, *International Space Law: Into the Twenty-First Century*, 25 VAND. J. TRANSNAT’L L. 225, 232 (1992) (proposing that “[p]roperty rights, properly implemented, would be a real boon to the rapid development of outer space, with concurrent economic and political benefits to those of us here on Earth”).

⁸⁹ See generally Brian J. Love, *Interring the Pioneer Invention Doctrine*, 90 N.C. L. REV. 379, 414 (2012) (arguing that “[p]rospect theory thus suggest that innovation is optimally incentivized when a single entity is vested early on with broad patent rights that allow it to control an entire technological filed. If broad rights do indeed encourage the development and commercialization of improved embodiments and related inventions, one might expect broad rights to be particularly beneficial for a pioneer inventor whose invention by definition created an entirely new field of technological endeavor.”).

Some may argue that further international agreements allowing the commercialization of space runs counter to the international community's opposition to ownership of outer space.⁹⁰ However, without a clear patent regime, private space companies will be reluctant to share their intellectual property discoveries.⁹¹

First, a proposed patent regime must be consistent with the purposes of the original outer space treaties and agreements. A consistent purpose builds on the historical and diplomatic framework regarding outer space usage dating back over fifty years.⁹² Potential international purposes include scientific investigation, peaceful cooperation, space exploration, and legal matters regarding the use of outer space. However, grounding a new patent regime in past international treaties and agreements still runs into difficult political and diplomatic obstacles. Admittedly, large-scale international agreements are difficult to negotiate and implement, especially with a large number of potential signatory countries.⁹³

Second, a proposed patent regime must either extend or supplement the territorial jurisdiction of patent host countries. Extending territorial jurisdiction physically is difficult due to a lack of scientific consensus on the boundaries of outer space.⁹⁴ For example, the U.S. military, the National Advisory Committee on Aeronautics, and NASA establish outer space as being 50 miles above sea level.⁹⁵ In contrast, the Fédération Aéronautique Internationale determines that the boundaries of outer space is 62.5 miles above sea level.⁹⁶ Consequently, imposing a spatial framework for territorial jurisdiction must be supplemented by a uniform standard for all Partner States.⁹⁷ Third, a proposed patent regime must have an identifiable and operational

⁹⁰ See F. Taniguchi, M. Sato & D. Saisho, *Consideration on the International Regime of the Moon Agreement*, 53 PROC. INT'L INST. SPACE L. 161, 163 (2010); see also John G. Sprankling, *Owning the Center of the Earth*, 55 UCLA L. REV. 979, 1021 (2008) ("[P]rivate property rights cannot exist in the moon and other celestial objects.").

⁹¹ See generally Wilbur Ross, Secretary of Commerce, U.S. Department of Commerce, Remarks at the Second Meeting of the Reconstituted National Space Council (Feb. 21, 2018) ("The countries new to space actually have an inherent advantage in terms of the regulatory environment because they carry no baggage from the earlier, simpler days of space.").

⁹² See generally 156 CONG. REC. 12, 17121 (2010) ("[T]o build upon the cooperative and mutually beneficial framework established by the ISS partnership agreements and experience in developing and undertaking programs and meeting objectives designed to realize the goal of human space flight.").

⁹³ See also Christoph Moser et al., *Why Do Trade Negotiations Take So Long?*, 27 JOURNAL OF ECONOMIC INTEGRATION, 280, 288 (2012) (positing that "[a]s the number of participants and the diversity of their preferences grow, it becomes increasingly difficult to imagine a successful conclusion to the Doha Round"); cf. *Treaties: A Historical Overview*, U.S. SENATE, <https://www.senate.gov/artandhistory/history/common/briefing/Treaties.htm#3> (last visited Nov. 4, 2019).

⁹⁴ Ezra J. Reinstein, *Owning Outer Space*, 20 NW. J. INT'L L. & BUS. 59, 95 (1999).

⁹⁵ Bhavya Lal & Emily Nightingale, *Where is Space? And Why Does That Matter?* 4 (Space Traffic Management Conference) (Nov. 5, 2014), https://aerospace.csis.org/wp-content/uploads/2019/09/Where-is-Space_-And-Why-Does-That-Matter_.pdf.

⁹⁶ See generally FÉDÉRATION AÉRONAUTIQUE INTERNATIONALE, Statutes Approved by the FAI General Conference (Sept. 28-29, 2000), https://www.fai.org/sites/default/files/documents/statutes2019_0.pdf ("The Fédération Aéronautique Internationale (FAI) is a world federation consisting of national and international aeronautic and astronautic organisations subscribing to the Statutes.").

⁹⁷ See Gary Myers, *Intellectual Property Resources in and for Space: The Practitioner's Experience*, 32 J. SPACE L. 385, 411 (2006).

remedy for patents that are infringed. Beneficial remedies recognize the patentholders' right of exclusion and provide a deterrence against future patent infringement.⁹⁸

To satisfy these three necessary requirements for a new patent regime, the ISS IGA must add an additional clause ("Clause 7") in Article 21 specifically establishing a patent regime for private nonstate third parties onboard the ISS. First, Clause 7 would define the term "private entity" as an individual, organization, or business which is primarily privately owned and/or managed by nonstate affiliates. Specifically defining the term "private entity" prevents confusion as to what entities qualify under the agreement and the difference between "public" and "private."⁹⁹ This definition would also support the connection of Clause 1 in Article 21 to "Article 2 of the Convention Establishing the World Intellectual Property Organization."¹⁰⁰ A succinct definition also alleviates international concerns that the changes to the ISS IGA pushes out Partner State influence.¹⁰¹ Some in the international community may still point out that Clause 7 still pushes towards a trend of outer space privatization. However, this argument fails to consider that private entities in outer space have operated in space almost as comprehensively as national organizations.¹⁰²

Second, Clause 7 would supplement territorial jurisdiction by only applying to the activities on or within the ISS. This is consistent with the current language of the ISS Agreement which only applies to ISS Partner States and sanctioned private individuals or entities.¹⁰³ Admittedly, Clause 7 would not apply to patent infringement on other privately-owned space objects.¹⁰⁴ However, planned future stationary space objects are controlled completely by private space companies instead of national governments.¹⁰⁵

Third, Clause 7 would provide a remedy against infringement similar to the exclusionary principles found in Article 6 of the ISS Agreement. Article 6 demonstrates that all ISS Partner States must concur before equipment may be used from private entities or non-Partner States. Under Clause 7, this concurrence would stipulate that private individuals or entities which commit verified patent infringement onboard the ISS may have their privileges onboard the ISS revoked by Partner States. Revoked privileges could include a temporary ban in participation in ISS procurement actions

⁹⁸ See Ira V. Heffan, *Willful Patent Infringement*, 7 FED. CIR. B.J. 115, 116 (1997).

⁹⁹ See Gregory Messenger, *The public-private distinction at the World Trade Organization: Fundamental challenges to determining the meaning of "public body"*, 15 INT'L J. CONST. L. 60, 62 (2017).

¹⁰⁰ ISS Agreement, *supra* note 42, at art. 21.

¹⁰¹ See E. E. Weeks, *Applying International Space Law Precedent to Space Tourism, Space Mining and Space Settlement*, 49 PROC. ON L. OUTER SPACE 490, 496 (2006).

¹⁰² See Pamela L. Meredith, *Spacecraft Failure-Related Litigation in the United States: Many Failures, but Few Suits*, 38 PROC. ON L. OUTER SPACE 22, 25 (1995).

¹⁰³ See generally ISS Agreement, *supra* note 42, at art. 5. (stating that "the Government of Canada, the European Governments listed in the preamble which become parties to this Agreement, as well as any other European Government that may accede to this Agreement in accordance with Article 25(3), acting collectively as one Partner, the Government of Japan, the Government of the Russian Federation, and the Government of the United States").

¹⁰⁴ Accord. Martin Menter, *Jurisdiction over Man-Made Orbital Satellites*, 2 J. SPACE L. 19, 21 (1974).

¹⁰⁵ Rachel A. Yates, *Minimizing Regulation of Space Tourism to Stimulate Commercial, Private Launch Capabilities*, 49 PROC. ON L. OUTER SPACE 60, 60 (2006).

or operating within Partner States on Earth.¹⁰⁶ Furthermore, Clause 7 would assert private individuals or entities which have previously committed patent infringement could possibly be barred from operating onboard the ISS altogether. This would be similar to the United Nations Ineligibility List which bars vendors from participating in U.N. procurement actions if they engaged in unethical business practices.¹⁰⁷

Linking patent infringement to business consequences promotes stronger corporate compliance and relieves ISS Partner States of national liability for private actions. Strong private compliance encourages “fewer legitimate claims, fewer lawsuits, and lower legal costs.”¹⁰⁸ Self-regulation also allows ISS Partner States to continue to guard their cross-waiver of liability.¹⁰⁹

Finally, self-regulation avoids enforcement issues between ISS Partner States when patent infringement occurs.¹¹⁰ Treaties and international agreements are only as effective as the foreign governments that enforce them.¹¹¹ Moreover, international treaties only apply to their state signatories, not private individuals or entities.¹¹² However, if one Partner State refuses to exercise Clause 7, the patent infringer may still be penalized by the remaining Partner States since uniform concurrence is necessary to interact with private entities onboard the ISS.¹¹³

Alternatively, it could be argued that this method of penalization fails to provide an identifiable legal remedy.¹¹⁴ Legal scholars disagree as to whether a breach of an international contract “amount[s] to a breach of international obligations of the state as a subject of international law and hence engage its international responsibility.”¹¹⁵ In response, Clause 7 could provide a specific adjudicatory forum that private entities must agree to for all disputes related to alleged patent infringement.

¹⁰⁶ See Ralph L. Kissick, *Commercial Space Launch Contracts: Disputes and Remedies*, 4 J.L. & TECH. 31, 36 (1989) (arguing that many “launch facility use agreements have what could be called termination for cause clauses, giving the Government agencies the contractual right to terminate the contract for certain specifically enumerated reasons”).

¹⁰⁷ *UNDP entries to the UN ineligibility list*, UNITED NATIONS DEVELOPMENT PROGRAMME, <https://www.undp.org/content/undp/en/home/operations/procurement/business/protest-and-sanctions/ineligibility-list/> (last visited Nov. 5, 2019).

¹⁰⁸ George M. Burditt, *Corporate Compliance Audits*, 51 FOOD & DRUG L.J. 217, 218 (1996).

¹⁰⁹ ISS Agreement, *supra* note 42, at art. 16; see Paul B. Larsen, *Cross-Waivers of Liability*, 35 PROC. ON L. OUTER SPACE 91, 94 (1992). *But see* Stefan Kaiser; Martha Mejia-Kaiser, *Space Passenger Liability*, 48 PROC. ON L. OUTER SPACE 207, 209 (2005).

¹¹⁰ See Marco Ferrazzani & Andre Farand, *European Perspective on Lessons Learned from the Intergovernmental Agreement (IGA) on International Space Station (ISS) Cooperation*, 57 PROC. INT’L INST. SPACE L. 293, 296 (2014).

¹¹¹ *Accord.* Henry E. Smith, *Intellectual Property as Property: Delineating Entitlements in Information*, 116 YALE L.J. 1742, 1819 (2007); see Tseming Yang, *International Treaty Enforcement as a Public Good: Institutional Deterrent Sanctions in International Environmental Agreements*, 27 MICH. J. INT’L L. 1131, 1156 (2006).

¹¹² Atip Latipulhayat, *Privatization of Space Law - Negotiating of Commercial and Benefit-Sharing Issues in the Utilization of Outer Space*, 55 PROC. INT’L INST. SPACE L. 243, 246 (2012).

¹¹³ ISS Agreement, *supra* note 42, at art. 5.

¹¹⁴ See Yang, *supra* note 111, at 1156 (arguing that “As a public good, treaty enforcement must overcome collective difficulties in getting states to contribute to the cost of enforcement”).

¹¹⁵ Francisco Orrego Vicuna, *Of Contracts and Treaties in the Global Market*, 8 MAX PLANCK Y.B. U.N. L. 341, 345 (2004).

V. CONCLUSION

Without an identifiable patent regime aboard the ISS, private non-state entities will be forced to rely on a patchwork of decades-old international treaties to protect their investments. This patchwork patent protection threatens future international cooperation with other companies, scientific organizations, or governments.

The ISS Agreement must add an additional clause in Article 21 specifically establishing a patent regime for private nonstate third parties onboard the ISS. This addition to the ISS Agreement would affirm the goals of the international space community, expand the territorial jurisdiction for patents in outer space, and provide usable remedies for patentholders. Patentholders could be confident that whatever inventions or processes they patented on Earth would be protected on the ISS. Furthermore, patentholders could be confident that being a private entity in space does not invite or guarantee patent infringement.¹¹⁶

¹¹⁶ See Richard M. Lebovitz, *The Duty to Disclose Patent Rights*, 6 NW. J. TECH. & INTELL. PROP. 36, 41 (2007) (arguing that an untrustworthy patent system could potentially lead to mistrust among scientists). *Contra* Brian J. Love, *Bad Actors and the Evolution of Patent Law*, 101 VA. L. REV. ONLINE 1, 12 (2015-2016). See generally Michael Abramowicz, *Perfecting Patent Prizes*, 56 VAND. L. REV. 115, 215 (2003) (arguing that “[i]f a prize system is to match the patent system, it might seem that the government must provide some form of guarantee. A sufficiently rigid formula or algorithm can serve this purpose, assuring that the inventor will profit from innovation. Without such a guarantee, the government might do a poor job in distributing prizes, rewarding unmeritorious inventions over meritorious ones.”).