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## **ARTICLE**

### **PATENT INFRINGEMENT IN OUTER SPACE IN LIGHT OF 35 U.S.C. § 105:**

#### **FOLLOWING THE WHITE RABBIT DOWN THE RABBIT LOOPHOLE**

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## I. INTRODUCTION

Since the 1980s, commentators have prophesized that a new era of human space exploration was imminently upon us. In more specific terms, these commentators have forecasted that the role of government agencies in space

operations was set to diminish and private enterprises would fill the resultant void, at least in regard to activities in Low-Earth Orbit (“LEO”).<sup>1</sup> However, for the most part, since the 1980s, this bold prediction, vividly represented in scenes of the movie *2001: A Space Odyssey* by a Pan Am spaceplane transporting Dr. Heywood R. Floyd to an orbiting space station, has not come to fruition . . . until possibly now.<sup>2</sup>

The confluence of a major policy redirection for the National Aeronautics and Space Administration (“NASA”) and significant achievements in the development of private commercial space enterprises occurring in 2010 indicates a subtle but noticeable shift in the structure and lead players of space activities. On February 1, 2010, under its Commercial Crew Development Round 1 project, NASA announced that it had awarded a total of \$50M to five commercial companies to partially fund the development of system concepts, key technologies, and capabilities that could ultimately be used in commercial crew human space transportation systems.<sup>3</sup> On June 4, 2010, Space Exploration Technologies Corporation (“SpaceX”) launched its Falcon 9 rocket for the first time from Cape Canaveral, Florida.<sup>4</sup> On June 28, 2010, the Obama administration unveiled the United States’ new space policy, which indicates that NASA no longer plans to send humans to the Moon.<sup>5</sup> The new space policy effectively

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<sup>1</sup> See, e.g., Barbara Luxenberg, *Protecting Intellectual Property in Space*, PROCEEDINGS OF THE TWENTY-SEVENTH COLLOQUIUM OF THE LAW OF OUTER SPACE, 172 (1984); Kunihiko Tatsuzawa, *The Regulation of Commercial Space Activities by the Non-Government Entities in Space Law*, PROCEEDINGS OF THE THIRTY-FIRST COLLOQUIUM OF THE LAW OF OUTER SPACE, 341 (1988).

<sup>2</sup> See generally LEWIS SOLOMON, *THE PRIVATIZATION OF SPACE EXPLORATION: BUSINESS, TECHNOLOGY, LAW AND POLICY* (2008); MICHAEL BELFIORE, *ROCKETEERS: HOW A VISIONARY BAND OF BUSINESS LEADERS, ENGINEERS, AND PILOTS IS BOLDLY PRIVATIZING SPACE* (2007) (describing the emergence of new entrepreneurial space companies over the last decade).

<sup>3</sup> See Brian Berger, *Biggest CCDev Award Goes to Sierra Nevada*, SPACE NEWS (Feb. 1, 2010), [http://www.spacenews.com/venture\\_space/100201-biggest-ccdev-award-goes-sierra-nevada.html](http://www.spacenews.com/venture_space/100201-biggest-ccdev-award-goes-sierra-nevada.html).

<sup>4</sup> See *Launch Manifest*, SPACE X, [http://www.spacex.com/launch\\_manifest.php](http://www.spacex.com/launch_manifest.php) (last visited Mar. 11, 2011).

<sup>5</sup> Compare THE VISION FOR SPACE EXPLORATION (2004) available at [http://www.nasa.gov/pdf/55583main\\_vision\\_space\\_exploration2.pdf](http://www.nasa.gov/pdf/55583main_vision_space_exploration2.pdf) (making human presence on the Moon a primary goal), with NATIONAL SPACE POLICY OF THE UNITED STATES OF AMERICA (2010) available at [http://www.whitehouse.gov/sites/default/files/national\\_space\\_policy\\_6-28-10.pdf](http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf) (eschewing all mention of the Moon).

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halted NASA's planned return to the Moon (known as the Constellation Program) and instead put a substantial emphasis on procuring commercial launch services to meet NASA's needs, including crew and cargo missions to the International Space Station.<sup>6</sup> On October 10, 2010, Virgin Galactic achieved the first piloted free flight and landing of its SpaceShipTwo sub-orbital vehicle.<sup>7</sup> Barely two weeks later, on October 25, 2010, NASA released a solicitation for its Commercial Crew Development Round 2 project valued at up to \$200M and designed "to stimulate efforts within the private sector to develop. . . human spaceflight services. . . [and to] foster activity leading to the development of orbital commercial Crew Transportation Systems."<sup>8</sup> On December 8, 2010, SpaceX successfully launched its Dragon spacecraft into LEO atop its Falcon 9 launch vehicle, subsequently reentered the Dragon spacecraft into the Earth's atmosphere, and then safely landed it in the Pacific Ocean where it was retrieved, becoming the first private enterprise to accomplish this task.<sup>9</sup> In the United States, other private companies, notably, Boeing, Sierra Nevada, Orbital Sciences and Bigelow Aerospace, are aggressively developing commercial space vehicles for operations in LEO.<sup>10</sup>

Absent an unexpected rash of commercial failures, the long predicted new era of a commercial space industry appears to be finally upon us, and is shap-

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<sup>6</sup> See NATIONAL SPACE POLICY OF THE UNITED STATES OF AMERICA (2010) at 11, *available at* [http://www.whitehouse.gov/sites/default/files/national\\_space\\_policy\\_6-28-10.pdf](http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf); Jacqui Goddard, Nasa reduced to 'pipe dreams' as Obama cancels Moon flights, *THE TIMES* (Feb. 2, 2010), [http://www.timesonline.co.uk/tol/news/world/us\\_and\\_americas/article7011322.ece](http://www.timesonline.co.uk/tol/news/world/us_and_americas/article7011322.ece).

<sup>7</sup> See Jason Paur, *Update: Virgin Galactic SpaceShipTwo Makes First Glide Flight*, *WIRED* (Oct. 10, 2010, 12:05 PM), <http://www.wired.com/autopia/2010/10/virgin-galactic-spaceshiptwo-makes-first-glide-flight/>.

<sup>8</sup> NASA COMMERCIAL CREW DEVELOPMENT ROUND 2 ANNOUNCEMENT NO. NASA-CCDEV-2 (Oct. 25, 2010) at A1, *available at* [http://prod.nais.nasa.gov/eps/eps\\_data/144064-SOL-001-002.docx](http://prod.nais.nasa.gov/eps/eps_data/144064-SOL-001-002.docx).

<sup>9</sup> See Launch Manifest, *supra* note 4; Henry Spencer, *Commercial capsule succeeds where NASA failed*, *NEWSIDENTIST* (Dec. 14, 2010, 1:38 PM), <http://www.newscientist.com/article/dn19868-commercial-capsule-succeeds-where-nasa-failed.html>.

<sup>10</sup> See Clara Moskowitz, *Spaceships Galore! Commercial Space Race to Orbit Heating Up*, *SPACE.COM* (Oct. 28, 2010, 5:18 PM), <http://www.space.com/9416-spaceships-galore-commercial-space-race-orbit-heating.html>; Doug Mohny, *NASA's Commercial Space Revolution*, *SATELLITE SPOTLIGHT* (Feb. 14, 2011), <http://satellite.tmcnet.com/topics/satellite/articles/144505-nasas-commercial-space-revolution.htm>.

ing up to become a *de facto* commercial space race. Because activities in space are inherently technological endeavors, it follows that in shifting from a predominantly governmental role to a substantial role by private enterprise in LEO, traditional terrestrial legal issues associated with intellectual property (“IP”) law will find increasing applicability to such commercial outer space activities.<sup>11</sup> Chief among these traditional terrestrial legal issues associated with IP law is the infringement of patents. For years, inventors have been filing and obtaining patents for technologies that have either exclusive applicability in outer space or dual-use applicability both on Earth and in outer space. For instance, a simple search of the term “outer space” in the United States Patent and Trademark Office’s patent database reveals that more than 4,000 issued patents and over 2,500 patent applications reference this term.<sup>12</sup> This “staking out” of the patent landscape with respect to inventions designed to be used in outer space and the emerging commercial space industry in LEO represents another kind of shift. It seems that not only a new era of commercial space activities is finally upon us, but a new era of patent litigation may be upon us as well.

Given that patent law is inherently and traditionally territorial and that a nation’s borders do not extend into outer space, commercial space patent litigation raises some important questions: will a domestic or regional patent afford adequate protection of an invention whose commercial exploitation requires that it be made, used, or sold in outer space? Also, what is the applicability of a patent issued by one nation in the context of patent infringement in outer space? As for the United States, finding the answer to these questions becomes an adventure through a thicket of statutory law, case law, and international treaties. The adventure is much like Alice’s in Wonderland, which began when she chose to follow the “white rabbit down the rabbit hole,” with the answer to one question only leading to more questions.

To explore how U.S. patent law would be applied to patent disputes on activities in outer space, this article will first describe the context in which such disputes will likely be litigated and then examine how an exception in 35

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<sup>11</sup> Luxenberg, *supra* note 1, at 172; Tatsuzawa, *supra* note 1, at 341.

<sup>12</sup> USPTO Patent Full-Text and Image Database, UNITED STATES PATENT AND TRADEMARK OFFICE, <http://patft.uspto.gov/netahtml/PTO/search-bool.html> (search “Term 1” for “outer space”) (last visited Dec. 10, 2010); USPTO Patent Application Full-Text and Image Database, UNITED STATES PATENT AND TRADEMARK OFFICE, <http://appft.uspto.gov/netahtml/PTO/search-bool.html> (search “Term 1” for “outer space”) (last visited May 12, 2010).

U.S.C. § 105, Inventions in outer space,<sup>13</sup> has seemingly created a jurisdictional loophole that could allow private entities to insulate themselves from patent infringement liability in the United States. This article will conclude by examining whether this loophole could hinder the U.S. patent system's ability to incentivize research on space-based technologies and whether the loophole is arguably inconsistent with the United States' obligations under the United Nations treaties pertaining to outer space operations. As possible remedies or mitigating tactics, this article considers potential solutions to render this loophole irrelevant or to close it, including a proposal to amend 35 U.S.C. § 105 to enable the courts to follow or expand existing principles of extraterritorial patent jurisdiction.

## II. THE LEGAL LANDSCAPE: THE INTERSECTION OF PATENT LAW AND SPACE LAW

Determining the applicability of national patent laws to outer space patent disputes requires an understanding of two bodies of law: patent law and space law. Before beginning our journey down the rabbit hole, we provide a brief overview of the principles of both patent law and space law that are most relevant to a court's resolution of patent infringement disputes in outer space.

### A. *Patent Law*

In most nations, a patent represents a property right granted by the national government for a fixed period of time to the inventor(s) of an invention. This property right is normally limited to the territorial reach of the granting nation.<sup>14</sup> Hence, patent law is inherently territorial in nature. Once issued, a patent authorizes its owner(s) to exclude others from making use of the claimed invention.<sup>15</sup> Patents are generally enforced according to the laws of the granting nation, though the patents of some nations may be enforced internationally in accordance with international treaties.<sup>16</sup>

In order to obtain legal protection for her inventions, the inventor must file a patent application in her "jurisdiction of interest."<sup>17</sup> An applicant who wishes

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<sup>13</sup> Inventions in Outer Space, Pub. L. No. 101-580, § 105, 104 Stat. 2863 (1990).

<sup>14</sup> See, e.g., *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 531 (1972), *superse- ded by statute*, Patent Amendments Act of 1984, Pub. L. No. 98-622, 98 Stat. 3383.

<sup>15</sup> 35 U.S.C. § 154 (2006).

<sup>16</sup> See 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, 246 (2008).

<sup>17</sup> See *id.* at 247.

to file an application in multiple countries should file an international Patent Cooperation Treaty (“PCT”) application in order to be eligible to subsequently file for domestic patents in each of the participating PCT countries.<sup>18</sup> While filing the PCT application allows the inventor to temporarily “reserve” her international patent rights, those rights do not become legally enforceable until the inventor files a domestic application in each jurisdiction in which she is seeking a patent.<sup>19</sup>

### *B. Space Law*

The term “space law” encompasses all national laws and international treaties that regulate activities associated with outer space.<sup>20</sup> The founding principles of current space law were largely developed during the height of the Cold War, when lawmakers were focused on regulating the major space-faring nations, rather than the activities of the private sector.<sup>21</sup> Consequently, none of the major international space treaties specifically addresses the applicability of national patent laws to activities in outer space.<sup>22</sup>

Nonetheless, the 1967 treaty, *Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* (hereinafter the “Outer Space Treaty”)—the formative instrument establishing the international legal framework for outer space activities—provides that a space object’s country of registration “shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer

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<sup>18</sup> *See id.*

<sup>19</sup> *See id.*

<sup>20</sup> FRANCIS LYALL & PAUL B. LARSEN, *SPACE LAW: A TREATISE* 2 (Ashgate, 2009).

<sup>21</sup> *See* Henry Hertzfeld, *The “Law of Outer Space” Is at a Crossroads: Current and Future Issues in International Space Law*, 15 *ILSA J. INT’L & COMP. L.* 325, 331 (2009) (“Private ownership and operation of space assets . . . was recognized but too far in the future for the drafters of the [Outer Space Treaty] in the 1960s to be concerned about.”).

<sup>22</sup> *See* Issue Paper, *Intellectual Property and Space Activities*, THE WORLD INTELLECTUAL PROPERTY ORGANIZATION, 5-7 (2004), available at [http://www.wipo.int/patent-law/en/developments/pdf/ip\\_space.pdf](http://www.wipo.int/patent-law/en/developments/pdf/ip_space.pdf) (last visited Mar. 29, 2011) [hereinafter WIPO Issue Paper]. It is important to distinguish activities carried out entirely in outer space and activities relating to outer space that are carried out at least partially on Earth within the territory of a country. The latter would generally be governed by patent laws of the country or countries where such activities occurred under the general territorial principles of patent jurisdiction. *See id.* While this article examines the case law for the latter, the article is primarily concerned with activities that occur entirely in outer space and are therefore outside the customary reach of national patent laws.

space or on a celestial body.”<sup>23</sup> This principle is analogous to the “floating island” principle that exists in maritime law with respect to ships in international waters.<sup>24</sup> Under the 1975 Convention on the Registration of Objects Launched into Outer Space (hereinafter the “Registration Convention”), which implements the Outer Space Treaty’s registration requirements, the “launching state” is responsible for registering a space object.<sup>25</sup> A launching State is either (i) the country that launches or procures the launching of the space object or (ii) the country from which the space object is launched.<sup>26</sup> Thus, the combined effect of the Outer Space Treaty and the Registration Convention is to enable launching States to extend their laws, including their patent laws, to their registered space objects.<sup>27</sup>

Consistent with the framework established by the Outer Space Treaty, in 1990 the United States extended the reach of its patent laws to U.S.-registered spacecraft by enacting 35 U.S.C. § 105. Section 105 provides that “any invention made, used, or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States shall be considered to be made, used or sold within the United States for the purposes of [U.S. patent laws].”<sup>28</sup> Therefore, an invention conceived or first reduced to practice on a U.S.-registered spacecraft is deemed to have been made in the United States. Further, an infringement lawsuit based on a U.S. patent for activities concerning the making, use, or selling of an invention in outer space on a U.S.-registered spacecraft may be brought in a U.S. court and would succeed if the activity is covered by the claims of the U.S. patent.

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<sup>23</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Oct. 10, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347 [hereinafter Outer Space Treaty]. See also LYALL & LARSEN, *supra* note 20, at 41 (“Of [the major space treaties] the Outer Space Treaty of 1967 (OST) is generally accepted as foundational, containing in part at least principles of a generality that have passed into customary law.”).

<sup>24</sup> Glenn H. Reynolds, *Legislative Comment: The Patents in Space Act*, 3 HARV. J. L. & TECH. 14, 19 (1990).

<sup>25</sup> See Registration of Objects Launched into Outer Space, art. II(1), Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. No. 8480.

<sup>26</sup> *Id.* at art. I(a)(i)-(ii).

<sup>27</sup> See LYALL & LARSEN, *supra* note 20 at 124-27 (proposing that the jurisdictional control states exert over their own space objects enables them to issue patent rights to inventors whose inventions are created within those space objects). See generally Hammerle & Ro, *supra* note 16 (for more in-depth discussions on the application of national intellectual property laws to space objects).

<sup>28</sup> 35 U.S.C. § 105 (1990).

In 1998, the major space powers incorporated the concept of national patent jurisdiction into an intergovernmental agreement concerning cooperation on the International Space Station (ISS).<sup>29</sup> Under this agreement, patent jurisdiction over an activity on the ISS belongs to the country of registration of the space station module wherein that activity occurs.<sup>30</sup> Consequently, Japan, Russia and the United States each have exclusive patent jurisdiction over activities conducted in their respective space station module(s), and any European partner state may claim patent jurisdiction over activities conducted in the space station modules registered to the European Space Agency.<sup>31</sup>

### III. DOWN THE RABBIT HOLE: PATENT INFRINGEMENT IN LIGHT OF 35 U.S.C. § 105

#### A. *Extraterritorial Reach of U.S. Patent Law*

With the basic principles of patent and space law in mind, our adventure down the rabbit hole begins with an examination of the current state of jurisprudence on the extraterritorial scope of U.S. patent law. Although a comprehensive examination of this topic is beyond the scope of this article,<sup>32</sup> suffice it to say that U.S. courts have struggled with the idea that, as with most national laws, U.S. patent law is strictly territorial. Radically new technologies continue to emerge and develop at seemingly exponential rates, and their manufacture and use have expanded into global systems and applications that reach beyond the borders of the U.S. This phenomenon forced the historical approach

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<sup>29</sup> See 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. 21, ¶ 2, Jan. 28, 1998 [hereinafter ISS Agreement] (“[F]or the purposes of intellectual property law, an activity occurring in or on a Space Station flight element shall be deemed to have occurred only in the territory of the [country] of that element’s registry, except that for [European Space Agency]-registered elements any European Partner State may deem the activity to have occurred within its territory”).

<sup>30</sup> See *id.*

<sup>31</sup> See *id.*

<sup>32</sup> See generally Denise W. DeFranco & Adrienne N. Smith, *Technology and the Global Economy: Progress Challenges the Federal Circuit to Define the Extraterritorial Scope of U.S. Patent Law*, 34 AIPLA Q.J. 373 (2006); John W. Osborne, *A Rational Analytical Boundary For Determination of Infringement By Extraterritorially-Distributed Systems*, 46 IDEA 587 (2006); Hammerle & Ro, *supra* note 16, at 241-75 (for a more comprehensive discussion of the extraterritorial reach of U.S. patent law).

of a strictly territorial application of U.S. patent law, tenuously held by the U.S. Supreme Court in *Deepsouth*,<sup>33</sup> to be tested by such new global systems and applications in light of the language of infringing activity defined in § 271 of the Patent Act.<sup>34</sup>

For the most part, U.S. courts have focused on defining the act of “use or using” for purposes of extraterritorial reach of U.S. patent law. One of the leading cases to examine an extension of the extraterritorial reach of U.S. patent law after passage of the 1952 Patent Act is the 1976 U.S. Court of Claims case of *Decca Limited v. United States*.<sup>35</sup> The underlying technology in this case concerned a worldwide radio navigation system known as “Omega” which was operated by the United States Government.<sup>36</sup> The system included components of a system located in foreign countries and called for the placement of receivers in ships and aircraft so as to retrieve positional information while travelling on or over the high seas.<sup>37</sup> In issuing its *per curiam* opinion, the court in *Decca* established that, for “system” or “apparatus” claims to a patent, the determinative factors to consider in deciding whether use of the patented system occurs within the United States are: (1) whether “control of a system” occurs on U.S. territory, (2) whether the system is “owned” by a U.S. entity, and (3) whether there is “beneficial use” in the U.S.<sup>38</sup> Based on these factors, the *Decca* court found that the United States Government could be subjected to the court’s jurisdiction for an infringement claim on a U.S. patent.<sup>39</sup>

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<sup>33</sup> See generally *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518 (1972) (establishing the traditional approach to U.S. extraterritorial patent jurisdiction in a 5-4 decision; Congress eventually responded to this decision by enacting 35 USC § 271(f) in an effort to close the loophole identified by the Court).

<sup>34</sup> Compare *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1157, 126 S. Ct. 1174 (2006) (holding that the global telecommunications system infringed a U.S. patent under 35 U.S.C. § 271(a)), and *Eolas Techs. Inc. v. Microsoft Corp.*, 399 F.3d 1325, 73 U.S.P.Q.2d 1782 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 998, 126 S. Ct. 568 (2005) (finding software is a component within the meaning of 35 USC § 271(f)), with *Microsoft Corp. v. AT&T Corp.*, 550 U.S. 437 (2007) (holding that Microsoft’s export of a master disk containing an infringing operating system does not constitute supplying “components of a patented invention” under 271(f) when the software is replicated abroad and installed on computers outside of the United States).

<sup>35</sup> *Decca Limited v. United States*, 210 Ct. Cl. 546, 544 F.2d 1070 (Ct. Cl. 1976) (*per curiam*).

<sup>36</sup> See *id.* at 1074.

<sup>37</sup> See *id.*

<sup>38</sup> See *id.* at 1083.

<sup>39</sup> See *id.*

In 2005, the United States Court of Appeals for the Federal Circuit in *NTP, Inc. v. Research in Motion, Ltd.*, modified the approach of *Decca* in its interpretation of the extraterritorial scope of system and method claims to a U.S. patent.<sup>40</sup> Here, the technology at issue related to systems for integrating existing electronic mail systems (“wireline systems”) with radio frequency (“RF”) wireless communication networks to enable a mobile user to receive e-mail over a wireless network using a portable handheld device known as a Blackberry.<sup>41</sup> One of the relay components of the system was determined to be located in Canada, prompting Research in Motion to argue that its allegedly infringing activity did not occur “within the United States” as required in § 271(a) of the Patent Act.<sup>42</sup> The court determined that it needed to consider “whether the using, offering to sell, or selling of a patented invention is an infringement under § 271(a) if a component or step of the patented invention is located or performed abroad.”<sup>43</sup> Specifically, the court relied on two of the *Decca* prongs—the place where the control of the system is exercised and the place where beneficial use of the system is obtained—in announcing what might be viewed as a new holistic test for deciding the situs of the infringing act: “the place at which the system as a whole is put into service.”<sup>44</sup> Relying on its new holistic test, the court found that “use of NTP’s asserted system claims occurred within the United States.”<sup>45</sup>

With respect to NTP’s asserted method claims, however, the court noted that “the concept of ‘use’ of a patented method or process is fundamentally different from the use of a patented system or device.”<sup>46</sup> The court then reasoned that:

[b]ecause a process is nothing more than the sequence of actions of which it is comprised, the use of a process necessarily involves doing or performing each of the steps recited. This is unlike use of a system as a whole, in which the components are used collectively, not individually. We therefore hold that a process cannot be used ‘within’ the United States as required by section 271(a) unless each of the steps is performed within

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<sup>40</sup> See *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1282 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1157, 126 S. Ct. 1174 (2006).

<sup>41</sup> See *id.* at 1287.

<sup>42</sup> See *id.* at 1311.

<sup>43</sup> *Id.* at 1315.

<sup>44</sup> *Id.* at 1317.

<sup>45</sup> *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1317 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1157, 126 S. Ct. 1174 (2006).

<sup>46</sup> *Id.*

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[the United States].<sup>47</sup>

The result of this case highlights an important distinction: when any element of a patented claim occurs outside the United States a system claim may be held infringed, but a method claim will not be held infringed in the United States. Hence, under the *NTP* analysis of extraterritorial reach, at least for system or apparatus claims, as long as the underlying space-based technology concerns a product over which its customer exercises “control” and obtains “beneficial use” of the product in the United States, a U.S. patent infringement claim is feasible, even if necessary components of the product or service are not physically located within U.S. territory.

*B. 35 USC § 105: Inventions in Outer Space*

An examination of the statutory language of 35 U.S.C. § 105<sup>48</sup> represents our next stop in the rabbit hole. Due to the strict territorial language of 35 U.S.C. § 100(c),<sup>49</sup> rejection of the “floating island” principle for claims based on U.S. patent law began gaining momentum in the courts.<sup>50</sup> The drafters of 35 U.S.C. § 105 took note of this trend and extended the definition of patent infringement to acts<sup>51</sup> in outer space on a “space object<sup>52</sup> or component there-

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<sup>47</sup> *Id.* at 1318.

<sup>48</sup> “(a) Any invention made, used, or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States shall be considered to be made, used or sold within the United States for the purposes of this title, except with respect to any space object or component thereof that is specifically identified and otherwise provided for by an international agreement to which the United States is a party, or with respect to any space object or component thereof that is carried on the registry of a foreign state in accordance with the Convention on Registration of Objects Launched into Outer Space.

(b) Any invention made, used, or sold in outer space on a space object or component thereof that is carried on the registry of a foreign state in accordance with the Convention on Registration of Objects Launched into Outer Space, shall be considered to be made, used, or sold within the United States for the purposes of this title if specifically so agreed in an international agreement between the United States and the state of registry.” 35 U.S.C. § 105 (1990).

<sup>49</sup> “The terms ‘United States’ and ‘this country’ mean the United States of America, its territories, and possessions.” 35 U.S.C. § 100(c).

<sup>50</sup> *See, e.g.,* SENATE COMM. ON THE JUDICIARY, INVENTIONS IN OUTER SPACE, S. REP. 101-266, at 3-4 (1990) (commenting that “In addition, numerous decisions in other areas of the law have declined to uphold this rationale [the “floating island” principle] with regard to United States flag ships and aircraft.”).

<sup>51</sup> These “acts” are limited to an invention being “made, used, or sold . . .” in outer space. 35 U.S.C. § 105(a).

of<sup>53</sup> under the jurisdiction *or control of the United States*,<sup>54</sup> (emphasis added) with three exceptions. Two of these exceptions remove a space object from the jurisdiction of U.S. patent law. Specifically, even if a space object is nominally under the jurisdiction or control of the United States, U.S. patent law will not extend to the space object if it is (1) specifically identified and otherwise provided for by an international agreement<sup>55</sup> to which the United States is a party (hereinafter, “Exception 1”) or (2) carried on the registry of a foreign state in accordance with the Registration Convention (hereinafter, “Exception 2”, and together with Exception 1, the “§ 105(a) Exceptions”).<sup>56</sup> As will be discussed *infra*, Exception 2 seemingly holds the most relevance to private enterprises in the United States because selection of where to register their space objects may be within their discretion.

Assuming one of the § 105(a) Exceptions does not apply, another implication of 35 U.S.C. § 105 is its impact to the state of extraterritorial principles in

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<sup>52</sup> The term “space object” is intended to be broader than a “vehicle.” See S. REP. 101-266, at 6 (“The term ‘space object’ is used as defined in the Registration Convention. It has been substituted for the term ‘aeronautical and space vehicle,’ first, because it is a term used in the various international space treaties, and second, in order to avoid the possibility that the term ‘vehicle’ may be interpreted more restrictively than the term ‘object.’”).

<sup>53</sup> The term “component thereof [a space object]” or its equivalent form “component parts” in the Outer Space Treaty is not explicitly defined. The authors of this paper contend that a “component thereof [a space object]” can arguably be interpreted by the courts to have a broad meaning. For example, a “component thereof [a space object]” may include items that are not physically located within a space object but are functionally associated with the space object, e.g., solar panels, communication stations, etc. Alternatively, a “component thereof” may also include items that are physically located within a space object but are not functionally associated with the space object, e.g., experimental payloads, laptop computers, supplies, etc.

<sup>54</sup> 35 U.S.C. § 105(a). See also Hammerle & Ro, *supra* note 16, at 262-63 (considering the possible significance of the term “of the *United States*.”). Does “United States” in this context mean the United States Federal Government or the territory of the United States in light of the definition of “United States” in 35 U.S.C. § 100(c) and the multiple uses of “United States” (with arguably, different meanings) in 35 U.S.C. § 105? The paper assumes *arguendo* that “of the United States” in the subject context effectively means “control” takes place “within the territorial borders of the United States.”

<sup>55</sup> S. REP. 101-266, at 6 (“The phrases ‘international agreement to which the United States is a party,’ and ‘an international agreement between the United States and the State of registry,’ could include, in addition to intergovernmental agreements, international agreements between a Federal agency of the U.S. Government and their foreign counterparts, including foreign governmental agencies or international organizations.”).

<sup>56</sup> 35 U.S.C. § 105(a) (1990).

regard to U.S. patent law. For example, note that “control” is a common term used both by the U.S. courts as a factor in determining whether there is an extraterritorial reach of U.S. patent law based on the infringing act of “use” and by § 105 in determining applicability of the statute to activities in outer space. Although an intent of 35 U.S.C. § 105 was to define the territorial status of space objects and components thereof, the coincidence of the word “control” being used may result in unintended consequences, such as 35 U.S.C. § 105 effectively further modifying extraterritorial principles with respect to space objects. For instance, to support a finding of extraterritorial application of U.S. patent law to an allegedly infringing use of a system or apparatus under either *Decca* or *NTP*, the elements of “control” from and “beneficial use” in the United States must exist.<sup>57</sup> Much like how *NTP* seemingly removed the consideration of U.S. “ownership” from *Decca*’s extraterritorial equation, 35 U.S.C. § 105 apparently removes the consideration of “beneficial use” in the United States from *NTP*’s extraterritorial equation, whereby only the consideration of “control” from the United States remains. Consider the scenario in which a space object is not registered under the Registration Convention but is controlled from the United States. Under 35 U.S.C. § 105, one might argue that U.S. courts would have patent law jurisdiction over the space object even without a finding of beneficial use in the United States. A court’s acceptance of this argument would effectively modify the state of extraterritorial application of U.S. patent law to a single consideration for space objects.

Another example of the impact of § 105(a) is its applicability to space objects if they are under the *jurisdiction* of the United States.<sup>58</sup> From this perspective, 35 U.S.C. § 105 completely supersedes *NTP* and *Decca* with respect to space objects because neither *NTP* nor *Decca* expressly examines the element of “jurisdiction” of the United States. To shed light on this potential impact, consider the scenario in which a space object is neither registered under the Registration Convention nor controlled from the United States. Nevertheless, if the space object is licensed in the United States under its regulatory protocols, the United States arguably has jurisdiction of the space object. Under this scenario, the language of § 105 would support an interpretation that U.S. patent law would still apply, even if the space object is not controlled from the U.S., has no beneficial use in the U.S., and is not owned by a U.S. entity.<sup>59</sup> By

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<sup>57</sup> *Decca Ltd. v. United States*, 544 F.2d 1070, 1083 (Ct. Cl. 1976) (per curiam); *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1316 (Fed. Cir. 2005).

<sup>58</sup> 35 U.S.C. § 105(a) (1990).

<sup>59</sup> *See id.* Note that 35 U.S.C. § 105 requires “a space object or component thereof under the jurisdiction or control of the United States” for U.S. patent law to apply. So long as “ju-

codifying the “floating island” principle for space objects, the drafters of 35 U.S.C. § 105 have effectively hurled the monkey wrench into the machinery of extraterritorial principles of U.S. patent law.

*C. The Rabbit “Loophole”*

Our journey down in the rabbit hole continues with another question: in light of the § 105(a) Exceptions, can a private enterprise in the United States avoid U.S. patent infringement claims based on making, using, and selling a space object by registering it in a foreign country? Alternatively, does Exception 2 eliminate a U.S. court’s ability to rely on the current state of extraterritorial principles even if the space object is “controlled” from the U.S., has “beneficial use” in the U.S., and is “owned” by a U.S. company? If so, the attractiveness to a private enterprise of pursuing this type of arrangement is obvious: the risk of being sued is vastly lower in a country with relatively few issued patents than in the United States. Do the § 105(a) Exceptions represent a loophole for avoiding patent infringement claims in the United States for activities in outer space? Our journey now shifts from following the rabbit down the rabbit hole to exploring the rabbit “loophole.” Exception 2 references the Registration Convention, therefore, one must first look to it for answers.

As discussed, the Outer Space Treaty provides that a space object is subject to the jurisdiction and control of the “State Party to the Treaty on whose registry an object launched into outer space is carried. . . .”<sup>60</sup> The Registration Convention defines the “State of Registry” as the “launching State on whose registry a space object is carried in accordance with article II.”<sup>61</sup> The “launching State” is defined as “(i) a State which launches or *procures* the launching of a space object; [or] (ii) a State from whose territory or facility a space object is launched (emphasis added).”<sup>62</sup> Based on this definition, there are four possible ways in which a country can become the “launching State” for a space object: (1) the State launches a space object, (2) the State procures the launching of a space object, (3) the State has a space object launched from its territory, or (4) the State has a space object launched from its facility.<sup>63</sup>

With respect to the second possibility, it is relatively clear that if a govern-

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isdiction of the United States” exists, the principles of control, beneficial use, and ownership in determining the situs of the infringing act are of no consequence for U.S. patent law to apply.

<sup>60</sup> Outer Space Treaty, *supra* note 23, at art. VIII.

<sup>61</sup> Registration Convention, *supra* note 25, at art. I.

<sup>62</sup> *Id.*

<sup>63</sup> LYALL & LARSEN, *supra* note 20, at 86.

mental entity procures launch services from a foreign entity such that the actual launch occurs on foreign soil, then the governmental entity's State can be designated the launching State. But what if a *private enterprise*, duly licensed within a State, procures launch services from a foreign entity (either governmental or private) wherein the actual launch occurs on foreign soil? Can the private enterprise's home State essentially "step into the shoes" of the private enterprise and still be designated the launching State in this scenario?

In order to answer this question, one first has to consider the interrelationship between the Registration Convention and the Outer Space Treaty. The Registration Convention references the Outer Space Treaty with particular emphasis that "[s]tates shall bear international responsibility for their national activities in outer space."<sup>64</sup> Relative to what constitutes an "international responsibility," the Outer Space Treaty explains this concept first in article VI wherein it states,

States Parties to the Treaty shall bear *international responsibility* for national activities in outer space. . . , whether such activities are carried on by governmental agencies *or by non-governmental entities*, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty.<sup>65</sup>

Article VI goes on to state, "[t]he activities of non-governmental entities in outer space. . . shall require *authorization and continuing supervision* by the appropriate State Party to the Treaty (emphasis added)."<sup>66</sup> The next section of the Outer Space Treaty, article VII, further provides that

[e]ach State Party to the Treaty that launches or procures the launching of an object into outer space . . . and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space. . .<sup>67</sup>

As is apparent in these provisions, once combined, both the Outer Space Treaty and the Registration Convention establish a model of State responsibility that includes not only a State's acts, but also the acts of its non-governmental entities.

Relative to State responsibility, the Outer Space Treaty is more expansive as

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<sup>64</sup> Registration Convention, *supra* note 25, at pmb1.

<sup>65</sup> Outer Space Treaty, *supra* note 23, at art. VI (emphasis added).

<sup>66</sup> *Id.*

<sup>67</sup> *Id.* at art. VII.

compared to general international law. As Professor Vladamir Kopal states in a 2003 United Nations Workshop,

For by the declaration of responsibility that relates equally to State and non-State activities, and also by the requirement of authorization and continuing supervision of the non-governmental entities by the “appropriate” State, the States Parties to the [Outer Space Treaty] assumed what is called in the doctrine of international law a direct responsibility, not only for their space activities, but also for the activities of their non-governmental entities in outer space.<sup>68</sup>

Partially in response to this concept of “direct responsibility,” signatory nations to the Outer Space Treaty began to recognize the need for domestic regulations and licensing protocols to fulfill their requirements of “authorization and continuing supervision” of non-governmental entities that conduct activities in outer space.<sup>69</sup> Given the Outer Space Treaty’s concept of a State’s “direct responsibility” for its non-governmental entities’ activities in outer space, a strong argument can be made that if a private enterprise abides by a State’s regulatory and licensing protocols, the State “steps into the shoes” of the private enterprise for purposes of “procuring” launch services even though it is actually the private enterprise that is procuring launch services, i.e., executing contracts and paying the bills. A number of specific examples can readily be found in which private enterprises have had their commercial space objects carried on the U.S. registry, even though the objects were launched on a foreign rocket from a foreign launch facility and on foreign territory.<sup>70</sup> By process of elimination of the possible choices under which the Registration Convention defines a “launching State,” one may logically conclude that a U.S. registration in these given examples can only be supported by an interpretation

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<sup>68</sup> Vladamir Kopal, *Introduction to the United Nations Treaties and Principles on Outer Space*, 2003 Proceedings

United Nations / International Institute of Air and Space Law Workshop on Capacity Building in Space Law 10, 14.

<sup>69</sup> See, e.g., Act on Space Activities (1982:963) (Swed.); Outer Space Act 1986 (U.K.); Commercial Space Launch Act of 1984, later codified at 49 U.S.C. §§ 70101-70119; Commercial Space Launch Amendments Act of 2004, now codified at 51 U.S.C. §§ 50901-50923; Law of Russian Federation on Space Activities (1993); Space Affairs Act (1993) (S. Afr.); Space Activities Act 1998 (Austl.).

<sup>70</sup> Consider the following commercial space objects carried on the U.S. registry yet launched on foreign soil: Genesis I and II (Bigelow Aerospace) launched on July 12, 2006 and June 28, 2007, respectively from Russia; DirecTV 5, 10, and 12 (DirecTV) launched on May 7, 2002, July 7, 2007, and December 29, 2009, respectively from Russia.

that the United States government “stepped into the shoes” of the private U.S. enterprise and “procured” launch services of the foreign State.

He who giveth, also taketh away, so goes the adage. As discussed *supra*, the drafters of 35 U.S.C. § 105 have effectively taken this adage to heart, albeit unintentionally, at least with respect to the potential loophole we now discuss. We suggest that an intent of 35 U.S.C. § 105 was to close a potential loophole to liability for patent infringement for an object operating in outer space due to the strict territorial language of 35 U.S.C. § 101(c).<sup>71</sup> The ironic result in the drafters’ well-intentioned attempt to reconcile 35 U.S.C. § 105 with the Outer Space Treaty is that they closed one loophole and unintentionally created another.

*D. Avoiding Patent Infringement Liability by Using Flags of Convenience*

In light of the arguments *supra*, it is possible that the Outer Space Treaty has laid the groundwork for a “flag of convenience” problem in outer space.<sup>72</sup> Similar to the Outer Space Treaty, under maritime law, a ship operates under the law of its country, or “flag” of registration.<sup>73</sup> The term “flag of convenience” refers to the practice of registering a ship in a country different from that of the ship’s owners for the purpose of reducing operating costs and avoid-

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<sup>71</sup> SENATE COMM. ON THE JUDICIARY, INVENTIONS IN OUTER SPACE, S. REP. 101-266, at 4 (1990) (“The *Gardiner* rationale [i.e., the “floating island” principle] was again disapproved by the Court of Claims in a subsequent case, *Ocean Science & Engineering v. U.S.* The court suggested the need for a clear signal from Congress on the matter: . . . ‘Perhaps the patent bar will note the possible loophole in the coverage of the U.S. patent laws and will invite the attention of Congress to it.’”) (footnote omitted).

<sup>72</sup> See Matthew J. Kleiman, *Patent Rights and Flags of Convenience in Outer Space*, 23 AIR & SPACE LAW. 4, 4-7 (2011) (describing the flag of convenience problem as it relates to patent infringement liability); LYALL & LARSEN, *supra* note 20, at 94 (comparing the system established by the Registration Convention to “the registry system in international shipping and the concept of the ‘flag of convenience’” and explaining that this system will permit “commercial entrepreneurs . . . to avoid the rigors of legal requirements as to supervision and liability [by] setting up shell companies in countries less space-competent than others”) (footnotes omitted); ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, SPACE 2030: TACKLING SOCIETY’S CHALLENGES 177 (2005) (questioning “whether the concept of launching state . . . opens the door to a ‘flag of convenience’ approach to space faring.”).

<sup>73</sup> Convention on the High Seas, art. 6, Apr. 29, 1958, 450 U.N.T.S. 11 [hereinafter Convention on the High Seas] (“Ships shall sail under the flag of one State only and, save in exceptional cases expressly provided for in international treaties or in these articles, shall be subject to its exclusive jurisdiction on the high seas.”).

ing burdensome regulations.<sup>74</sup> In 2009, when measured in terms of total tonnage, more than half of the world's merchant ships were registered under flags of convenience, with the Panamanian, Liberian and Marshall Islands flags accounting for nearly 40% of the global fleet.<sup>75</sup> Due to lax regulations, minimal oversight and poor recordkeeping in these countries, flags of convenience are often criticized for creating a permissive environment for criminal activities, poor working conditions and environmental damage.<sup>76</sup>

To determine whether the Outer Space Treaty and Registration Convention could enable a U.S. company to avoid patent infringement liability in the United States by utilizing flags of convenience, we will consider three new scenarios:

- i. Scenario 1: U.S. company launches and controls a satellite from a facility located outside of the United States

First, consider the scenario where a private enterprise, Acme Corporation, having its principal place of business in the United States, is duly licensed by the United Kingdom to establish a permanent launch facility in the Turks and Caicos Islands (a British Crown Colony in the Caribbean). Acme's satellite is launched from the facility and carried on the registry of the United Kingdom in accordance with the Registration Convention. Some level of operational control of the space object is maintained at Acme's headquarters in the United States, but primary operational control is conducted from the Turks and Caicos facility. Further, beneficial use of the satellite exists within the United States in the form of navigational services.

Under Exception 2, the U.S. courts would not have jurisdiction if Acme's satellite infringed a U.S. patent based on the satellite being used in outer space because the satellite is registered with the United Kingdom.<sup>77</sup> However, as-

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<sup>74</sup> See *Flag of Convenience Definition*, BUSINESSDICTIONARY.COM, <http://www.businessdictionary.com/definition/flag-of-convenience.html> (last visited Apr. 8, 2011).

<sup>75</sup> REGINA ASARIOTIS ET AL., U.N. CONFERENCE ON TRADE AND DEV., REVIEW OF MAR. TRANSP., at 54-57, U.N. Sales No. E.09.II.D.11 (2009), available at [http://www.unctad.org/en/docs/rmt2009\\_en.pdf](http://www.unctad.org/en/docs/rmt2009_en.pdf).

<sup>76</sup> See, e.g., *What are Flags of Convenience?*, INTERNATIONAL TRANSPORT WORKERS' FEDERATION, <http://www.itfglobal.org/flags-convenience/sub-page.cfm> (last visited Apr. 8, 2011); The Common Maritime Policy, EUR. POL. DOC. (COM 14) § 2 (1996), available at [http://www.europarl.europa.eu/workingpapers/tran/w14/2\\_en.htm](http://www.europarl.europa.eu/workingpapers/tran/w14/2_en.htm) (last visited Apr. 8, 2011); Rex S. Soh & Sock-Yong Phang, *Quasi-flag of convenience shipping: the wave of the future*, 33 TRANSP. J. 31, 31-36. (Dec. 1993).

<sup>77</sup> The acts of making and selling the satellite in outer space are generally unrealistic in

suming *arguendo* that Exception 2 does not apply, would extraterritorial principles yield a different result? Under both *Decca* and *NTP*, the United States would also arguably not have jurisdiction if Acme's satellite infringed a patented system based on the act of using the satellite because there is insufficient control exercised over the satellite from the United States, albeit the remaining prongs of both the *Decca* and *NTP* analyses favor a finding of jurisdiction. Indeed, in 1993, the U.S. Court of Claims addressed a similar situation in *Hughes Aircraft Co. v. United States*, where it held that there was no infringement of a U.S. patent by a satellite, the ARIEL 5,<sup>78</sup> that never entered the United States and was built in and primarily controlled from the United Kingdom, even though NASA's Goddard Space Center in Maryland "was the central communications link for tracking and data acquisition services" for the satellite.<sup>79</sup> Applying *Decca*, the court reasoned that although a certain amount of control was provided from Maryland, "the 'control point' for the spacecraft itself was in England," so the United States had insufficient control over the spacecraft to establish jurisdiction.<sup>80</sup> We suggest the same analysis would apply to Acme's satellite which is launched and primarily controlled from the Turks and Caicos as given in this first scenario.

- ii.        Scenario 2: U.S. company launches a satellite from a facility located outside of the United States, but controls the spacecraft from its headquarters located within the United States

For our second scenario, let us change the facts slightly. Acme Corporation's satellite is launched from the Turks and Caicos Islands, but it is primarily controlled from Acme's headquarters in the United States, with the same beneficial use as before in the U.S. Again, because the United Kingdom is the "State from whose territory or facility [the] space object is launched," the satellite is properly carried on the registry of the United Kingdom in accordance with the Registration Convention.<sup>81</sup>

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the foreseeable future and therefore not examined in this article.

<sup>78</sup> *Hughes Aircraft Co. v. United States*, 29 Fed. Cl. 197, 243 (1993). ARIEL 5 was an observational satellite designed to study the Earth's atmosphere in the X-ray band region of the electromagnetic spectrum. J. F. Smith & G. M. Courtier, *The Ariel 5 Programme*, 350 PROC. R. SOC. LOND. A. 421, 432-37 (1976).

<sup>79</sup> *Hughes*, 29 Fed. Cl. at 243.

<sup>80</sup> *Id.* (distinguishing the level of U.S. control over the ARIEL 5 satellite from the system at issue in *Decca*, where a "master station" for the system was located within the United States).

<sup>81</sup> Registration Convention, *supra* note 25, at art. I.

Under Exception 2, the United States would not have jurisdiction in the event Acme's satellite infringed a U.S. patent based on activities occurring on the satellite while being used in outer space. Note that the level of control is not a consideration with respect to the applicability of Exception 2.<sup>82</sup> Assuming *arguendo* that Exception 2 does not apply, however, would extraterritorial principles yield a different result in this scenario? Under both *Decca* and *NTP*, the United States would arguably have jurisdiction in the event an invention used on the satellite infringes a U.S. patented system while in outer space because the satellite and therefore the invention located thereon) is primarily controlled from the United States.<sup>83</sup> Indeed, the court in *Hughes* noted that under *Decca*, the United States would have had patent jurisdiction over the ARIEL 5 satellite "had [NASA] actually originated the [satellite control] commands within the United States and then transmitted those commands to the satellite through its STDN [Spaceflight Tracking and Data Network] system."<sup>84</sup> However, the alleged infringement in *Hughes* took place before the enactment of 35 U.S.C. § 105, so the court did not address Exception 2. Because Exception 2 seemingly renders U.S. patent law inapplicable for space objects that are carried on the registry of a foreign state in accordance with the Registration Convention, regardless of whether primary control is exercised from the United States, it is possible that Acme has now insulated itself from patent infringement liability under circumstances in which it would not have been able to do so under the extraterritorial principles of *Decca* or *NTP*.

- iii. Scenario 3: A foreign subsidiary of a U.S. company launches and controls a satellite from a facility located within the United States

For the third scenario, let us change the facts again to a more extreme example. Acme Corporation forms a wholly owned subsidiary, Acme Sub, which is incorporated in and operated from the Turks and Caicos Islands in accordance with all appropriate corporate formalities. Acme Sub purchases a satellite from a U.S. manufacturer, procures launch services from a facility in the Unit-

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<sup>82</sup> See 35 U.S.C. § 105(a) (1990).

<sup>83</sup> *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1317 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1157, 126 S. Ct. 1174 (2006) (holding that the United States has jurisdiction over a multi-national wireless communication system enabling a person in the United States to receive e-mail with a portable handheld device); *Decca Limited v. United States*, 544 F.2d 1070, 1074-75 (Ct. Cl. 1976) (*per curiam*) (holding that the United States had jurisdiction over a worldwide radio navigation system where the "master station" was located within the United States).

<sup>84</sup> *Hughes*, 29 Fed. Cl. at 242.

ed States and controls the satellite from a facility in the United States. Beneficial use of the satellite also occurs in the U.S. Nevertheless, because Acme Sub is incorporated in Turks and Caicos, the United Kingdom agrees to “steps into the shoes” of Acme Sub and be deemed the launching State under the Registration Convention by virtue of being the State that “procured” the launching of the satellite. In sum, the Acme Corporation is relying on a pure “flag of convenience” strategy.

As in Scenario 2, applying the extraterritorial principles of either the *Decca* or *NTP* decisions would arguably lead to the conclusion that the United States has jurisdiction to a patent infringement claim based on Acme Sub’s satellite’s activities in outer space. Nevertheless, Exception 2 removes Acme Sub’s satellite from U.S. patent jurisdiction because the satellite is properly registered on the U.K. spacecraft registry under the Registration Convention.<sup>85</sup> Using the Exception 2 as a shield, Acme Corp. and Acme Sub have apparently insulated themselves from patent infringement liability in the United States in this scenario notwithstanding the obvious evasive tactics being used.<sup>86</sup>

#### IV. SQUARING EXCEPTION 2 WITH THE UNITED STATES’ OBLIGATIONS UNDER THE OUTER SPACE TREATY

The foregoing discussion has shown how the § 105(a) Exceptions have created a loophole in U.S. patent law that could permit private U.S. and foreign entities to insulate themselves from patent infringement liability in the United States for their outer space operations under circumstances wherein they might otherwise be liable under current U.S. extraterritorial principles. This loophole poses at least two problems. First, allowing companies to avoid liability for infringing U.S. patents could hamper the effectiveness of promoting research sought by the U.S. patent system. Patents traditionally play an important role in promoting highly technological research and product development, for they offer an exclusionary right for a limited period to the owner which justifies the

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<sup>85</sup> See 35 U.S.C. § 105(a) (1990); Registration Convention, *supra* note 25, at art. I.

<sup>86</sup> The authors reiterate that this analysis is examining patent infringement claims based on patented technologies used only in outer space where none of the claims cover terrestrial operations. In addition, had Acme Sub launched the satellite from the United States, but built and controlled the satellite from outside the United States, it would likely have been protected from patent infringement liability in the United States by the temporary presence defense to patent infringement, which is codified at 35 U.S.C. § 272. See *Hughes*, 29 Fed. Cl. at 240-41 (holding that the temporary presence doctrine provided a “complete defense” to the defendant’s infringement of a U.S. patent by a spacecraft that “entered the United States one time for the sole purpose of being launched into outer space”).

initial costs of research and subsequent costs of productization. An ineffective patent system could reduce incentives for private space companies to innovate and cause space companies to protect their inventions as trade secrets instead of disclosing them to the public in patent filings.<sup>87</sup> Second, while a purpose of Exception 2 is to recognize and defer to the United States' obligations under the Outer Space Treaty and the Registration Convention, it is unclear whether completely deferring to the Registration Convention was actually required in order to accomplish this goal. In fact, entirely ceding responsibility for patent infringement by space objects that are operated by U.S. persons or companies may be inconsistent with the United States' obligations under the Outer Space Treaty.

To examine this view further, consider, as stated *supra*, that the Outer Space Treaty provides that "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."<sup>88</sup> Although the language "shall" suggests a mandatory edict is being placed on the launching State, with respect to "retain jurisdiction," neither the Outer Space Treaty nor the Registration Convention requires that the designated launching State exercise *exclusive* jurisdiction over its registered space objects. The failure of the Outer Space Treaty to vest a single state with exclusive jurisdiction over space objects seems intentional when compared with language in the 1959 Convention on the High Seas, which provides that "Ships shall sail under the flag of one State only and, save in exceptional cases expressly provided for in international treaties or in these articles, shall be subject to its *exclusive* jurisdiction on the high seas."<sup>89</sup> By contrast, the language in article VIII of the

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<sup>87</sup> The negative ramifications of ineffective patent protection for inventions used in outer space are discussed in more detail in Kleiman, *supra* note 72. See also Reynolds, *supra* note 24, at 15-17 ("Many of the most promising [space technologies] can only be reduced to practice in outer space, since they rely on microgravity or other unique characteristics of the space environment. Thus, a lack of patent protection would likely forestall research in these fields. . . . By failing to extend patent protection to space innovations made by smaller firms and research centers, we would systematically be depriving ourselves of our most valuable research resources.").

<sup>88</sup> Outer Space Treaty, *supra* note 23, at art. VIII (emphasis added).

<sup>89</sup> Convention on the High Seas, *supra* note 73, art. 6 (emphasis added). Article 92 of the United Nations Convention on the Law of the Sea, to which the United States is not a party, contains a virtually identical provision. However, even the maritime "law of the flag" is not absolute: national courts are willing to disregard the doctrine in favor of overriding public policy considerations. For instance, the United States Supreme Court held that a foreign flag could not shield a cruise ship from the requirements of the Americans with Disabilities

Outer Space Treaty is much less restrictive.

Further support in the view that the State of Registry does not necessarily have exclusive jurisdiction over its registered space objects can be found by the fact that the Registration Convention seems to encourage creative jurisdictional arrangements when there are multiple potential launching States. Specifically, the Registration Convention states that the determination of the launching State shall be made “without prejudice to appropriate agreements concluded or to be concluded among the launching States on jurisdiction and control over the space object and over any personnel thereof.”<sup>90</sup> A 1986 report by the U.S. Congressional Office of Technology Assessment even speculated that this provision of the Registration Convention could be a basis upon which to establish joint jurisdiction under the Registration Convention for the then-proposed international space station.<sup>91</sup>

Assuming the State of Registry’s jurisdiction over its registered space objects is non-exclusive, how might a State other than the State of Registry assert jurisdiction over a space object? There are five principles upon which States have traditionally sought to assert jurisdiction over a person or entity. Jurisdiction based on the geographic territory of a State (Territorial Jurisdiction) is perhaps the most common form of jurisdiction, but a State may also assert jurisdiction beyond its geographic borders based on the nationality of the persons or entities involved (National Jurisdiction), the impact of the acts committed on vital State interests (Protective Jurisdiction), the principle that some crimes are universally condemned (Universal Jurisdiction), and the ability of a State to act with regard to an action by a foreigner outside its territory where that action would substantially affect the person or property of a citizen (The Passive Personality Principle).<sup>92</sup>

The possibility of more than one State having jurisdiction over a spacecraft based on these principles of jurisdiction is already established in current U.S. space law. The U.S. law concerning the licensing of private spacecraft utilizes National Jurisdiction to mandate that all U.S. citizens, U.S. corporations, and foreign corporations that are controlled by a U.S. citizen or corporation must obtain a license from the U.S. government prior to launching a spacecraft, operating a launch site, or reentering a reentry vehicle into the atmosphere, re-

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Act while the ship was in U.S. waters. *Spector v. Norwegian Cruise Line Ltd.*, 545 U.S. 119 (2005).

<sup>90</sup> Registration Convention, *supra* note 25, at art. II, ¶ 2.

<sup>91</sup> OFFICE OF TECHNOLOGY ASSESSMENT, *SPACE STATIONS AND THE LAW: SELECTED LEGAL ISSUES* (Aug. 1986), available at <http://www.fas.org/ota/reports/8627.pdf>.

<sup>92</sup> Reynolds, *supra* note 24, at 18.

ardless of whether such activities are conducted within or outside of the United States.<sup>93</sup> When these activities are conducted outside of the United States, the foreign States where the activities are actually conducted would presumably also have Territorial Jurisdiction over such activities. Regardless of which State is designated as the “launching State” under the Registration Convention, absent an agreement to the contrary, the U.S. operator of a spacecraft would still need to obtain a license from the United States to launch or recover a spacecraft or operate a launch facility.<sup>94</sup> If the foreign State is designated as the State of Registry, the application of Exception 2 in a future patent dispute would lead to the incongruous result of a spacecraft being within the jurisdiction of the United States for licensing purposes, but outside of the jurisdiction of United States for purposes of patent infringement.

In addition, while article VIII of the Outer Space Treaty focuses on the “State Party to the Treaty on whose registry an object launched into outer space is carried,” other sections of the Outer Space Treaty extend responsibility for space activities beyond the formality of registration. As stated *supra*, article VI provides that States shall bear “international responsibility” for outer space activities “carried on by governmental agencies *or by non-governmental entities*” and that the “activities of non-governmental entities in outer space . . . shall require *authorization and continuing supervision* by the appropriate State Party to the Treaty (emphasis added).”<sup>95</sup> Article VII further provides that “[e]ach State Party to the Treaty that launches or procures the launching of an object into outer space . . . is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object. . . .”<sup>96</sup>

Neither article VI nor article VII takes into account the formality of registration. Rather, both articles expect States to shoulder the burden of responsibility for the activities of their non-governmental spacecraft, and meeting this responsibility was a primary reason behind the United States asserting National Jurisdiction over licensing the space-related activities of U.S citizens and corporations, even when these activities take place abroad.<sup>97</sup> For licensing pur-

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<sup>93</sup> 51 U.S.C. § 50904(a) (2011).

<sup>94</sup> *Id.* at § (a)(2).

<sup>95</sup> Outer Space Treaty, *supra* note 23, at art. VI.

<sup>96</sup> *Id.* at art. VII.

<sup>97</sup> See Commercial Space Launch Act, Pub. L. No. 98-575, § 2(7), 98 Stat. 3055 (1984) (finding that “the United States should . . . regulate [private sector] launches and services *in order to ensure compliance with international obligations of the United States . . .*”) (emphasis added). See also LYALL & LARSEN, *supra* note 20, at 470 (“Given that [under the Outer Space Treaty] a state governs the lawful activities of persons and entities under its

poses, application of U.S. law does not rest upon whether a spacecraft is registered with the United States or with another State party to the Registration Convention.<sup>98</sup> It is therefore questionable whether a law that permits the mere registration of a space object to determine jurisdiction for patent infringement lawsuits, without any consideration of extraterritorial patent jurisdictional principles, is consistent with the United States' responsibilities under the Outer Space Treaty.

V.    HOW U.S. PATENT OWNERS MAY ATTEMPT TO ENFORCE THEIR PATENTS  
      DESPITE THE § 105(A) EXCEPTIONS

At this point in our journey, it would appear that a patent owner would have little recourse against a well-informed and cunning patent infringer. The § 105(a) Exceptions represent significant legal predicaments. In particular, Exception 2 is analogous to sovereign immunity if an invention is made, used, or sold in outer space on a space object registered in a foreign registry in accordance with the Registration Convention, the alleged infringer is immune from an infringement claim based on a U.S. patent with respect to the acts of making, using, or selling the invention. Exception 2 vastly limits a court's discretionary authority to take into account any other equitable considerations presenting harsh consequences.

Rather than attempting to defeat Exception 2 head-on, a potentially successful litigation strategy for a U.S. patent owner may reside in attacking a would-be infringer's reliance on Exception 2. To quote Sun Tzu in the *ART OF WAR*, "So in war, the way is to avoid what is strong and to strike at what is weak."<sup>99</sup> With this advice in mind, the following potential tactics are presented.

A.    *Infringing Acts Under 35 U.S.C. § 105 and § 271(a) Remain  
      Unreconciled*

Embedded in the complexity of U.S. patent law resides at least one potential tactic with the power to counter the § 105(a) Exceptions. This opportunity lurks due to differences between the enumerated acts of infringement identified in 35 U.S.C. § 105, Inventions in outer space, and those given in 35 U.S.C. §

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jurisdiction, it has power to allow access to space to its nationals. . . . When a state permits private users to have access to outer space that access will therefore be restricted . . . through licensing of the launch provider . . .").

<sup>98</sup> See 51 U.S.C. 50904.

<sup>99</sup> Sun Tzu on the Art of War: The Oldest Military Treatise in the World, Translated from the Chinese by Lionel Giles, M.A., Ch. 6, ¶ 30 (1910).

271, Infringement of patent.<sup>100</sup> 35 U.S.C. § 105 addresses “any invention made, used, or sold in outer space.”<sup>101</sup> Comparatively, 35 U.S.C. § 271(a) addresses the scenarios wherein “whoever without authority makes, uses, *offers to sell*, or sells any patented invention, within the United States, or *imports* into the United States any patented invention . . . .”<sup>102</sup> Because 35 U.S.C. § 105 does not explicitly address the acts of “offering to sell” and “importing,” it is arguable that the § 105 (a) Exceptions would not render U.S. patent law inapplicable for infringement claims based on an offer to sell within, or importation into, the United States. And therefore, even if a space object or a component thereof is carried on a registry of a foreign state in accordance to the Registration Convention or provided for in an international agreement, U.S. courts may seemingly find jurisdiction for patent infringement claims alleging an act of offering to sell or importation.

While a comprehensive examination of what constitutes an infringing offer to sell within the United States is beyond the scope of this article,<sup>103</sup> in the context of extraterritorial activities in outer space, the reality of applying an argument that an “offer to sell” has occurred within the United States for an invention used in outer space presents numerous practical hurdles. Other than an actual offer to sell an invention to be placed in service in outer space on a U.S. registered (domestic) space object, a court may be reluctant to find an offer to sell has occurred “within the United States” for an invention that is to be used in outer space, particularly on a foreign-registered space object. Consider, for example, a hypothetical scenario of a company offering to sell a satellite telephone service in the United States which uses a telecommunications satellite (i.e., the space object) carried on the registry of a foreign State, and a compo-

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<sup>100</sup> 35 U.S.C. § 271(a) (“Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States, or imports into the United States any patented invention during the term of the patent therefore, infringes the patent.”). Congress amended § 271(a) to include the acts of “offers to sell” and “imports” in response to the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement by way of the Uruguay Round Agreements Act, Pub. L. No. 103-465, § 533, 108 Stat. 4809, 4988 (1994). 35 U.S.C. § 105(a), codified in 1990, was not amended to reconcile its terms with the 1994 amendments to §271(a).

<sup>101</sup> 35 U.S.C. § 105 (1990).

<sup>102</sup> 35 U.S.C. § 271(a) (2003) (emphasis added).

<sup>103</sup> For a more comprehensive examination of this topic, *see generally* Chantal Kuhn Rappi, *The Past, Present and Future of Offer-to-Sell Infringement Jurisprudence and Damages*, 22 INTELL. PROP. LITIG., no. 4, Summer 2011 available at [http://apps.americanbar.org/litigation/mo/premium-It/newsletters/intellectual/ipl\\_summer2011.pdf](http://apps.americanbar.org/litigation/mo/premium-It/newsletters/intellectual/ipl_summer2011.pdf).

ment of the satellite uses an invention that reads on the claims of a U.S. patent. Would a court find that offering to sell the right to use the satellite telephone service inherently encompasses an offer to sell the invention used on the telecommunications satellite? Even if it did, the act of offering to sell the satellite telephone service in this example faces other challenges before arriving at a conclusion that the act constitutes an offer to sell an invention “within the United States.”<sup>104</sup> For instance, can the infringing act of an offer to sell be separated from and not conditioned upon the location of the contemplated or actual sale of the invention?<sup>105</sup> Similarly, does an “offer to sell within the United States” also require that contemplated performance occur in the United States regardless of where the actual offer was made?<sup>106</sup> In the above example, a finding of jurisdiction by a U.S. court would need to be based on a chain of logic that relies in part on a finding that the offer to sell the service inherently offers to sell an invention contemplated for future use on the space object. In other words, in such a case, the location of contemplated use of the space object could be reasonably connected to the act of offering to sell the service that uses such space object. Absent perhaps the situation in which the seller was intentionally engaging in a bait-and-switch offer (in which case an infringing “use” is never truly contemplated), a reasonable argument can be made, based on the holding of *Transocean*, that one cannot rely on the act of offering to sell an invention for contemplated use or performance in outer space without also invoking the contemplated act of “selling” or “use”, thereby summoning consideration of 35 U.S.C. § 105 and the § 105(a) Exceptions. In the event a U.S. court were to decide that the location of the infringing act of an offer to sell an invention for use in outer space requires consideration of 35 USC § 105, a

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<sup>104</sup> *Id.* at 17, discussing the decision of *Ion, Inc. v. Sercel, Inc.*, No. 5:06-CV-236 (E.D. Tex. Sep. 16, 2010). The author concludes that negotiations between parties taking place in the United States to manufacture and deliver an infringing product abroad would not appear to be an infringing offer under the *Transocean* case, discussed *infra* at notes 106-09.

<sup>105</sup> See *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Contractors USA, Inc.*, 617 F.3d 1296, 1308-10 (2010) (considering whether an offer by a U.S. company to sell a patented invention to another U.S. company for delivery and use in the U.S. constitutes an offer to sell within the U.S., even though the seller later modified the product sold such that use of the patented invention did not occur. In reaching its decision, the court first noted that an “offer to sell is a distinct act of infringement separate from an actual sale.” Even so, the court then concluded that “the location of the contemplated sale controls whether there is an offer to sell within the United States.”).

<sup>106</sup> *Id.* The court held that “a contract between two U.S. companies for performance in the U.S. may constitute an offer to sell within the U.S. under § 271(a)” even when the offer was negotiated or the contract signed while the two U.S. companies were abroad.

finding of extraterritorial jurisdiction in the U.S. for this example would also require the court to distinguish the test for the location of the infringing act of an “offer to sell” announced in *Transocean*. Of course, the facts of the *Transocean* case can be readily distinguished from this current example, because in the example the infringing act of an “offer to sell” has occurred in the United States, whereas in *Transocean* it did not. However, given the court’s broad-sweeping language in *Transocean*, which has been subsequently relied on by at least one federal district court,<sup>107</sup> it can be reasonably argued that the location where the infringing offer actually occurs is not determinative of the location of the infringing act, but rather the location of the contemplated or actual performance is.<sup>108</sup> And thus, in the above example, even if the “offer to sell” occurs entirely within the United States, if the patented invention is entirely made, used, or sold in outer space on a space object carried on a foreign registry, then the cunning patent infringer may reasonably argue that the offer to sell occurs in the country of foreign registry.<sup>109</sup>

The act of importation also presents unique issues. Upon first blush, importing an invention on an object in outer space “into the United States” seems unrealistic. However, in light of the International Space Station, where each individual module is on the registry of one of the international partner States,<sup>110</sup> the act of constructive importation into the United States is quite likely. Consider the scenario where an experimental payload, specifically identified as a Japanese experiment (i.e., space component) in an international, intergovernmental agreement to which the United States is a party, is permanently moved from the Japanese Experiment Module to the U.S. Lab and subsequently used in the U.S. Lab. The experimental payload is effectively imported into the United States from Japan. If the payload reads on the claims of a U.S. patent,

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<sup>107</sup> See, e.g., *Ion, Inc. v. Sercel, Inc.*, No. 5:06-CV-236, 2010 WL 3768110, at \*3-4 (E.D. Tex. Sep. 16, 2010).

<sup>108</sup> See *Transocean*, 617 F.3d at 1308-10 (applying the following logic: first, the location of contemplated performance of the invention determines the location of a contemplated sale; second, the location of the contemplated sale controls the location of an offer to sell; hence, the location of contemplated performance of the invention determines the location of the offer to sell).

<sup>109</sup> See *Ion*, 2010 WL 3768110, at \*3-4 (motion for judgment as a matter of law on damages based on foreign sales and offers for foreign sales; holding, based on guidance in *Transocean*, that § 271(a) does not apply to offers made in the United States to sell patented inventions in Brazil and Canada).

<sup>110</sup> ISS Agreement, *supra* note 29, at art. 21 ¶ 5. In regard to the European Space Agency (ESA), an activity conducted on an ESA-registered module may be deemed to have occurred within the territory of any European Partner State. *Id.*

the patent owner may be able to sue the Japanese payload owner for infringement and argue that the basis for such a lawsuit is the act of importing the patented invention into the United States. This argument could be made even in light of Exception 1 because the patent owner is relying on the act of importation as opposed to the act of making, using, or selling to allege an infringing activity. However, similar to what was discussed *supra*, are the acts of importing and then using an invention mutually exclusive from a practical perspective? In this example, a court could find that, even though the payload was imported into a U.S. space object, the payload itself was specifically identified by the international agreement to be under the jurisdiction and control of Japan and therefore Exception 1 of 35 U.S.C. § 105 applies.

Another complication to the potential application of a tactic of filing a claim alleging an act of an offer to sell or of importing an invention is the court's discussion of infringement of method claims in *NTP*. In the *NTP* case, the court noted legislative history expressing the view that only "use" of a patented method can infringe a patent.<sup>111</sup> The significance of this legislative history in 1987 may be somewhat in question, given that it speaks to the scope of infringing acts by method claims before the changes eschewed in conformance with the TRIPS Agreement had occurred in 1994. Nevertheless, at least for method claims, it would seem that allegations of acts of an "offer to sell" or "importation" of a patented invention are closely knit to the location of where the use of the patented method occurs. One would therefore expect that for an allegation resting solely upon claims to a patented method, this tactic would face a significant challenge.

Although application by the courts of the tactic proposed in this section is uncertain, the tactic does offer, particularly with respect to claims directed to a patented system, an opportunity for courts to open the jurisdictional door to patent infringement cases that would otherwise have had the door shut due to the § 105(a) Exceptions.

#### *B. Induced Infringement*

The acts defined in 35 U.S.C. § 271(a) are acts of direct infringement. Contrastingly, 35 U.S.C. § 271(b) provides a patent owner a cause of action based on induced infringement.<sup>112</sup> "In order to succeed on a claim of inducement, the

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<sup>111</sup> See *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1319 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1157, 126 S. Ct. 1174 (2006) ("Congress has consistently expressed the view that it understands infringement of method claims under section 271(a) to be limited to use.").

<sup>112</sup> 35 U.S.C. § 271(b) (2003) ("Whoever actively induces infringement of a patent shall

patentee must show, first that there has been direct infringement. . .and second that the alleged infringer knowingly induced infringement and possessed specific intent to encourage another's infringement."<sup>113</sup> Whether or not an extraterritorial extension of U.S. patent law can be made via induced infringement is an open issue.<sup>114</sup> On one hand, some "courts have held that § 271(b) 'applies to exclusively territorial conduct.'"<sup>115</sup> Yet on the other hand, "[t]he Federal Circuit has not definitively addressed whether inducing activity extraterritorially can give rise to liability under U.S. patent law. . ."<sup>116</sup> Reconsider the example discussed *supra* where an offer occurs within the United States to sell a right to use an invention covered by a U.S. patent and used in outer space on a space object carried on the registry of a foreign state. If a court holds that the location of the delivery or performance of the contemplated sale is determinative with respect to where an offer to sell occurs, a patent owner would not have a cause of action based on a § 271(a) "offer to sell" claim of infringement for infringing activities occurring on the foreign space object. Consequently, a claim based on actively inducing infringement by a domestic offer to sell would likely face a similar challenge. However, a patent owner may still have a cause of action based on an extraterritorial extension of induced infringement, even though the act of direct infringement constructively occurs abroad.<sup>117</sup>

*C. Attacking the Validity of a Registration in a Foreign Registry*

A patent owner may also challenge the underlying basis of Exception 2 or the validity of the registration itself. If the registration is rendered invalid, it logically follows that Exception 2 would not apply. The Registration Convention places certain continuing obligations on a launching State. According to Article II.2, where there are two or more possible launching States for a space

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be liable as an infringer.").

<sup>113</sup> *Minn. Mining & Mfg. v. Chemque, Inc.*, 303 F.3d 1294, 1304-05 (Fed. Cir. 2002).

<sup>114</sup> *Westerngeco, LLC. v. Ion Geophysical Corp.*, No. 4:09-cv-1827, 2011 WL 864946, at \*22 (S.D. Tex. Mar. 2, 2011).

<sup>115</sup> *Id.* at 43 (citing *Wing Shing Products (BVI), Ltd. v. Simatelex Manufactory Co.*, 479 F. Supp. 2d 388, 409 (S.D.N.Y. 2007)).

<sup>116</sup> *Id.*

<sup>117</sup> This strategy appears to be tenuous. See *DSU Medical Corp. v. JMS Co.*, 471 F.3d 1293, 1305 (Fed. Cir. 2006) (en banc) (quoting with approval a jury instruction stating, "Unlike direct infringement, which must take place within the United States, induced infringement does not require any activity by the indirect infringer in this country, as long as the direct infringement occurs here.").

object, the potential launching States “shall jointly determine which one of them shall register the object.”<sup>118</sup> Such determination shall “*bear in mind*” the provisions of Article VIII of the Outer Space Treaty, which provides that 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 (emphasis added).<sup>119</sup> The implication of this language is that merely retaining jurisdiction or merely retaining control is insufficient. At least in the context of the Outer Space Treaty, it appears that to be deemed a valid launching State, the launching State must retain jurisdiction and control of the space object.

The regulatory and licensing protocols of a nation would seemingly require sufficient minimal contacts to support a court’s finding that jurisdiction has been retained over a private enterprise. Conversely, it would be more difficult for a launching State to satisfy its continuing obligation to “retain control” over a space object. Retaining operational control would most likely fall within the definition of “retain control.” But, is this term limited to operational control? What about financial control? What about administrative control? At the present time, the definition of “control” in the context of article VIII of the Outer Space Treaty is unknown. Moreover, even with respect to operational control, there are various levels of operational control. Recall Scenario 3 where the launching State (i.e., the United Kingdom) retains no operational control of Acme’s satellite. Would a court having jurisdiction to adjudicate the validity of a registration recognize the inequities of Scenario 3 and effectively “pierce the veil” of Acme Sub’s registration thereby rendering it invalid? The unpredictability of the answer to this question was best conveyed by the *Decca* court’s summary of U.S. Supreme Court decisions on whether or not to imply exceptions in instances involving flags of convenience; “[s]ometimes it does so, sometimes not. . .”<sup>120</sup> Thus, although the outcome of this strategy is uncertain, the legal basis for rendering a registration invalid theoretically exists under auspices of the Outer Space Treaty and the Registration Convention’s reference to the Outer Space Treaty.

## VI. CONCLUSION

Given the current language and structure of 35 U.S.C. § 105, and in light of the definition of a “launching State” under the Registration Convention, questions arise as to whether a private enterprise can insulate itself from patent in-

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<sup>118</sup> Registration Convention, *supra* note 25, at art. 2, ¶ 2.

<sup>119</sup> *Id.*

<sup>120</sup> *Decca Limited v. United States*, 544 F.2d 1070, 1073 (Ct. Cl. 1976) (per curiam).

fringement claims in the United States when it launches, controls, or launches and controls, a foreign-registered space object from within the territorial borders of the United States, particularly when there is beneficial use, ownership, or both, from the United States. Even if a private enterprise would otherwise be within the jurisdiction of the U.S. judicial system, absent an amendment, the § 105(a) Exceptions may represent a significant loophole that enables a private enterprise to avoid patent infringement claims in the United States with respect to its activities in outer space. Once the commercial space industry comes of age, we may find that this loophole will both decrease the ability of the U.S. patent system to fully incentivize private research and development of space technologies<sup>121</sup> and hamper the United States' ability to satisfy its obligation under the Outer Space Treaty to be responsible for and to supervise its governmental and non-governmental national space activities.

Many commentators have argued that the harmonization of international patent laws or a new outer space patent jurisdiction is required in order to negate the impact of outer space flags of convenience and properly protect space technologies from patent infringement.<sup>122</sup> Yet the "traditional reluctance of terrestrial nations to surrender their sovereignty to international organizations" makes the implementation of such a system unlikely in the foreseeable future.<sup>123</sup> In the meantime, closing the loophole created by the § 105(a) Exceptions, with particular emphasis on preventing use of Exception 2 to create flags of convenience, would be an important intermediate step towards achieving these objectives.

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<sup>121</sup> SENATE COMM. ON THE JUDICIARY, INVENTIONS IN OUTER SPACE, S. REP. 101-266, at 5 (1990) (explaining that the legislative intent of § 105 was to confront "[u]ncertainty as to the application of the patent law in [three areas where U.S. patent law does not recognize extra-territorial activity which] may chill prospects for commercial investment in outer space research and manufacturing."). Hence, the incorporation of Exception 2 with the intent of conforming to the Outer Space Treaty may arguably result in the very chilling effect that § 105 was designed to prevent.

<sup>122</sup> See, e.g., Kleiman, *supra* note 72, at 6 ("The ideal solution to the flag of convenience problem, at least as it relates to effective patent protection, is to create a new multinational patent jurisdiction for filing and enforcing patents in outer space."); LYALL & LARSEN, *supra* note 20, at 127 ("A general and uniform patent protection for inventions made in outer space would give investors confidence in outer space research and encourage such activities."); WIPO Issue Paper, *supra* note 22, at ¶ 82 ("[T]he best solution [to legal uncertainty regarding intellectual property protection for the space industry is] to declare space and its accessories (for example, launch sites and vehicles) as a single territory with a single and uniform law and with a single and universal enforcement body.").

<sup>123</sup> Kleiman, *supra* note 72, at 6.

Because the Outer Space Treaty does not explicitly assign exclusive jurisdiction to the State of Registry, it is doubtful that strict deference to the Registration Convention is necessary in determining whether a U.S. court should extend U.S. patent jurisdiction to certain space objects registered in foreign states. Following the same principles used in determining extraterritorial jurisdiction for Earth-based activities could, instead, be a more equitable mechanism for determining whether the United States has a legitimate interest in asserting jurisdiction over the extraterritorial patent infringement of U.S. patents. For these reasons, Congress should consider amending 35 U.S.C. § 105 by modifying Exception 2 to require U.S. courts to follow extraterritorial principles when evaluating whether the United States has jurisdiction for a claim of patent infringement occurring on a “foreign-flagged” spacecraft. In addition, the United Nations Committee on the Peaceful Uses of Outer Space, which is currently responsible for maintaining the registry of space objects under the Registration Convention, should consider playing a more active role in evaluating the validity of space object registrations under the Registration Convention, particularly in light of launching States’ continuing obligations defined in the Outer Space Treaty. In circumstances where this U.N. committee notices a “flag of convenience” issue arising with a U.S.-based company, the committee may attempt to persuade U.S. officials to seek an international agreement with the pertinent foreign state to address the jurisdictional issues related to U.S. patents.<sup>124</sup>

Our journey is now complete. This article has taken the reader down an adventurous voyage exploring the mishmash of statutory law, case law, and international treaties that make up a legal “Wonderland” known as the extraterritorial reach of U.S. patent law on space-related activities, complete with sensical and nonsensical twists and turns. As humans continue to reach for the stars, the time may be near where patent owners and alleged infringers will, like Alice, have to take their own journey into this Wonderland.

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<sup>124</sup> See 35 U.S.C. § 105 (b) (1990) (“Any invention made, used, or sold in outer space on a space object or component thereof that is carried on the registry of a foreign state in accordance with the Convention on Registration of Objects Launched into Outer Space, shall be considered to be made, used, or sold within the United States for the purposes of this title if specifically so agreed in an international agreement between the United States and the state of registry.”).