Is Space Arbitration the Next Frontier?: Updating the Outer Space Liability Regime to Create Universal Access to Binding Arbitration

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I. INTRODUCTION

In space, no one can hear satellites collide. And yet, the debris left from these collisions can have severe, lasting consequences.[1] The satellite industry is rapidly expanding, and the dramatic increase in new satellites launches is likely to substantially increase the risk of collisions.[2] As of January 2024, there were 12,463 satellites in orbit,[3] an increase of 50.9% from January 2022[4] and nearly triple the number of satellites in orbit in 2017.[5] Over 100,000 additional satellites have been proposed,[6] with experts projecting 57,000 new satellites in orbit by 2030.[7] As the cost of building and launching satellites has rapidly decreased,[8] the satellite industry has exploded, generating $281 billion in

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[1] Robert P. Merges & Glenn H. Reynolds, *Rules of the Road for Space?: Satellite Collisions and the Inadequacy of Current Space Law*, 40 ENV'T L. INST. NEWS & ANALYSIS 10009, 10010 (2010), https://www.law.berkeley.edu/files/article-2011-10-40.10009-1.pdf [https://perma.cc/D8A9-8Q7C] ("[I]f enough debris accumulates, we are at risk of a chain reaction—called the Kessler effect—in which satellite fragments damage more satellites, fragmenting them and producing still more debris. Potentially, this could lead to a 'debris belt' in orbit that would make access to space much more dangerous and expensive").

[2] Laura Yvonne Zielinski, *The Rise of Satellite Arbitrations*, GLOB. ARB. REV. (Oct. 17, 2023), https://globalarbitrationreview.com/guide/the-guide-telecoms-arbitrations/second-edition/article/the-rise-of-satellite-arbitrations [https://perma.cc/5WCA-6V8S] (arguing that "the recent multiplication of activities and the entry of a large number of new actors into the satellite market is likely to . . . bring[] about the risk of an increasing number of disputes").

[3] *Online Index of Objects Launched into Outer Space*, U.N. OFF. FOR OUTER SPACE AFFS., https://www.unoosa.org/oosa/osoindex/search-ng.jspx?lf_id= [https://perma.cc/39NC-JSVF] (The United Nations Office for Outer Space Affairs (UNOOSA) maintains a database of objects launched into outer space. As of January 26, 2024, there were 12,463 objects in the database with an "in orbit" status. This index is regularly updated as new objects are launched.).

[4] Nibedita Mohanta, *How Many Satellites Are Orbiting Around Earth in 2022?*, GEOSPATIAL WORLD (Apr. 20, 2023), https://www.geospatialworld.net/prime/business-and-industry-trends/how-many-satellites-orbiting-earth/#:~:text=According%20to%20UNOOSA%20records%2C%20there,record%20of%20the%20operational%20satellites [https://perma.cc/5EFQ-A83P] (There were 8,261 satellites in orbit as of January 2022 according to the UNOOSA index.).

[5] *How Many Satellites Are Orbiting the Earth in 2017?*, PIXALYTICS (Nov. 15, 2017), https://www.pixalytics.com/sats-orbiting-earth-2017/ [https://perma.cc/8VF8-S2JF] (There were 4,635 satellites in orbit as of November 2017 according to the UNOOSA index.).

[6] Miles Lifson & Richard Linares, Opinion, *Is There Enough Room in Space for Tens of Billions of Satellites, as Elon Musk Suggests? We Don't Think So*, SPACENEWS (Jan. 4, 2022), https://spacenews.com/op-ed-is-there-enough-room-in-space-for-tens-of-billions-of-satellites-as-elon-musk-suggests-we-dont-think-so/ [https://perma.cc/R68S-9V7T].

[7] Rahul Rao, *Avoiding Satellite Collisions: NOAA Unveils Prototype Warning System*, SPACE.COM (Feb. 21, 2022), https://www.space.com/noaa-satellite-collision-warning-system-prototype [https://perma.cc/ME5R-XPAU].

[8] Christian Davenport, *The Revolution in Satellite Technology Means There Are Swarms of Spacecraft No Bigger Than a Loaf of Bread in Orbit*, WASH. POST (Apr. 6, 2021), https://www.washingtonpost.com/technology/2021/04/06/small-satellites-growth-space/

revenue in 2022.[9] It is clear that the intrigue of space and the potential that lies outside our atmosphere have caught the attention of many worldwide business leaders.

While the rapid increase in satellites will help to address the market demand for telecommunication services,[10] space is quickly becoming overcrowded with satellites and space debris, with current projections estimating at least 23,000 objects in space at least four inches in diameter.[11] As the number of objects in orbit continues to grow, the probability of collisions increases exponentially.[12] Experts warn that the increasing space debris created from collisions will lead to a cascading effect where the debris from collisions will cause exponentially more collisions, eventually rendering Earth's orbital zones unusable and ending any future activities in space.[13] We have already seen the lasting impact of a satellite collision. In 2009, Cosmos 2251, an inactive satellite owed by the Russian government, collided with Iridium 33, an active satellite operated by Iridium Satellite LLC.[14] The collision created thousands of pieces of debris, most of which are expected to remain in orbit for decades and half of which may remain for over 100 years.[15]

[https://perma.cc/G76B-DA8P] (noting that the cost of a satellite has shrunk from as much as $400 million to as little as $1 million).

[9] *State of the Satellite Industry Report: 2022 Global Satellite Industry Revenues*, SATELLITE INDUS. ASS'N (June 2022), https://sia.org/news-resources/state-of-the-satellite-industry-report/ [https://perma.cc/LX36-YGSK].

[10] Zielinski, *supra* note 2.

[11] Rao, *supra* note 7. In addition, experts project that there are about 900,000 objects in space between 0.4 and 4.0 inches wide. Mike Wall, *Space Collision: Chinese Satellite Got Whacked by Hunk of Russian Rocket in March*, SPACE.COM (Aug. 17, 2021), https://www.space.com/space-junk-collision-chinese-satellite-yunhai-1-02 [https://perma.cc/CPE4-6X2N]. It is worth noting that even tiny pieces of debris can cause serious damage to a satellite due to the high speeds at which they travel—some at over 17,000 miles per hour. *Id.*

[12] Richard L. Hermer-Fried, *Kessler Syndrome: A United States' Statutory Solution for Satellite Debris Removal and the Mitigation of Orbital Collisions*, 18 J. INT'L BUS. & L. 259, 260 (2019) (arguing that current regulation is inadequate to address this impending issue).

[13] *Id.* Experts have warned about the risk of damage caused by space debris as early as 1998. Peter T. Limperis, *Orbital Debris and the Spacefaring Nations: International Law Methods for Prevention and Reduction of Debris, and Liability Regimes for Damage Caused by Debris*, 15 ARIZ. J. INT'L & COMP. L. 319, 342 (1998) (advising that "[t]he growth of debris will continue through the collision of existing debris and further launches unless the international community affirmatively acts to prevent the further abuse of the space environment. . . .").

[14] BRIAN WEEDEN, 2009 IRIDIUM-COSMOS COLLISION FACT SHEET 1 (Nov. 2010), https://swfound.org/media/6575/swf_iridium_cosmos_collision_fact_sheet_updated_2012.pdf [https://perma.cc/Z4MD-K5X7].

[15] *Id.* at 2. Space objects over time eventually fall out of orbit. Jeffrey Kluger, *You Should Worry (a Little) About Falling Space Debris*, TIME (July 11, 2014), https://time.com/2976883/space-debris-falling/ [https://perma.cc/9GDW-KWZA]. While most pieces incinerate as they fall back to Earth, some larger chunks do strike the surface. *Id.*

Another collision came in November 2021 when a Russian anti-satellite missile test broke apart a satellite, creating a large debris cloud with at least 1,500 fragments big enough to be tracked.[16] The debris has posed safety risks to astronauts aboard the International Space Station and has forced satellite operators to perform evasive maneuvers to avoid the debris.[17] Both of these collisions sparked discussion within the space law community of who can be held liable under the existing liability regime and what recourse is available to the party that suffered the damage.[18] These discussions all ultimately led to the same conclusion: the current liability regime is inadequate to address these types of conflicts, which is highly problematic for the future of the space industry.[19]

The law of space is governed by a set of international space treaties ratified in the 1960s and early 1970s when human space exploration first began.[20] These treaties were written at a time when space activities were carried out by governmental entities and thus provide that disputes arising in outer space be addressed through diplomatic channels between nations.[21] One of these treaties, the 1972 Liability Convention, provides that a "launching State" is absolutely liable for damage occurring in outer space caused by a space object launched from its territory.[22] Now that the space industry landscape has dramatically changed and private actors have entered the satellite industry,[23] significant questions remain on how disputes between private parties and governments may be resolved under the current framework and how the framework should be updated to reflect the modern space industry.[24]

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[16] Tereza Pultarova, *Space Debris from Russian Anti-Satellite Test Will Be a Safety Threat for Years*, SPACE.COM (Nov. 17, 2021), https://www.space.com/russia-anti-satellite-test-space-debris-threat-for-years [https://perma.cc/TZP5-RWRR].

[17] *Id.*

[18] *See generally* Frans G. von der Dunk, *Too-Close Encounters of the Third Party Kind: Will the Liability Convention Stand the Test of the Cosmos 2251-Iridium 33 Collision?*, 28 SPACE, CYBER, & TELECOMM. L. PROGRAM FAC. PUBL'NS 199 (2010); Alexander F. Cohen, *Cosmos 954 and the International Law of Satellite Accidents*, 10 YALE J. INT'L L. 78, 78–79 (1984).

[19] *See, e.g.*, von der Dunk, *supra* note 18, at 206.

[20] Henry R. Hertzfeld & Timothy G. Nelson, *Binding Arbitration as an Effective Means of Dispute Settlement for Accidents in Outer Space*, 56 INT'L INST. SPACE L. 129, 130 (2013).

[21] *Id.* ("The set of international space treaties were negotiated and ratified during this early period of human space activity in the 1960s and early 1970s and reflect the drafters' focus on government rather than commercial uses of space. Although the private use of space was envisioned, these treaties largely assumed that diplomatic negotiations would solve future space-related disputes between nations.").

[22] Vivasvat "Viva" Dadwal & Charles "Chip" B. Rosenberg, *Looking to the Past for the Future: International Investment Law as a Framework to Protect Private Actors in Outer Space*, 3 ITA REV. 52, 52–53 (2021).

[23] Zielinski, *supra* note 2.

[24] Hertzfeld & Nelson, *supra* note 20, at 133–34 (arguing that "[i]t has long been recognized that accidents will occur in outer space and that the provisions included in the space treaties do not provide for effective enforcement or resolution of may [sic] potential types of disputes that are likely to occur").

This Note argues that the existing legal framework surrounding disputes arising in outer space is inadequate to address the modern needs of the space industry. Part II describes the current liability regime governing space activities and illustrates the inadequacy of this framework in the context of recent satellite disputes. Part III describes efforts by the International Law Association (ILA) and Permanent Court of Arbitration (PCA) to design dispute resolution systems for space-related disputes and discusses why these attempts have gained little to no traction in the space industry. Part IV argues that the Liability Convention should be amended to provide all space actors with access to binding arbitration for disputes arising in outer space and place liability directly on the entity that launched the space object, regardless of public or private status. Part V briefly concludes.

II. THE LIABILITY REGIME ESTABLISHED BY INTERNATIONAL SPACE LAW

Five treaties form the backbone of international space law and govern all activities occurring in outer space.[25] The first space treaty, commonly known as the "Outer Space Treaty," went into effect in 1967 and created the basic legal framework for international space law.[26] It established that outer space was to be "free for exploration and use by all States" and prohibited the national appropriation of outer space or celestial bodies by claims of sovereignty.[27] Further, it established State liability for damage caused by objects in outer space.[28] Between 1968 and 1984, four successive treaties were signed to further expand on the principles established in the Outer Space Treaty.[29] One of these treaties, commonly known as the "Liability Convention," provided further clarification and expanded on the principles of State liability.[30] Together, the Outer Space Treaty and Liability Convention form the liability regime for activities occurring in outer space.[31]

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[25] *Space Law Treaties and Principles*, U.N. OFF. FOR OUTER SPACE AFFS., https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties.html [https://perma.cc/L9NC-LW36].

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

[27] *Id.* art. I, II.

[28] *Id.* art. VII.

[29] *Space Law Treaties and Principles*, *supra* note 25.

[30] *See* Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

[31] *See generally id.*; Outer Space Treaty, *supra* note 26; *Space Law Treaties and Principles*, *supra* note 25. In addition to the Outer Space Treaty and Liability Convention, three other treaties form the legal framework for International Space Law. *Id.* The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space ("Rescue Agreement"), adopted in 1968, provides that States render all possible assistance to astronauts in distress and return them to the launching State. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects

A. *The Outer Space Treaty*

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, commonly known as the "Outer Space Treaty," is the "master document" of international space law.[32] It has been ratified or signed by 129 nations, including all spacefaring States.[33] One of the treaty's main purposes was to encourage international cooperation to prevent or minimize conflicts, which is reflected in the broad language used in establishing a legal framework.[34] Thus, it provides a general liability regime for damage caused by space objects.[35] Specifically, Article VII of the Outer Space Treaty states:

Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, 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, including the Moon and other celestial bodies.[36]

Launched into Outer Space, Dec. 3, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue Agreement]. The Convention on Registration of Objects Launched into Outer Space ("Registration Convention"), adopted in 1976, created a mandatory registry for objects launched in outer space. Convention on Registration of Objects Launched into Outer Space, Sept. 15, 1976, 28 U.S.T. 695, 1023 U.R.T.S. 15 [hereinafter Registration Convention]. The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies ("Moon Agreement"), adopted in 1984, prohibits military activity on the moon, requires States to inform the United Nations of their activities on the moon, and provides that an international regime should be established to govern the exploitation of resources on the moon. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, July 11, 1984, 610 U.N.T.S. 205 [hereinafter Moon Agreement]. While the first four treaties were signified or ratified by most nations, the Moon Agreement has notably only been ratified by sixteen nations, none of which are the major spacefaring nations, including the United States, Russia, and China. Henry R. Hertzfeld, Brian Weeden & Christopher D. Johnson, *Outer Space: Ungoverned or Lacking Effective Governance? New Approaches to Managing Human Activities in Space*, 36 SAIS REV. INT'L AFFS. 15, 16 (2016).

[32] Hertzfeld, Weeden & Johnson, *supra* note 31, at 16.

[33] *Id.*

[34] Frans von der Dunk, *Space Law and the Resolution of Disputes on Space Activities*, 2 ARBITRATION.RU 6, 8 (2021) ("The most fundamental and comprehensive space law convention, the 1967 Outer Space Treaty which provides the general legal framework for all space activities, thus did not include any clause on dispute resolution—only some general provisions remotely related to the possibility of States becoming unsatisfied with the framework regime as it stood. Note that the Treaty itself, often nicknamed the 'Principles Treaty,' includes more broad and generally worded principles and concepts than specific hard and fast rules.").

[35] Frans von der Dunk, *International Satellite Law*, *in* OXFORD RSCH. ENCYCLOPEDIA PLANETARY SCI., 1, 3 (Steven Freeland ed., 2019), https://doi.org/10.1093/acrefore/9780190647926.013.39 [on file with the *Ohio State Law Journal*].

[36] Outer Space Treaty, *supra* note 26, art. VII.

In practice, this means that the State from which a space object was launched has absolute liability for damage caused by that object in air space or outer space.[37] Liability is exclusively "state-to-state," meaning that the "launching state" is liable to the home State of the damaged space object.[38] At the time of adoption, space activities were nearly exclusively carried out by State actors.[39] As such, the treaties establish legal frameworks centered around State activities.[40] The treaty did anticipate the emergence of private actors engaging in space activities through the language included in Article VI, which provides:

> 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. . . . The activities of non-governmental entities in outer space . . . shall require authorization and continuing supervision by the appropriate State Party to the Treaty.[41]

This provision of the treaty places all direct liability on State actors and does not establish any direct liability for non-governmental actors.[42] The effect of this Article in concert with Article VII is that a State will be liable for damage caused by any space object launched from its territory, even if the object is privately owned.[43]

In the context of satellite disputes, if a private company located in the United States launches its own satellite and that satellite collides with another satellite, launched from India, the United States would be fully liable.[44] The United States company would bear no liability despite being at fault for the damage.[45] If the damaged satellite is owned by India, then the United States government is

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[37] *See* Jan Frohloff, *Collisions of Artificial Satellites: The Liability of States and Private Entities*, 45 AIR & SPACE L. 341, 343 (2020).

[38] *Id.* Legal issues surrounding how to determine which State is the "launching state" are further explored in Part II.C.

[39] Alexander P. Reinert, Note, *Updating the Liability Regime in Outer Space: Why Spacefaring Companies Should Be Internationally Liable for Their Space Objects*, 62 WM. & MARY L. REV. 324, 339 (2020) (noting that at the time of the treaty's adoption, the United States and Soviet Union had essentially "monopolized" activity in outer space).

[40] *Id.* at 334 ("Article VI represented a consequential compromise between the United States and the Soviet Union. In negotiating the Outer Space Treaty, the United States wanted to involve private parties in the discussions. The Soviet Union, however, sought to limit space activities to only States. Ultimately, the superpowers compromised to allow Article VI to open the door for private entities to operate in space, yet the treaty guarantees national governments will play the decisive role in governing space activity."). *See also* von der Dunk, *supra* note 35, at 7 (Article VI "provided a strong impetus for States to establish national space legislation as the most fundamental and comprehensive mechanism to take care of such responsibility and exercise sufficient authorization and supervision controls for the purpose.").

[41] Outer Space Treaty, *supra* note 26, art. VI.

[42] Frohloff, *supra* note 37, at 343.

[43] *Id.* at 344.

[44] *See id.*

[45] *See id.* at 343.

directly liable to the Indian government.[46] However, if the damaged satellite is owned by a private company operating in India, the Indian company does not have a direct claim against the United States, nor does the Outer Space Treaty provide a procedure for this scenario.[47] The Indian private company could ask its government to approach the United States government through diplomatic channels to attempt to reach a resolution, but the United States would not be obligated to compensate the company.[48] In other words, private companies cannot be held liable for their space objects, but if one of their space objects is damaged, they do not have a direct claim against a State or a forum to bring a claim.[49]

B. *The Liability Convention*

The principle that States are internationally liable for damage caused by space objects launched from their territory was further developed in the Convention on International Liability for Damage Caused by Space Objects, commonly known as the "Liability Convention," which entered into force in 1972.[50] This treaty also governs nearly all space activities as it has been ratified by almost 100 countries, including most spacefaring nations.[51] Like the Outer Space Treaty, the Liability Convention only applies to State actors and does not afford legal protections to private actors.[52] While Article II reiterates the liability regime established in the Outer Space Treaty, Article III of the Liability Convention creates "'fault'-based liability" on States.[53] Specifically, the Article provides that:

In the event of damage being caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible.[54]

This language establishes that launching States are only liable for damage if they are at fault or if a private actor launching from within their country is at fault.[55] This liability is "absolute," which means that the State is liable even in

[46] *See id.*
[47] *See id.* at 343–44.
[48] Frohloff, *supra* note 37, at 344.
[49] *Id.* at 343–44.
[50] *See* Liability Convention, *supra* note 30.
[51] Dadwal & Rosenberg, *supra* note 22, at 52.
[52] Zielinski, *supra* note 2.
[53] Hertzfeld & Nelson, *supra* note 20, at 132.
[54] Liability Convention, *supra* note 30, art. III.
[55] Frohloff, *supra* note 37, at 344.

the absence of negligence by the party at fault.[56] Further, the reference to "space object[s]" indicates that any liability extends even to small space debris.[57]

If a State suffers damage from a space object, the Liability Convention allows the State to present a claim for compensation to the launching State through diplomatic channels.[58] If no settlement has been reached after a year of negotiations, the injured State can utilize the dispute resolution mechanism outlined in Articles XIV through XX.[59] This process, best described as "quasi-arbitration," results in a recommendatory award from a three-member Claims Commission that only becomes binding if the parties have agreed.[60] As the Liability Convention only applies to States, this dispute resolution process is only available to State actors.[61]

C. *Inadequacy of the Existing Liability Regime for Private Actors in Space*

The Liability Convention provides some clarification on the circumstances that would invoke liability and creates a limited dispute resolution process for States, but does not improve the limited recourse options for private actors.[62] Generally, a private company that has suffered property damage in outer space has two options: (1) rely on its home State to present a claim for compensation to the launching State; or (2) bring a claim in the judicial system of the launching State.[63] If the company asks its home government to make a claim on its behalf, it loses ownership over the dispute resolution process and becomes dependent on a third party that was not even involved in the incident that led to the dispute.[64] If the company sues a foreign government in the foreign government's own courts, it would have to overcome the government's likely

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[56] Merges & Reynolds, *supra* note 1, at 10009 (noting that "[d]efenses, such as due care or contributory negligence, are unavailable . . . to the 'launching state'").

[57] von der Dunk, *supra* note 35, at 6.

[58] Liability Convention, *supra* note 30, art. IX.

[59] *Id.* art. XIV–XX.

[60] Zielinski, *supra* note 2; Liability Convention, *supra* note 30, art. XVIII–XIX. Article XV provides: "The Claims Commission shall be composed of three members: one appointed by the claimant State, one appointed by the launching State and the third member, the Chairman, to be chosen by the parties jointly." *Id.* art. XV. Further, Article XVIII provides that "[t]he Claims Commission shall decide the merits of the claim for compensation and determine the amount of compensation payable, if any." *Id.* art. XVIII.

[61] Zielinski, *supra* note 2.

[62] Frohloff, *supra* note 37, at 345.

[63] *Id.* As to the first option, the company can ask its home State to intervene on its behalf, but the Liability Convention does not allow a private entity to bring a claim against its home State to instigate the claims process provided for in the treaty. *Id.* As to the second option, Article XI(2) specifies that private parties are not precluded "from pursing a claim in the courts or administrative tribunals or agencies of a launching State." Liability Convention, *supra* note 30, art. XI.

[64] *See* Hertzfeld & Nelson, *supra* note 20, at 133.

objections based on sovereign immunity and would be subjected to a severe power imbalance between itself and a major world power.[65] The ability of a private company to recover losses in this liability scheme is likely to be quite challenging.[66]

In a situation where a private entity damages the property of another private entity in space, the potential plaintiff can sue the other party in their home court.[67] This system generally disadvantages defendants, as they are then forced to defend themselves in the home court of the plaintiff.[68] Unless the plaintiff and defendant do business together and the relationship is worth preserving, there is little incentive for a plaintiff to agree to a neutral dispute resolution forum.

States also face challenges in this liability regime if their property is damaged by privately owned property. A government can sue a private entity in its own court system, but if the private actor is from a foreign country, the government may encounter challenges enforcing the judgments of its court in the country of the private entity.[69] Ultimately, the difference in dispute resolution mechanisms available based on the type of entities involved in the dispute does not create an ideal dispute resolution system.

Further questions surround the difficulty in determining which State is the "launching State" under the Liability Convention. While the Outer Space Treaty does not use the term "launching State,"[70] the Liability Convention provides a definition: "[a] State which launches or procures the launching of a space object" and "[a] State from whose territory or facility a space object is launched."[71] The first part of the definition, which establishes liability for a country that launches *or* procures a launch, creates issues where an object was launched from one country but the launch was arguably procured by another.[72] This definitional problem became a central issue in the Cosmos 2251-Iridium 33 collision.[73]

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65 *Id.*

66 *See* Frohloff, *supra* note 37, at 345; *see also* von der Dunk, *supra* note 35, at 7 ("[The Outer Space Treaty and Liability Convention] present a strong incentive for states to legislate nationally to ensure that they can include in licenses or authorizations the desired levels of reimbursement or derogation obligations and attendant insurance obligations.").

67 Hertzfeld & Nelson, *supra* note 20, at 133.

68 *Id.*

69 *Id.*

70 *See generally* Outer Space Treaty, *supra* note 26.

71 Liability Convention, *supra* note 30, art. I.

72 *See* Reinert, *supra* note 39, at 340. Another issue is how a multinational corporation may bring a claim if one of their many spaceports is located in the country where the space object that caused the damage was launched. *Id.* Further, if the claimant was a company located in one of the countries that could be the launching State, the claimant would not be able to hold both countries jointly liable, as it would violate Article VII's prohibition on using the Convention for intrastate disputes. *Id.*

73 *Id.*

When Cosmos 2251 and Iridium 33 collided in 2009, questions arose as to if the Liability Convention would be invoked, and how it would be applied.[74] Cosmos 2251 was an inactive Russian communications satellite launched from Russia in 1993.[75] Iridium 33 was an active communications satellite operated by U.S.-based Iridium Satellite LLC, but was launched in Kazakhstan at a Russian launch facility aboard a Russian vehicle.[76] The fact that both satellites were launched by Russia but one of the satellites was owned by a U.S. company presented complex legal issues.[77] The Liability Convention does not provide a clear answer on whether Russia and Kazakhstan would be considered joint launching States, or whether the U.S. would be the launching State because the launch was procured by a U.S. company.[78]

No dispute resolution processes are known to have occurred regarding the Iridium-Cosmos collision.[79] The concerns raised about the applicability of the Liability Convention to the collision turned out to be purely theoretical, but they highlight legal issues that could arise again in a future satellite collision.

If the Liability Convention had been invoked in the Iridium-Cosmos collision, it would have only been the second time that the Convention was invoked.[80] The first time was in 1977, in response to the incident involving nuclear-powered Cosmos 954, a Soviet naval surveillance satellite.[81] Only a few months after launch, the satellite fell out of orbit.[82] Debris from the satellite that did not disintegrate in the atmosphere landed in western Canada, scattered across multiple territories.[83] The Canadian government declined the U.S.S.R.'s offer to assist in cleaning up the debris.[84]

About a year later, Canada used the Liability Convention to bring a claim against the U.S.S.R. for $6 million CAD.[85] However, Canada never established a Claims Commission under Articles XIV and XX of the Convention.[86] The governments of each country entered into negotiations, and a settlement of $3 million CAD was reached in 1981.[87] As such, the diplomatic resolution of the

[74] von der Dunk, *supra* note 18, at 200.

[75] WEEDEN, *supra* note 14. For reference, satellites in the same classification as Cosmos had a typical service life of five years. *Id.*

[76] *Id.*

[77] The complexities of this legal dispute are beyond the scope of this Note. For an in-depth discussion, see generally von der Dunk, *supra* note 18.

[78] *Id.* at 201–02.

[79] Zielinski, *supra* note 2.

[80] *See* Dadwal & Rosenberg, *supra* note 22, at 53.

[81] *Id.*

[82] Cohen, *supra* note 18, at 79.

[83] *Id.*

[84] *Id.* at 80.

[85] Dadwal & Rosenberg, *supra* note 22, at 53.

[86] von der Dunk, *supra* note 34, at 11.

[87] Dadwal & Rosenberg, *supra* note 22, at 53–54.

Cosmos 954 incident means that the claims process under the Liability Convention has not yet been fully utilized.[88]

III. PREVIOUS ATTEMPTS TO CREATE A DISPUTE RESOLUTION MECHANISM FOR SPACE DISPUTES

It has been decades since the international space law community began to recognize the need for a proper dispute resolution system for space-related disputes. Beginning in the late 1970s, the International Law Association (ILA) began to develop a framework for an International Tribunal specifically for the space industry.[89] The expansion of the private sector of the space industry in the 1990s led the ILA to produce a "Revised Convention" that created a robust dispute resolution framework.[90] In the 2000s, recognition of the increase of the commercialization of space led the Permanent Court of Arbitration (PCA) to developed special rules for space-related arbitrations.[91] Despite the widespread recognition by international law organizations of the need for a well-defined dispute resolution process, neither the ILA Revised Convention nor the space rules developed by the PCA have been utilized in a dispute.[92] Part II.A describes the dispute resolution system created by the ILA and Part II.B describes the arbitration rules created by the PCA. Part II.C examines why these attempts to create a dispute resolution method have not gained traction in the international space community.

A. *International Law Association (ILA) Revised Convention*

The International Law Association (ILA) began discussions on a space-related dispute resolution system around 1978.[93] These discussions culminated in the adoption of the "ILA Draft Convention on the Settlement of Space Law Disputes" in 1984, with a revised final draft adopted in 1998 ("ILA Revised Convention").[94] The ILA Revised Convention provides for a mixed dispute resolution process, beginning with non-binding dispute settlement, followed by binding arbitration.[95] The system was designed for both State and non-State actors, with special attention to place private entities "on a footing as equal as

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[88] *Id.*

[89] Carson W. Bennett, Note, *Houston, We Have an Arbitration: International Arbitration's Role in Resolving Commercial Aerospace Disputes*, 19 PEPP. DISP. RESOL. L.J. 61, 71 (2019).

[90] Lotta Viikari, *International Law Association's Draft Convention on the Settlement of Disputes Related to Space Activities*, 2 ARBITRATION.RU 14, 14 (2021).

[91] Evgeniya Goriatcheva & Mikhail Batsura, *Specialized Arbitration Rules for Disputes Relating to Outer Space Activities*, 2 ARBITRATION.RU 18, 18 (2021).

[92] Viikari, *supra* note 90, at 17; Goriatcheva & Batsura, *supra* note 92, at 23.

[93] Bennett, *supra* note 89, at 71.

[94] Viikari, *supra* note 90, at 14.

[95] *Id.* at 15–16. The Convention was heavily influenced by the United Nations Convention on the Law of the Sea dispute resolution system. *Id.* at 14.

possible with state stakeholders."[96] Because all dispute settlement procedures under the Convention were open to private actors, this marked a "very liberal approach [to] international law" in that non-State actors could engage directly with dispute resolution institutions and would not have to ask their home State to engage in an international tribunal on their behalf.[97]

The first step in resolving a dispute under the ILA Revised Convention is to engage in an "exchange of views" through "negotiations or other peaceful means."[98] If this step fails to result in agreement, one party can invite the other to submit the dispute to conciliation.[99] If conciliation fails to resolve the conflict, either party can then trigger a binding dispute resolution procedure in the International Court of Justice (ICJ) or an arbitral tribunal.[100]

The ILA Revised Convention includes detailed procedures for an arbitral tribunal.[101] The tribunal would consist of five members, "preferably" chosen from a list established and maintained by the UN Secretary-General, "each of whom shall be a person experienced in space law or space affairs and having the highest reputation for fairness, competence and integrity."[102] To begin the nomination process, each party would select one arbitrator of any nationality, with the party instigating the arbitration going first.[103] The remaining three arbitrators would then be "appointed by agreement between the parties" and must be of a different nationality than the parties (unless the parties otherwise agree).[104] The president of the tribunal would then be chosen *by the parties* from the three appointed by agreement.[105]

Once the arbitral tribunal is established, the tribunal would establish its own procedures.[106] Decisions would be made by majority vote and a quorum would

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96 *Id.* at 15 (noting that binding arbitration processes are particularly important to private enterprises).

97 *Id.*

98 Space Law Committee, *Final Draft of the Revised Convention on the Settlement of Disputes Related to Space Activities, in* 68 INT'L L. ASS'N REP. CONF. 249, 250 (A.H.A. Soons & Dr. Michael Byers, eds., Charles Clore House 1998) [hereinafter ILA Revised Convention].

99 *Id.*

100 *Id*. Conciliation may fail because one party declines the other's invitation to conciliation or because the parties do not agree on a conciliation procedure. *Id.*

101 *Id.* at 255–258. It also includes detailed procedures for an International Tribunal for Space Law that was never established. *Id.* at 258–265.

102 *Id.* at 255–577.

103 *Id*. at 256.

104 ILA Revised Convention, *supra* note 98, at 256.

105 *Id.* Compare this procedure with the UNCITRAL Arbitration Rules, which only provide for a three-arbitrator panel, where the third arbitrator is selected by the party-appointed arbitrators and serves as the presiding arbitrator. UNCITRAL Arbitration Rules art. IX, U.N. COMM'N ON INT'L TRADE L. (2021), https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/21-07996_expedited-arbitration-e-ebook.pdf.

106 *Id.* at 257.

be established if at least half of the members were present.[107] The president would have the deciding vote in the case of a tie.[108] The award would be final and binding unless the parties agreed to an appellate procedure.[109] The expenses of the tribunal would be shared equally among the parties (unless decided otherwise by the tribunal).[110] The Revised Convention makes no mention of confidentiality or privacy.[111] Despite the significant effort of the ILA to create the Revised Convention, it has never been signed or ratified by any States.[112]

B. *Permanent Court of Arbitration (PCA) Outer Space Rules*

Over the following decades, the space sector continued to grow and experts continued to recognize the need for "neutral, effective and accessible mechanisms . . . [to settle] space-related disputes."[113] In 2009, the collision between Cosmos 2251 and Iridium 33 drew attention to the lack of availability of neutral dispute resolution mechanisms for private actors.[114] This recognized gap in justice led the Permanent Court of Arbitration (PCA) to begin development of arbitration rules specifically for space-related disputes.[115]

The Optional Rules for Arbitration of Disputes Relating to Outer Space Activities ("PCA Outer Space Rules" or "Rules") were developed over a two-year period with the International Bureau of the PCA and an Advisory Group consisting of air and space law experts from all over the world.[116] The Advisory Group sought to develop a dispute resolution system that would be "international, neutral, accessible to a variety of public and private actors, and capable of responding to potentially high demand for dispute resolution."[117] In recognition of the significant advantages of international arbitration, the Advisory Group sought to develop a system that would capitalize on the general advantages of arbitration while also designing a system that would address the particularities of the space sector.[118]

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[107] *Id.*
[108] *Id.*
[109] *Id.* at 258.
[110] ILA Revised Convention, *supra* note 98, at 257.
[111] *See generally id.*
[112] Viikari, supra note 91, at 17.
[113] Goriatcheva & Batsura, *supra* note 92, at 18–19.
[114] *Id.* at 19.
[115] *Id.*
[116] *Id.*
[117] *Id.* at 20. The Advisory Group developed this purpose through recognition that the existing mechanism "suffered from certain lacunae." Specifically, the existing processes were "non-binding, exclusive to States or the relevant [intergovernmental organizations], or limited to certain subject-matters." Further, the neutral mechanisms available to the States were not designed to address the needs of the space sector. *Id.*

[118] *Id.* Specific advantages of arbitration that the Advisory Group considered include: (1) neutrality; (2) availability to public and private entities; (3) confidentiality; (4)

The PCA Outer Space Rules were published in 2011.[119] They were developed using the existing United Nations Commission on International Trade Law (UNCITRAL) rules, but modifications were made based on the unique circumstances of space activity, including waiving sovereign immunity, providing a broad scope to private parties, forgoing jurisdictional limitations by not defining "outer space," and adding more robust confidentiality provisions.[120] While the Rules provide direct accessibility to arbitration for private actors, one of the defining principles of the Rules is that they are based on party consent.[121] So in effect, these rules may only be utilized where parties have agreed by contract to submit specific types of space-related disputes to arbitration under these Rules, or where a dispute has already arisen and the parties agree to arbitration under the Rules.[122]

The procedure for the appointment of arbitrators under the PCA Outer Space Rules is comparable to the ILA Revised Convention. The arbitral panel is made of one, three, or five arbitrators.[123] The PCA Secretary-General is responsible for keeping a list of arbitrators with subject matter expertise.[124] For a three-arbitrator panel, each party appoints one arbitrator, and the two appointed arbitrators then select the third arbitrator, who acts as the presiding

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"enforceability of awards"; (4) awards that are final and binding; and (5) ability of parties to select "specialized decision-makers." *Id.*

[119] Bennett, *supra* note 89, at 72.

[120] *Id.* at 72–73.

[121] OPTIONAL RULES FOR ARB. DISPS. RELATING TO OUTER SPACE ACTIVITIES § 1(1) (PERM. CT. ARB. 2011) [hereinafter PCA Outer Space Rules], https://docs.pca-cpa.org/2016/01/Permanent-Court-of-Arbitration-Optional-Rules-for-Arbitration-of-Disputes-Relating-to-Outer-Space-Activities.pdf [https://perma.cc/ZFY2-N6QF], ("Where parties have agreed that disputes between them in respect of a defined legal relationship, whether contractual or not, shall be referred to arbitration under the Permanent Court of Arbitration Optional Rules for Arbitration of Disputes Relating to Outer Space Activities, then such disputes shall be settled in accordance with these Rules subject to such modification as the parties may agree. The characterization of the dispute as relating to outer space is not necessary for jurisdiction where parties have agreed to settle a specific dispute under these Rules.").

[122] *See id. See also* Hertzfeld & Nelson, *supra* note 20, at 132–33 (expressing that the "key limitation" of the PCA Outer Space Rules is that "they only apply if states (or other actors) expressly agree to adopt them, either in a treaty or agreement of general application, or in an *ad hoc* agreement reached by the parties after a disputes has arisen").

[123] PCA Outer Space Rules § 2(8–10).

[124] PCA Outer Space Rules § 2(10). The Rules are vague on this point, only specifying that the arbitrators "have expertise in the subject matters of the dispute at hand for which these Rules have been designed." *Id.* The list of arbitrators is publicly available on the PCA's website. *Panels of Arbitrators and Experts for Space-Related Disputes*, PERMANENT CT. ARB. (Dec. 2023) https://pca-cpa.org/en/about/panels/panels-of-arbitrators-and-experts-for-space-related-disputes/ [https://perma.cc/PH73-5AGU]. As of March 2024, the list consisted of only seven arbitrators with expertise in space law. PCA Outer Space Rules, Annex 4 – Specialized Panel of Arbitrators, https://docs.pca-cpa.org/2023/12/51849f19-pca-184031-v16a-current_list_annex_4_sp_outer_space_arb.pdf [https://perma.cc/74LY-8Q93].

arbitrator.[125] Where a five-arbitrator tribunal is chosen, two arbitrators are appointed by the parties, and those two party-appointed arbitrators select the remaining three arbitrators and designate one of the three as the presiding arbitrator.[126] Similar to the ILA Revised Convention, the PCA Outer Space Rules allow for the appointment of technical experts to assist the arbitral tribunal.[127]

In contrast to the ILA, the PCA Outer Space Rules establish procedures for confidentiality.[128] If a party wishes to invoke the confidentiality of specific information or documentation, it may make an application to the tribunal to have it classified as confidential.[129] The tribunal then has the power to determine whether the information is of such nature that denying protection of confidentiality "would be likely to cause serious harm to the party or parties invoking its confidentiality."[130] Additionally, awards rendered under the Rules are final and binding on the parties, as the Rules do not establish appellate procedures.[131]

C. *Lack of Adoption by the Space Industry Despite Growing Need*

Despite the international significance of the ILA Revised Convention as the first substantial attempt to create a dispute resolution system for space-related disputes, it has received criticism from experts.[132] One critique is that it does not sufficiently address the power dynamic between State actors and private entities, as non-State actors will be unlikely to match the resources of State actors.[133] Further, some argue that it does not provide sufficient "accessibility and standing" for small commercial enterprises and individuals.[134]

Another concern raised is that the framework for selecting the arbitral panel does not sufficiently take into account the potential need for technical experts to resolve space-related disputes.[135] The arbitrator list only recommends

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125 PCA Outer Space Rules § 2(9).

126 PCA Outer Space Rules § 2(9); *cf* ILA Revised Convention, *supra* note 98, at 256 (instructing that the president of the tribunal be selected by the parties).

127 PCA Outer Space Rules § 3(29). The list of technical experts is publicly available on the PCA's website. PCA, *supra* note 124. As of March 2024, the list consisted of only seven experts, with no experts from the major spacefaring nations of the United States and Russia. PCA Outer Space Rules, Annex 5 – Specialized Panel of Scientific Experts, https://docs.pca-cpa.org/2023/12/d87401ec-pca-184007-v14a-current_list_annex_5_sp_outer_space_exp.pdf [https://perma.cc/C5HF-5UWW].

128 PCA Outer Space Rules § 3(17).

129 PCA Outer Space Rules § 3(17).

130 PCA Outer Space Rules § 3(17).

131 PCA Outer Space Rules § 4(34).

132 Viikari, *supra* note 90, at 17.

133 Viikari, *supra* note 90, at 17 (noting that this may be especially problematic for the "rapidly developing small-satellite industry").

134 Bennett, *supra* note 89, at 71.

135 *Id.*

"experience[] in space law or space affairs,"[136] but disputes in the space sector often involve complex technological issues.[137] The ILA Revised Convention does allow two or more "scientific or technical experts" to sit on the tribunal, but does not grant them voting power.[138] The lack of decision-making power for technical experts indicates an emphasis on the legal resolution of disputes when a stronger focus on the technical aspects of disputes may be needed.[139] The lack of adoption of the ILA Revised Convention likely indicates skepticism or concern from spacefaring nations about its effectiveness.

The PCA Outer Space Rules were well received by the international academic community upon adoption.[140] The PCA has received regular inquiries about the Rules from both public and private entities, and some actors in the space sector have adopted the Rules in their model contracts.[141] And yet, there are no known cases of the Rules being used in an arbitration.[142] Interestingly, the PCA has arbitrated some space-related disputes, most notably *CC/Devas v. India*, but these arbitrations were administered under the UNCITRAL Arbitration Rules.[143]

Although it may come as a surprise that the Rules have never been utilized in their thirteen-year history, there are a few practical reasons that may explain why. First is the likely unawareness of the Rules in the satellite and telecommunications sector where most of space-related disputes occur.[144] Although the PCA is well supported by States and international organizations, the private sector may lack awareness or confidence in the PCA, and therefore

[136] ILA Revised Convention, *supra* note 98, at 255.

[137] Viikari, *supra* note 90, at 17.

[138] ILA Revised Convention, *supra* note 98, at 251.

[139] Viikari, *supra* note 90, at 17.

[140] Goriatcheva & Batsura, *supra* note 91, at 22. The ILA even recognized the adoption of the Rules as a "welcome and necessary development in the field of space law." *Id.* at 23.

[141] *Id.*

[142] *Id.*

[143] *Id. CC/Devas v. India* was a highly complex arbitration involving India cancelling a telecommunications contract leasing capacity in the electromagnetic spectrum with Devas, an Indian company with Mauritian shareholders. CC/Devas Ltd. (Mauritius) v. Republic of India, Case No. 2013-09, (Perm. Ct. Arb. 2016).

[144] Charles B. Rosenberg & Vivasvat Dadwal, *The 10 Year Anniversary of the PCA Outer Space Rules: A Failed Mission or the Next Generation?*, WOLTERS KLUWER: KLUWER ARB. BLOG (Feb. 16, 2021), https://arbitrationblog.kluwerarbitration.com/2021/02/16/the-10-year-anniversary-of-the-pca-outer-space-rules-a-failed-mission-or-the-next-generation/ [https://perma.cc/Y8AP-FV8N]. One informal survey of companies in the space industry about arbitration clauses in contracts resulted in no respondents mentioning the PCA. The survey concluded that this may indicate unawareness of the PCA and therefore the PCA Outer Space Rules. Viva Dadwal & Eytan Tepper, *Arbitration in Space-Related Disputes: A Survey of Industry Practices and Future Needs*, 70TH INT'L ASTRONAUTICAL CONGRESS (Oct. 2019), https://www.mcgill.ca/iasl/files/iasl/iac-19e723x50661_dispute_settlement_in_space_law.pdf [https://perma.cc/N3K2-WCK8].

reference to the Rules in commercial contracts and agreements may not be highly prevalent.[145]

The second consideration is whether the Rules effectively address the needs of industries involved in outer space.[146] Disputes in the telecommunications industry are typically highly complex, relating to issues such as "satellite launch and delivery, regulatory measures, and lease of satellite capacity."[147] As these rules have not yet been tested, an analysis of the Rules' adequacy is purely theoretical.[148] A practical application is needed to assess whether the Rules meet the needs of the space industry.[149]

A third consideration is how effectively current arbitration agreements and treaties accommodate the Rules, considering that they are optional in nature.[150] If a dispute does arise that applies the PCA Outer Space Rules, it will likely be because the Rules were appropriately incorporated into a pre-dispute arbitration clause.[151] It seems less likely that an accused party would willingly agree to participate in an arbitration under the Rules, especially if the party is a powerful State entity.

Despite the apparent failures of both the ILA and the PCA to create workable, effective dispute resolution systems available to private actors operating in outer space, the problem that these organizations sought to address is even more prevalent today.[152] Both attempts to create a dispute resolution regime failed due to lack of adoption, but it is unknowable whether either or both regimes could be successfully utilized. A system requiring consent of both parties seems unworkable in a world of complex international politics and extreme imbalances in power between small telecommunications companies and the most influential countries in the world. A new dispute resolution regime is needed which involves all major spacefaring nations and provides private entities with adequate access to a neutral forum.

IV. AMEND THE LIABILITY CONVENTION

As demonstrated in Part II, the existing liability regime established in the Outer Space Treaty and the Liability Convention is no longer a workable framework to govern liability in the modern space industry. The Claims

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145 Iram Majid, *Is Space Law Truly Rocket Science?: A Comprehensive and Critical Analysis of the Dispute Resolution Mechanism in Space-Related Disputes - Part 1*, SCC ONLINE: BLOG (May 14, 2021), https://www.scconline.com/blog/post/2021/05/14/is-space-law-truly-rocket-science-a-comprehensive-and-critical-analysis-of-the-dispute-resolution-mechanism-in-space-related-disputes-part-1/ [https://perma.cc/A8Q9-L34G].

146 *Id.*

147 Rosenberg & Dadwal, *supra* note 144.

148 Majid, *supra* note 145.

149 *Id* (also noting that it is "pertinent to compare and analyse them" in the context of the five space treaties).

150 Rosenberg & Dadwal, *supra* note 144.

151 Jan Frohloff, *Arbitration in Space Disputes*, 35 ARB. INT'L 309, 310 (2019).

152 *See generally supra* Part I.

Commission procedure outlined in the Liability Convention must be replaced with a comprehensive dispute resolution mechanism that provides access to all entities who conduct activities in outer space and can be enforced anywhere in the world. The Liability Convention should be amended to provide access to binding arbitration for any party that has been harmed in Earth's atmosphere and beyond.

A. *Provide Binding Arbitration as a Means to Resolve Disputes Arising in Outer Space*

The dispute resolution process created in the Liability Convention does not provide an adequate procedure for efficiently and effectively resolving space disputes and should be replaced with a robust dispute resolution system that includes binding arbitration. Binding arbitration provides many advantages over other dispute resolution systems, including confidentiality, the ability of parties to decide which law applies to the dispute, and the ability for experts to serve as arbitrators.[153] A two-step mediation-arbitration process would allow parties to initially try a cooperative negotiation process, and if the mediation is unsuccessful, move to a binding arbitration process that would be enforceable in nearly every country. This process should be provided for in an amendment to the Liability Convention.

B. *Arbitration is the Ideal Dispute Resolution Method for Disputes Under the Liability Convention*

Generally, parties prefer binding arbitration because the New York Convention allows them to seek judicial enforcement of an arbitral award in nearly any country.[154] As the Liability Convention's Claims Commission procedure requires party agreement for an award for be binding, it is possible that an injured party could be awarded damages but lack a means to enforce the judgment.[155] Therefore, a formal, binding process is crucial for ensuring fairness in enforcement.

Arbitration is the ideal form of binding dispute resolution to adopt for space liability disputes as it provides several advantages over court proceedings. First, arbitral procedures are private and can be made confidential, which allows the parties to protect confidential or proprietary information in an industry with rapid technological advancements.[156] Second, arbitration avoids challenging

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[153] George Khoukaz, *ADR That is Out of This World: A Regime for the Resolution of Outer-Space Disputes*, 2018 J. DISP. RESOL. 265, 276–77 (2018).

[154] Convention on the Recognition and Enforcement of Foreign Arbitral Awards, art. I, ¶ 1, Jun. 10, 1958, 330 U.N.T.S. 38; *See also* Khoukaz, *supra* note 153, at 277–78 (noting that the New York Convention is considered "one of the most successful multilateral agreements ever signed" with over 150 signatory counties).

[155] von der Dunk, *supra* note 34, at 10.

[156] Hertzfeld & Nelson, *supra* note 20, at 136.

choice of law issues that a court would have to decide, as outer space is not subject to the laws of a State.[157] Arbitration procedures could allow the parties to negotiate which substantive and procedural laws would apply, or the arbitral panel could choose which laws to apply.[158] Third, arbitration provides the opportunity for experts in a particular area of law to serve as arbitrators.[159] This is particularly important in space law, where the subject matter of the dispute is likely to be highly technical and may require scientific knowledge to fully understand the facts of the dispute.[160] Finally, arbitral proceedings have the ability to resolve disputes quickly and can render final discussions with limited or no options for appeals.[161]

"The space industry is no stranger to international arbitration," as arbitration serves as the preferred formal dispute resolution procedure for commercial contract disputes in the space industry.[162] Arbitration cases arising in the space sector are generally rooted in the "satellite, telecommunications and launch services industries."[163] The highly technical nature of satellite technology, insurance requirements, confidentiality, and export controls can result in contractual commercial disputes.[164] Disputes typically go to arbitration because the contracts between companies contain pre-dispute arbitration clauses.[165] Arbitration is preferred for contractual space-related disputes for the same general reasons as discussed above, primarily the confidentiality of arbitral proceedings and the ability to negotiate the applicable law.[166]

Arbitration is also utilized in many industries analogous to the space industry.[167] Binding arbitration is provided for in the following international

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[157] Khoukaz, *supra* note 153, at 268 ("Since outer-space is deemed as part of the 'common heritage of humankind,' no state may assert control or exclusive dominion over any part of outer-space. Subsequently, when a dispute arises in outer-space, . . . the decision as to which substantive law applies is hard, if not impossible, to figure out.").

[158] *Id.* at 276.

[159] *Id.* at 277.

[160] *See id.*

[161] *Id.*

[162] Dadwal & Rosenberg, *supra* note 22, at 55.

[163] Frohloff, *supra* note 151, at 309. These types of disputes commonly involve satellite manufacturers and operators, launch service providers, and insurance companies. *Id.* at 310. Market activities in the satellite industry include the manufacture and launch of satellites (upstream activities), the production and distribution of satellite data (midstream activities), and satellite broadcasting (downstream activities). Zielinski, *supra* note 2.

[164] Zielinski, *supra* note 2 (describing the following examples of past satellite disputes: "the late delivery of satellites, the placing of a satellite into a wrong orbit, defective satellites already in orbit, the lease of satellite capacity, the right to orbital positions and frequency bands, export control and the cancellations of space contracts.")

[165] Frohloff, *supra* note 151, at 310. *See also* Zielinski, *supra* note 2 (noting that "the European Space Agency provides for arbitration in Clause 35(2) of its General Clauses and Conditions for ESA Contracts" and that arbitration clauses are routinely included in contracts by "SpaceX, Avanti, Boeing, Airbus, and Arianespace").

[166] *See* Frohloff, *supra* note 151, at 324–25.

[167] Hertzfeld & Nelson, *supra* note 20, at 135.

organizations: "[t]he [International Telecommunication Union (ITU)] Convention, the European Space Agency Convention, the U.N. Convention of the Law of the Seas, [and] the World Trade Organization Convention."[168] Arbitration is widely used in public international law cases involving treaty disputes, including maritime boundary disputes between States under the Law of the Sea Convention.[169]

Another example of binding international arbitration working successfully for private companies is within international investment law.[170] Investment treaties provide private investors with substantive rights that protect and secure their investments and procedural rights that give them direct access to dispute resolution against government entities.[171] Many of these treaties provide a two-tiered dispute resolution process, where the parties first participate in a form of non-binding dispute resolution, and if that fails, they move on to arbitration.[172]

The international investment law regime provides two general conclusions we can draw that support utilizing arbitration in the space industry.[173] First, States are generally agreeable to providing protections for foreign investors and their investments under international law within their own territories.[174] In the context of space law, the standards established in investment treaties could provide a starting point for discussions on minimum legal protections for private actors in relation to the States' activities in outer space.[175] Second, States prefer utilizing "confidential, neutral, and binding forms of dispute resolution," even when the dispute is with a private actor.[176] Binding dispute resolution provides opportunities for States to "promote the rule of law and market-oriented space policies" and to promote the development of a "transparent and predictable" body of space law.[177]

C. *The Amended Liability Convention Should Create a Robust Dispute Resolution System*

The widescale adoption of a treaty amendment that establishes a dispute resolution system for disputes arising in outer space, accessible by governmental

[168] *Id.*

[169] *Id.* at 136.

[170] *See generally* Kaj Hober, *Investment Treaty Arbitration and Its Future – If Any*, 7 ARB. L. REV. 58 (2015).

[171] Susan D. Franck, *Empirically Evaluating Claims About Investment Treaty Arbitration*, 86 N.C.L. REV. 1, 9–11 (2007).

[172] *Id.* at 11–12.

[173] *See* Dadwal & Rosenberg, *supra* note 22, at 55.

[174] *Id.*

[175] *Id.*

[176] *Id.*

[177] *Id.* A thorough comparison of international investment treaty arbitration to a potential space law arbitration process is beyond the scope of this Note due to the inherent complexity of international investment law. However, the success of arbitration in this sphere provides compelling evidence the binding arbitration could be effective in space-related disputes.

and private parties, is a necessity. The existing space treaties' limited access to dispute resolution is no longer feasible in our modern space industry and does not provide adequate remedies for private actors doing business in space. For a new treaty or treaty amendment to be effective, it should include specific provisions on how the dispute resolution system would function and be administered.

The Liability Convention is a logical treaty to amend since it already includes procedures on submitting State-to-State disputes to a Claims Commission.[178] Article IX, which stipulates that claims go through diplomatic channels first, and Articles X through XX, which detail the procedures for the Claims Commission, could be replaced with dispute resolution procedures that apply to all actors with property in space.[179] In terms of the specific provisions that this dispute resolution system would entail, there are numerous options that an organization drafting the amendment could consider.

First, consideration should be given to the general aspects of an "effective and enforceable" dispute resolution system.[180] An effective system contains these elements: (1) "easy access"; (2) "a fairness and equitable process and resolution"; (3) speed and economy; (4) "incentives for space sustainability"' (5) "reasonable compensation for damages"; and (6) "enforceable judgments in all nations." In general, binding arbitration can provide for each of these elements.[181] But in addition to binding arbitration, including a process for mediation within the dispute resolution system can bolster the system's overall effectiveness.[182] As the space industry generally benefits from cooperation among its major players, mediation provides an advantageous option that is more cooperative and less hostile than an adversarial process like arbitration.[183] An additional benefit to mediation is that under the 2020 Singapore Convention, settlement agreements from mediation are enforceable in many countries.[184]

A two-step dispute resolution process, with mediation as the first step and binding arbitration as the second step, would be an effective approach to resolving space disputes. The two-step system created by the ILA Revised Convention could provide a basis for developing the ideal system.[185] The main difference would be replacing the first step with mediation. The ILA Revised

[178] *See supra* Part II.

[179] *See generally* Liability Convention, *supra* note 30, at art. IX–XX.

[180] Hertzfeld & Nelson, *supra* note 20, at 130.

[181] *See generally id.*

[182] Khoukaz, *supra* note 153, at 276 n.98.

[183] *Id.* at 276 (noting that a cooperative environment "could allow for better relief subsequent to a dispute—such as help in cleaning disasters—which will trigger a series of positive reactions . . . between both private and public actors, reflecting the initial aspirations of a peaceful, cooperative space exploration program").

[184] *Background to the Convention*, SINGAPORE CONVENTION ON MEDIATION, https://www.singaporeconvention.org/convention/about [https://perma.cc/TAY9-S9HK]. Forty-six countries, including the United States, China, India, and South Korea, have signed the Convention. *Id.*

[185] *See supra* Part II.

Convention provides for an informal reconciliation process that allows for an exchange of information and proposals.[186] However, a more formal mediation is preferable to reconciliation because a neutral, third party mediator can work with the parties on a resolution, and a settlement agreement may be enforceable under the Singapore Convention.[187] Mediation-arbitration, or Med-arb, is a procedure where parties engage in mediation first, and if they reach an impasse, move on to arbitration where the mediator then assumes the role of the arbitrator.[188] Med-arb is the best fit for space disputes because the mediation step allows the parties to start with a cooperative process but move on to an adjudicative process if negotiations fail.

For the second step of the med-arb process, the treaty amendment should provide for a formal binding arbitral process. In designing the arbitration rules, consideration should be given to both the ILA Revised Convention and the PCA Outer Space Rules and the nuances between the two. One notable difference between the two is that only the PCA Outer Space Rules specifically provide for confidentiality provisions.[189] Any dispute resolution system designed for the space industry should provide procedures to preserve confidentiality, as actors in the space industry are generally risk-averse and would wish to avoid disclosing sensitive intellectual property in discovery unless necessary to resolve the dispute.[190]

Further consideration should be given to how the arbitral panel would be structured. The ILA Revised Convention provided for a five-member arbitral panel, consisting of two party-appointed arbitrators and three arbitrators selected by agreement of the parties, with a tribunal president chosen by the parties from among the three selected by agreement.[191] The PCA Outer Space Rules provided for arbitral panels of one, three, or five arbitrators, with the arbitral panels consisting of two party-appointed arbitrators and an additional one or three selected by the party-appointed arbitrators, with the party-appointed arbitrators also selecting the presiding arbitrator.[192] The amended Liability Convention should follow the PCA model, which provides more flexibility in establishing a panel appropriate for the particular dispute.

The treaty should also provide for a well-established arbitral institution to administer the dispute resolution process. The PCA may be a practical choice,

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[186] ILA Revised Convention, *supra* note 98, at 250.

[187] Katie Shonk, *What Is Med-Arb? The Pros and Cons of Med-Arb, a Little-Known Alternative Dispute Resolution Process*, HARV. L. SCH.: PROGRAM ON NEGOT. DAILY BLOG (Sept. 19, 2023), https://www.pon.harvard.edu/daily/mediation/what-is-med-arb/ [https://perma.cc/2AXU-QVE3]; *Background to the Convention*, *supra* note 184.

[188] Shonk, *supra* note 187. Med-arb is a cost-effective two-step dispute resolution process, as it eliminates the need to get an arbitrator up-to-speed on the facts of a dispute. *Id.*

[189] *See* Zielinski, *supra* note 2; *see* PCA Outer Space Rules, supra note 121, § 3 art. 17(7).

[190] Khoukaz, *supra* note 153, at 277.

[191] ILA Revised Convention, *supra* note 98, at 256.

[192] PCA Outer Space Rules, *supra* note 121, § 2(9).

considering that it has already arbitrated a few space-related disputes,[193] and therefore would likely to be well-suited to handle outer space disputes in the future. The PCA is generally well respected in the international law community,[194] with 122 member States,[195] and having served as a venue for many inter-State arbitrations.[196]

D. *Update the Liability Regime to Hold Private Actors Accountable*

An updated dispute resolution system will only truly be effective if the Liability Convention is amended to place liability on the responsible actor, whether governmental or private. As discussed in Part II, the Liability Convention places liability for damage occurring in outer space on the launching State.[197] Under this regime, private companies are not directly liable for any damage they may cause in outer space.[198] For the dispute resolution system proposed in Part IV.B to function correctly, all spacefaring entities would need the legal ability to seek damages directly from the entity that damaged their property.[199] Under the current regime, they would be forced to negotiate with the home country of the private entity that was responsible for the damage.[200]

By holding private entities directly liable for the damage they cause, it not only allows the owner of damaged property to engage in dispute resolution directly with the entity that caused the damage, but it also provides positive incentives for private companies to take greater responsibilities for their operations.[201] Further, it would replace the unworkable current framework of determining which state is the "launching state" for the purpose of liability.[202]

Opponents of amending the Liability Convention will likely argue that updates to the Liability Convention are not needed due to the rarity of accidents occurring in outer space. This is evidenced by the fact that the Liability Convention's Claims Commission has not been utilized in its 51-year history[203] and only two known incidents have occurred that could have utilized the Commission.[204] Further, the failed adopted of the ILA Revised Convention and PCA Outer Space Rules are potential indicators that the space industry is not in

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[193] *See* Majid, *supra* note 145.

[194] *See* Maria Belen Moreno, *From its Origins to Actuality: The Permanent Court of Arbitration*, WOLTERS KLUWER: KLUWER ARB. BLOG (Sept. 23, 2023), https://arbitrationblog.kluwerarbitration.com/2023/09/23/from-its-origins-to-actuality-the-permanent-court-of-arbitration/ [https://perma.cc/6GVV-PRUB].

[195] *Id.*

[196] Hertzfeld & Nelson, *supra* note 20, at 132.

[197] *See supra* Part II.

[198] *Id.*

[199] *Id.*

[200] *Id.*

[201] *See* Reinert, *supra* note 39, at 351.

[202] *Id.*

[203] *See supra* Part II.

[204] *See supra* Part I.

need of specialized dispute resolution procedures.[205] However, even though historically there have been few instances of disputes arising in outer space, many experts project that the growing number of satellites is greatly increasing the likelihood of disputes in the future.[206] It is better to put dispute resolution measures in place now, before they become needed.

The nearly universal adoption of the Outer Space Treaty and Liability Convention is a very positive indicator that States would be willing to adopt a proposed amendment to change the liability regime. Both the Outer Space Treaty and Liability Convention have been adopted by over 100 countries and nearly all spacefaring nations.[207] Universal adoption of the amendments will be critical to ensuring access to the arbitral system. Critics may point to the lack of adoption of the most recent space treaty, the Moon Agreement, which has only been ratified by eighteen States, not including the United States, Russia, China, Japan, or India.[208] However, the treaty received little support in large part due to concerns that the provisions would be highly detrimental to the free enterprise and adversely affect future space exploration.[209] Concerns of that magnitude are not likely to arise in the context of liability, so the overwhelming support of the Outer Space Treaty and Liability Convention are likely better indicators that an amendment to change the liability regime does have potential to receive significant support from spacefaring nations.

V. CONCLUSION

Updating the liability regime for damages occurring in outer space is vital to ensuring a workable legal framework for the modern space industry. The accelerating rate of satellite launches is not expected to slow down,[210] and as such, it is not a matter of *if* another satellite collision occurs, but *when*. A strong legal framework needs to be created before it becomes regularly needed.

The existing liability regime, established through the Outer Space Treaty and Liability Convention, is insufficient to address the modern realities of the space industry.[211] Private actors are not held directly liable for the damage they cause, and they also lack legal rights to demand compensation for damages to their property from foreign nations or companies operating outside of their

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205 *See supra* Part III(C).

206 Zielinski, *supra* note 2. *See also supra* Part I.

207 Hertzfeld, Weeden, & Johnson, *supra* note 31, at 16; Dadwal & Rosenberg, *supra* note 22, at 52.

208 Irmgard Marboe, *What, If Any, Relevance Does the Moon Agreement Have to Activities in Space Today?*, NEW SPACE AGE: BEYOND GLOB. ORDER (2021), https://global.upenn.edu/sites/default/files/perry-world-house/Marboe_SpaceWorkshop.pdf [https://perma.cc/52V4-BRFM].

209 Nancy L. Griffin, Comment, *Americans and the Moon Treaty*, 46 J. AIR L. & COM. 729, 749–50 (1981).

210 *See supra* Introduction.

211 *See supra* Part II.

country.[212] Binding arbitration provides the best means for resolving disputes arising in outer space, because arbitration is successfully used in other industries for international disputes, allows for decision-makers with specialized knowledge and expertise, is legally enforceable in nearly all countries, and can be provided through strong, existing institutions.[213] The Liability Convention should be amended to allow all entities access to a binding arbitration process where a claim can be brought against any type of actor.[214] Further, it should be amended to allow private actors to be wholly or partially liable for space objects under their ownership or control.[215]

As humankind continues to ponder the future of outer space, we cannot overlook the importance of a legal framework to govern how nations and private companies will utilize space in the coming decades. Modifying the existing liability framework for disputes in outer space is critical, perhaps even imperative. Amending the Liability Convention is a rational and feasible strategy for creating a workable framework that will give all actors in the space industry the "space" to have their disputes resolved.

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212 *Id.*
213 *See supra* Part III.
214 *See supra* Part IV.
215 *Id.*