Commercial Space Activities: Legal Framework and Challenges

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Abstract

Commercial space endeavors have experienced a considerable upswing in recent times, as private enterprises have entered the space sector and embarked on a diverse array of ventures, encompassing satellite launches, space tourism, and asteroid mining. This scholarly article delves into the legal framework that governs commercial space activities and the challenges that emerge within this dynamic context. The article commences by scrutinizing the international treaties and agreements that constitute the basis of space law, notably the Outer Space Treaty, the Rescue Agreement, and the Liability Convention. These treaties establish fundamental principles, including the peaceful utilization of outer space, the freedom to explore, and the responsibility for damages arising from space objects. Nevertheless, the expansion of commercial space activities gives rise to questions concerning the application of these principles to private entities operating in space. The absence of clarity and consistency in national laws governing commercial space activities is a significant challenge that has been identified in this paper. Various countries adopt different approaches to licensing, liability, and property rights in space, which can potentially result in conflicts and uncertainties for commercial operators. Moreover, the paper delves into topics such as space debris management, intellectual property rights in space resources, and the potential for conflicts between commercial and governmental interests in space exploration. These challenges underscore the necessity for a comprehensive and adaptable legal framework that can accommodate the diverse range of activities occurring in space, all while ensuring compliance with international obligations. In conclusion, this research paper underscores the importance of addressing the legal complexities surrounding commercial space activities to foster a

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sustainable and cooperative environment for future space exploration. By examining the current legal framework and identifying key challenges, this paper aims to contribute to ongoing discussions on shaping the future of commercial space activities.

***Keywords*:** Commercial Space Activities, International Space Law, Space Tourism, Space Exploration

Commercial Space Activities

Determining what constitutes a "commercial" space operation may be challenging. Some define a commercial. Some define a commercial activity as one in which a private sector organization risks its own money and offers products or services mainly to customers or other private sector organizations rather than the government. Direct-to-home satellite television (like DirecTV and DishTV), satellite radio (like Sirius XM and Worldspace), and commercial communications satellites (like Intelsat Ltd., SES Global, and Eutelsat) that broadcast voice, data, and Internet services are a few examples of these operations.

Although the satellite system is owned by the government, other definitions are more inclusive and include the sales of consumer electronics by businesses. The main illustration of this is the GPS navigation satellite system, which is controlled by the US Department of Defence but has a wide range of consumer applications, including cell phones, automotive navigation systems, and precision farming. Commercial firms sell the gadgets that people use all around the world in their vehicles, boats, or on their person, but the Department of Defence (DOD) provides the satellite signal that powers these devices at no cost to customers.

Broader definitions of commercial space operations encompass companies like the Boeing-Lockheed Martin United Launch Alliance (ULA) that primarily provide services to government clients. Others do not consider these commercials because they receive the majority of their income from the government, which also bears a large amount of the risk. After all, the government needs the services. [i]

Space Tourism

Another specialized area of the aviation sector is space tourism, which aims to provide travelers with the opportunity to become astronauts and engage in space flight for pleasure, business, or both. A very tiny percentage of consumers are able and willing to pay for a space adventure due to the high cost of space tourism. Space visitors have a variety of possibilities. For instance, Crouch et al. (2009) look into the decision-making processes associated with four different forms of space tourism: atmospheric zero-gravity flights, high-altitude jet fighter missions, short-duration suborbital flight missions, and longer-duration orbital space travel.

According to Reddy et al. (2012), the following factors in order of significance are what motivate people to travel to space: seeing Earth from space, experiencing weightlessness, traveling at high speeds, having an uncommon experience, and making a scientific contribution. In terms of commercial space tourism offerings, only atmospheric zero-gravity flights and high-altitude jet fighter missions are currently accessible to travelers. Because of this, this part gives an example of each, and later in this chapter, we'll talk about the possibility of suborbital and longer-duration orbital excursions into space.[ii]

How to Purchase a Space Ticket

The ambition of becoming an astronaut is getting easier to achieve, even though space tourism is still in its early stages. The procedures to purchase your space ticket are as follows:[iii]

1. Choose Your Space Tourism Provider
2. Reserve Your Seat
3. Training and Preparation
4. Liftoff and Spaceflight
5. The Space Experience
6. Return to Earth

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Regulation in Space Tourism in Perspective to India

a. Remote Sensing

The Remote Sensing Data Policy (RSDP), which was first presented in 2001 and updated in 2011, is in place in India. The Remote Sensing Data Distribution Policy (RSDP) regulates the gathering and sharing of satellite remote sensing information by non-governmental organizations. This information can be obtained from foreign or Indian satellites.

The updated RSDP states that upon request, non-discriminatory satellite remote sensing data with a resolution of up to one meter shall be made available. Protection was mandated for satellite remote sensing data with a resolution of up to 5.8 meters in the previous 2001 regulation. The DOS is the nodal agency for RSDP implementation, and it makes all decisions on the availability of remote sensing data.

As per the 2011 Remote Sensing Data Protection Act, the DOS will become the proprietor of any satellite remote sensing data obtained via the Indian Remote Sensing Satellite Program. After receiving the required approval from the DOS, commercial organizations are permitted to operate remote sensing satellites from India under the 2011 RSDP. To acquire or distribute foreign satellite remote sensing data in India, it also permits the NRSC and Antrix Corporation Limited (ACL) to enter partnerships with international satellite operators.

b. Spectrum Allocation

2018 saw the release of a revised National Frequency Allocation Plan (NFAP) by the Indian government. The Radio Regulations (2016 edition) of the International Telecommunication Union (ITU) serve as the foundation for the NFAP. The NFAP does not provide the right to use spectrum, even though it regulates its usage in India. All organizations in India are required to seek a license from the Ministry of Communications' Wireless Planning and Coordination Wing (WPCW) to use spectrum. The Indian government may occasionally exempt specific situations from the need to get authorization or a license to use spectrum.

The Telecom Regulatory Authority of India proposed in 2007 that the number of telecom businesses permitted to operate in the Indian telecom market should be unlimited. Additionally, it was suggested that a significant criterion for future spectrum allocation be the subscriber base. Another telecom strategy was announced in 2012, this time with the main goal of giving Indian residents access to effective and reasonably priced communications.

c. Satellite Communication

The Telecom Regulatory Authority of India proposed in 2007 that the number of telecom businesses permitted to operate in the Indian telecom market should be unlimited. Additionally, it was suggested that a significant criterion for future spectrum allocation be the subscriber base. Another telecom strategy was announced in 2012, this time with the main goal of giving Indian residents access to effective and reasonably priced communications.

The SATCOM policy's goal to make the Indian National Satellite System (INSAT) accessible to the Indian public is one of its most notable aspects. Foreign investment and privatization in the Indian space industry were initially intended by the SATCOM policy.

Both domestic and foreign satellites may be used for satellite operations under the Indian SATCOM policy, though proposals utilizing Indian satellites are given priority. Leasing INSAT capacity to private sector entities is another important feature of the Indian SATCOM policy. INSAT was first primarily utilized by Indian government agencies, including All India Radio and the Department of Telecommunications.

Challenges of Regulation of Space Tourism

The way that space tourism is now approached and the vehicles that are being developed to access space are essentially all built on advances in the development of rocket launch vehicles and rocket planes. A longer-term perspective on space exploration and the creation of safer methods to launch people into Earth orbit and beyond will require the development of new

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technology. There are a lot of methods available that do not involve setting up a chemical bomb beneath the passengers and crew.

These cutting-edge techniques include the utilization of tethers, full space elevators to reach geostationary orbit (GEO), sophisticated ion engine thrusters, several forms of nuclear propulsion, lighter-than-air vehicles equipped with ion engines, and solar electric propulsion. Concepts like solar sail technology, ion engines, nuclear propulsion, and solar electric propulsion become more intriguing and conceivable after GEO is reached.

Space agencies should invest more money in studying these next-generation systems, which will eventually provide more affordable, ecologically friendly, dependable, and secure means of space travel, as long as private initiatives show the feasibility of near-Earth space tourism.[iv]

What are mega constellations?

Mega-constellations are systems that use thousands to hundreds of thousands of minimal Earth Orbit (LEO) satellites to provide broadband data services with minimal latency to any location on the Earth. Mega-constellation satellites often have to be as tiny and inexpensive as possible without sacrificing their ability to provide services. They typically orbit in the 400–1200 km range.[v]

What future developments are mega-constellations bringing about for the satellite industry?

Volume manufacturing results from the requirement to produce tens of thousands of satellites at a reasonable cost. The satellite industry can become more like the automotive industry by automating the building process and using a statistical approach to quality control. The way we create satellites and how we can increase time to build, quality, and cost, to become faster, better, and cheaper, is completely transformed by this scale manufacturing.

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Up until now, the majority of communication satellites were largely manually constructed, with methods and expert workers achieving quality through handiwork that was not easily scaled to low cost, high volume, or rapid build times. High-volume purchases help amortize one's non-recurring costs for mega-constellations. Human operators can collaborate with robots and automated systems to produce new satellites in a few hours thanks to the modular design's low cost and simple assembly. Having volume and repeatability instead of one-off semi-custom satellites allows us to leverage automotive industry-style methods without sacrificing the faster, better, more affordable triangle.

There has been a parallel revolution in launcher technology to go along with these new advancements in satellite technologies and production methods. Launch systems have developed to be able to launch many satellites at once at a reasonable cost as the size and weight of the satellites have decreased, which helps control overall system costs. Launch costs have been lowered in part by the reusable nature of launch technologies. A higher cadence of launches can also aid in problem-solving and expedite the evolution and improvement of launchers.[5]

Companies like SpaceX and OneWeb are launching mega-constellations of satellites to provide global internet coverage. This presents unique challenges:

- ***Space Traffic Management***

  Why does this matter?

  A growing number of private and public actors, small satellites, and new advancements in reusable launch vehicles are all contributing to the increasing number of satellites and debris in space. The ensuing space traffic overload jeopardizes the security and robustness of space assets belonging to the EU and its member states: In addition to an increasing number of satellites—more than 50,000 more are anticipated to be launched over the next ten years—more than a million debris pieces larger than one centimeter are estimated to be orbiting the Earth at this time. Therefore, if nothing is done, it is expected that the chances of a satellite being severely damaged or destroyed in a collision will increase dramatically.

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What is STM?

Space is becoming more and more crowded, so action is urgently needed to preserve it as a resource for coming generations. Hence, STM seeks to maintain the safety of space operations, the usability of space orbits, and space accessibility for many years to come, all the while guaranteeing and enhancing the competitiveness of the EU industry.[vi]

- ***Radio Frequency Interference***

The conduction or radiation of radio frequency energy by an electronic or electrical device that results in noise that usually obstructs the operation of a nearby device is known as radio frequency interference. It also describes when radio astronomy interferes with a satellite's ability to operate normally. Limiting radio frequency interference is crucial because it can cause disruptions to the regular operation of electrical and electronic devices.

The majority of electrical and electronic devices, including switching power relays, industrial controls, medical equipment, electronic printers, laptops, PCs, gaming consoles, and computing devices, emit radio frequency interference. Radio frequency interference can be produced by electrical or electronic devices in two ways: conducted radio frequency interference and radiated radio frequency interference. When it comes to the first scenario, the interference is released into the environment straight from the device, while in the second scenario, it enters an AC power line via a component or device's power cord.

Radiofrequency interference in satellite communications can occur inadvertently or on purpose. While man-made interference is regarded as intentional radio frequency interference, various types of space weather, such as solar storms, can produce natural radio frequency interference.[vii]

- ***Environmental impact***

Does everyone have the right to an unhindered view of the sky? A question like this would have been deemed absurd for the majority of human history, but in light of the recent emergence of satellite mega constellations, it is being asked more and more frequently. Mega constellations are enormous groups of thousands of spacecraft that have the potential to revolutionize global connectivity and commerce and launch a multitrillion-dollar orbital

industry. However, the emergence of massive constellations also poses a threat to clog the sky, interfering with certain astronomers' tasks, and producing space debris that endangers both people on Earth and in space. A paper suggesting that such constellations might be practically illegal due to environmental laws passed by the US Congress more than 50 years ago was first covered by Scientific American in January 2020.

The first 60 satellites in Elon Musk's Starlink constellation were launched in May 2019, signaling the start of the mega constellation era. With Starlink, the company aims to provide high-speed broadband Internet to every corner of the world by constructing and managing a low-Earth orbit network of over 12,000 communications satellites. SpaceX launched 180 Starlink satellites by the end of 2019. Currently, the constellation comprises over 3,000 satellites, which make up half of all satellites in orbit that are actively in use.[viii]

International Law and Treaties

Key international treaties like the *Outer Space Treaty (OST)* and *the Liability Convention* are central to regulating commercial space activities. However, they were written decades ago and may need revisions to address modern challenges.

- ***The Outer Space Treaty (OST)***[ix]

  Adopted by the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), the Outer Space Treaty (OST) is an international agreement that was made available for signature on January 27, 1967. As of my most recent knowledge update in January 2022, it had been signed by more than 100 countries and went into effect on October 10, 1967.

  The Outer Space Treaty, which is regarded as a founding document of international space law, lays out a series of guidelines and principles for the peaceful use of space and the Moon. Among the fundamental ideas mentioned in the treaty are:

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a. Outer Space for Peaceful Purposes: Space should be free for all states to explore and use for peaceful purposes, and space exploration and use should be conducted for the benefit of all nations.

b. Weapons of Mass Destruction Prohibition: Under the treaty, it is forbidden to station nuclear weapons or any other type of WMD in Earth's orbit or on the Moon or any other celestial body.

c. Non-Appropriation of Outer Space: In no way may the Moon or any other celestial body be appropriated by the national government. No state may assert its sovereignty.

d. International Cooperation: Information sharing and other forms of cooperation between states are encouraged in the exploration and utilization of space.

e. Preventing Dangerous Contamination: It is the responsibility of states to prevent dangerous pollution of space and celestial bodies. This includes taking precautions to avoid introducing life from Earth to other celestial bodies.

f. States are responsible for any harm that their space operations cause to other nations or their space objects.

- ***The Liability Convention***[x]

The Liability Convention, formally known as the "Convention on International Liability for Damage Caused by Space Objects," is an international treaty that addresses issues related to liability for damage caused by space activities. It was adopted by the United Nations General Assembly in 1972 and entered into force on September 1, 1972.

Key provisions of the Liability Convention include:

a. Absolute Liability: States that launch or authorize the launch of space objects are held liable for any damage caused to another state or its space objects. This means that the launching state is responsible for damage regardless of fault.

b. Joint and Several Liability: If more than one state is involved in a space launch, they are jointly and severally liable. This means that each state involved is individually responsible for the entire amount of the damages.

c. Liability for Non-Governmental Entities: The convention extends liability not only to states but also to non-governmental entities, such as private companies, that are involved in space activities.

d. Limits on Liability: While the convention imposes absolute liability, it also allows states to limit their liability through insurance or other financial guarantees. However, the limitation should be "equitable" and take into account factors such as the type of space activity, the nature of the space object, and the potential extent of damage.

e. Claims Procedures: The convention establishes procedures for making compensation claims. States that suffer damage must submit a claim to the state responsible for the space object.

The Liability Convention works in conjunction with the Outer Space Treaty, which sets the framework for the peaceful use of outer space. Together with other treaties and agreements, these instruments contribute to the establishment of a legal framework for the responsible and peaceful use of outer space.

Jurisdiction

The domain of space jurisdiction, which deals with the legal authority of nations to enforce laws in outer space, has gained significance due to the increasing involvement of the private sector in the realm of space tourism. As per the provisions laid out in the Outer Space Treaty of 1967, while nations are prohibited from claiming ownership over space and celestial bodies, objects launched into space and the individuals aboard them continue to fall within the legal purview of the state of their registration. (tt)

Paragraph 1 of Article V alludes to the fundamental concept, which has already been articulated in Article VIII of the Outer Space Treaty of 1967 and Article II of the Registration Convention, concerning the appropriate accountability and autonomy of each respective participant for the launched entities. Additionally, it entails the facilitation of registration for said entities[xi].Paragraph 2 of Article V explicitly declares that each Partner, in conformity with Article VIII of the Outer Space Treaty and Article II of the Registration Convention, shall

maintain jurisdiction and authority over the components it registers by paragraph 1, as well as over the individuals who are its citizens and are present on or within the Space Station.[xii] The jurisdiction and control exercised are contingent upon the applicable provisions outlined in the IGA 1988, the MOUs, and the implementing agreements, which also encompass the relevant procedural mechanisms established therein, as stated in Article V paragraph 2.[xiii] Article V is designed in a manner that offers a solid legal foundation and distinctly establishes the legal jurisdiction and accountability of every individual involved in the Program. It is noteworthy to mention that Article V adheres to the principle of "jurisdiction and control" already established in Article VIII of the Outer Space Treaty of 1967, thus ensuring that, despite the potential existence of an actual superiority, no definitive legal conclusion can be drawn regarding the relationship.[xiv]

Licensing & Safety

An increasing number of States necessitate a license as a precondition to engaging in space endeavors. Several States mandate a permit for each specific instance of launching a space object, whereas others demand distinct licenses for a launch or re-entry conducted overseas. The majority of States that have instituted national Space Law regulations mandate a license for a launch originating from their jurisdiction or carried out by their citizens from any location. Certain States also oversee launch facilities, commonly referred to as spaceports[xv].

The prevailing phenomenon entails that domestic Space Laws delineate national endeavors by taking into account both the factors of nationality and territorial principles[xvi].

Several examples follow

Brazil regulates the launching of objects from its territory[xvii]. Kazakhstan also necessitates a license before engaging in space activities[xviii]. Australia imposes a prerequisite that an applicant obtains a space license, launch permit, or overseas launch certificate before conducting operations[xix]. Both space activities within Australia and those conducted by Australians outside

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of the country are encompassed by its licensing system[xx]. In Australia, the act of launching a space object is defined as putting an object into an area that is more than 100 km above the average sea level or attempting to do so[xxi]. To launch a specific space object or a series of space objects from a launch facility located in Australia, a launch permit is mandatory[xxii]. If an Australian citizen participates in the launch of a space object from a facility in a foreign territory, an Overseas Launch Certificate is required[xxiii].

A permit for the initiation is bestowed following the confirmation by the authorizing entity that the petitioner exhibits the aptitude to pursue the initiation and associated compensations without significant detriment to the well-being of the populace, the safety of the populace, or possessions[xxiv]. The initiation of an entity designated for space must not infringe upon the security of Australia, its foreign policy, or its commitments on an international scale, and the petitioner must fulfill the essential fiscal and assurance prerequisites[xxv].

France mandates that a French citizen or legal entity with its primary operations located in France must possess a license to initiate or facilitate the launching of a space apparatus from French territory[xxvi].

A license is mandatory for any individual, entity, or organization incorporated under the laws of the United Kingdom, that intends to initiate or arrange the initiation of a celestial body, manage a celestial body, or participate in any action conducted in the realm of outer space (excluding the rental of satellite capacity for space segment, specifically transponders)[xxvii].

The licensing process consists of several steps:

- Pre-application consultation;
- Policy review and approval;
- Safety review and approval;
- Payload review and determination;
- Financial responsibility determination;
- Environmental review; and
- Compliance monitoring[xxviii].

The extent to which national space legislation is applicable varies across different jurisdictions. In certain jurisdictions, there is no regulation of activities conducted by their citizens in international waters or within the territory of another country. Similarly, some jurisdictions do not regulate the space activities of non-citizens, even if they occur within their territory[xxix]. It could be argued that the most comprehensive law regarding the applicability of national law is found in France, where personal jurisdiction is imposed on any individual involved in space activities, as long as there is a connection to France. Similarly, Australia, the United States, South Africa, and the Russian Federation have enacted legislation with broad jurisdiction. In contrast, India does not have any legislation that applies to its space activities beyond its borders.

Endnotes

[i] SPACEPOLICYONLINE.COM, 'Commercial Space Activities' (2022) https://spacepolicyonline.com/topics/commercial-space-activities/ accessed November 11, 2023
[ii] Graham A. and Dobruszkes F., *Air Transport: A Tourism Perspective* (Elsevier 2019) 249- 253
[iii]'Explained: What is space tourism? How can you book your ticket to space?' *Times of India* (2023)

http://timesofindia.indiatimes.com/articleshow/103931851.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst accessed November 14, 2023

[iv] Joseph N. Pelton and Ram S. Jakhu, *Space Safety Regulations and Standards* (Butterworth-Heinemann 2011) 485-495
[v] Francis Kinsella, 'Mega-constellations in space: revolutionizing the satellite industry' (Airbus secure communications April 2020) https://securecommunications.airbus.com/en/meet-the-experts/mega-constellations-in-space-revolutionising-satelliteindustry#:~:text=Mega%2Dconstellations%3A%20a%20web%20of,services%20anywhere%20on%20the%20planet. accessed November 17, 2023
[vi] Defence Industry and Space, 'Space Traffic Management' https://defence-industry-space.ec.europa.eu/eu-space-policy/space-traffic-management_en accessed November 17, 2023
[vii] Margaret Rouse, 'Radio Frequency Interference' (Technopedia January 5, 2017) https://www.techopedia.com/definition/9074/radio-frequency-interference-rfi accessed November 17, 2023
[viii] JONATHAN O'CALLAGHAN, 'Satellite Constellations Could Harm the Environment, New Watchdog Report Says' (Scientific American November 24, 2022) https://www.scientificamerican.com/article/satellite-constellations-could-harm-the-environment-new-watchdog-report-says/ accessed November 16, 2023
[ix] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Adopted 27 January 1967, entered into force 10 October 1967) 18 U.S.T. 2410 610 U.N.T.S. 205, 61 I.L.M. 386 (1967)
[x] Convention on International Liability for Damage Caused by Space Objects (Adopted 29 March 1972, entered into force 1 September 1972) 24 U.S.T. 2389, 861 U.N.T.S. 187, 10 I.L.M. 965 (1972)
[xi]IGA, 1988 at art. V, para. 1.
[xii] See id. at art. V, para. 2. According to Article XXII this also applies in respect to criminal jurisdiction. The U.S., in addition, may exercise criminal jurisdiction over criminal acts committed by a "non-U.S. national which endangers the safety of the manned base or crew members," provided that before the prosecution consultations have taken place and an agreement has been reached between the U.S. and the Partner State whose national is being charged. See id. at art. XXII, para. 2.
[xiii] See id. at art. V, para. 2.
[xiv] See HORST BITTLINGER, HOHEITSGEWALT UND KONTROLLE IM WELTRAUM 60-66 (1988); see also Reifarth, supra note 18, at 46; see also Reifarth, HANDBUCH, supra note 6 at 548.
[xv] Thomas Brannen, Private Commercial Space Transportation's Dependence on Space Tourism and NASA's Responsibility To Both, 75 J. AIR L. &COM. 639, 656-67 (2010); Michael C. Mineiro, Law and Regulation Governing U.S. Commercial Spaceports: Licensing, Liability, and Legal Challenges, 73 J. AIR L. & COM. 759, 760-65 (2008).
[xvi] See Steven Freeland, Matching Detail with Practice: The Essential Elements of National Space Legislation, in PROCEEDINGS OF INTERNATIONAL INSTITUTE OF SPACE LAW 540, 541 (2010); Frans G. von der Dunk, Liability Versus Responsibility in Space Law: Misconception or Misconstruction?, in PROCEEDINGS OF THE THIRTY-FOURTH COLLOQUIUM ON THE LAW OF OUTER SPACE 363, 367(1991). Professor Bin Cheng posits that a State has three kinds of jurisdiction: territorial, quasi-territorial (over its aircraft, ships, and space objects), and personal (i.e. over its nationals, both natural and artificial). But jurisdiction has two elements: jurisdiction (i.e., the power of the State to enact laws) and jurisdiction (i.e., the power of the State to execute and enforce its laws). There is a clear hierarchy between jurisdictions in the order territorial, quasi-territorial, and personal and the more important ones can override the less important ones. Effective jurisdiction exists when the State's jurisdiction is not overridden by that of any other State; the State is responsible under Article VI of the Outer Space Treaty for all activities over which the State has effective jurisdiction. Thus, though a State is responsible not only for acts within its territorial jurisdiction but also for all acts precipitated by

its space objects, ships, and aircraft and for activities by its nationals, it should exert effective jurisdiction over those activities. Cheng, supra note 49, at 25.

[xvii] Portaria 27 de 20 dejunho de 2001, art. 6 (Braz.).

[xviii] Law of the Republic of Kazakhstan on Space Activities, art. 13 (Jan. 6, 2012), No. 528-IV, http://www.oosa.unvienna.org/pdf/spacelaw/national/kazakhstan/528-IV2012-01-06E.pdf.

[xix] Space Activities Act 1998 (Cth) divs 3 & 4 (Austl.); see ARANZAMENDI, supra note 7, at 16.

[xx] Space Activities Act 1998 (Cth) s 6 (Austl.). The licensing regime for launching activities has been laid down in Australia by the Space Activities Act 1998 and the Space Activities Regulation 2001 and has extraterritorial application.

[xxi] Ibid S.8

[xxii] Ibid S. 11, 26(1). However, if the Minister instead grants an exemption certificate, the applicant need not obtain a launch permit. Exemption certificate covering specified conduct that might otherwise be prohibited under the law on launch permit. Id S. 46.

[xxiii] Ibid S. 35

[xxiv] Ibid S.32

[xxv] Ibid S.18

[xxvi] 4 French Space Operations Act, supra note 72, art. 2. The French Space Operations Act was adopted in 2008 and entered into force in 2010. Before this legislation, a legal framework existed through agreements and contracts with Arianespace and the European Space Agency to govern the authorization of national activities in France. Centre spatial gyanais (CSG) used to control space activities through the safety mission of Centre national d'6tudes spatiales (CNES) which is the national space agency of France and therefore, CNES exercised indirect control.

[xxvii] 6 UK SPACE AGENCY, REVISED GUIDANCE FOR APPLICANTS, OUTER SPACE ACT 1986, https://www.gov.uk/govemment/uploads/system/uploads/attachment data/file/320158/Guidance_for ap plicants_-_June_2014.pdf [herein after, REVISED GUIDANCE]. The lease of space segment satellite capacity (transponders) from international inter-governmental satellite organizations or privately owned entities for use by the lessee or by a person sub-letting the capacity need not be licensed. Further, utilization of space segment capacity using earth stations for either transmission or reception purposes also does not require a license. However, this exception does not apply to persons involved in telemetry, tracking, and control of satellites in orbit. Id. at 1. Those who intend to carry out launches must understand the hazards involved and make reasonable attempts to limit them. Id. annex A. The applicant must insure himself against liability. Further, the launching activities may not jeopardize public health, the safety of persons or property, national security, or the U.K.'s ability to meet its international obligations. The license can be transferred with the written consent of the Secretary of State. REVISED GUIDANCE, at 4. The United Kingdom does not have a licensing procedure or law specifically addressing a launching facility or launching site. However, the application for licensing for a launch includes detailed questions on the ground segment. Id. annex A.

[xxviii] Office of Commercial Space Transportation, FED. AVIATION ADMIN., http://ast.faa.gov/lrra/

[xxix] Also, most statutes do not deal with the transfer of satellites, especially inter-State transfer of satellites. For example, Australia has a broad scope of applications providing for all activities within its territory and outside its territory by its nationals. However, it is silent regarding inter-State transfer of satellites

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