

Registration of Space Objects with the United Nations Secretary-General

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Abstract

Under international law, States and intergovernmental organisations are required to register their space objects with the Secretary-General of the United Nations. The paper notes the evolution of space object registration, the application of the Convention on the Registration of Objects Launched into Outer Space and, additionally, provides a brief overview of the registration practices of States and intergovernmental organizations. The paper also reviews the role of the United Nations Office for Outer Space Affairs (UNOOSA) in discharging the Secretary-General's responsibilities under international space law and highlights the opportunity for the evolution of space object registration provided by the fiftieth anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space in 2018 (UNISPACE+50).

I. Evolution of the Nature of Space Object Registration

The issue of space object registration with the United Nations Secretary-General emerged from the belief of States that “the United Nations should provide a focal point for international cooperation in the peaceful exploration and use of outer space”.¹ In its original conception, the Register was a mechanism to provide the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) with information on objects launched into orbit or beyond. The information, voluntarily and “promptly” submitted by States launching objects, was to be maintained by the Secretary-General in a public registry. Neither the type or manner in which information was to be provided were specified, allowing the “States of registry” themselves to

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1 General Assembly resolution 1721B (XVI) of December 1961. All United Nations documents cited in this paper can be obtained from www.unoosa.org.

determine the types of information and frequency in which the information should be provided.

With the need for “space governance” leading to the elaboration of international space law, the nature of registration evolved to bear a legal dimension. The obligations associated with space object registration were first codified under treaty in the “*Magna Carta of Space*”: the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (“Outer Space Treaty”).

As a State’s rights and obligations pertaining to a space object were further developed under subsequent legal instruments, the necessity for the “provision for registration by launching States of space objects launched into outer space with a view, *inter alia*, to providing States with additional means and procedures to assist in the identification of space objects”² was addressed in the Convention on Registration of Objects Launched into Outer Space (“Convention”), which entered into force in 1976. For the first time, space object registration became a mandatory requirement with the intent to “assist in their identification and would contribute to the application and development of international law governing the exploration and use of outer space”.³ Drawing on the common (though not necessarily best) practices of States over the preceding fifteen years in voluntarily submitting information for inclusion in the “Resolution Register”, the Convention specified the types of information to be included in the new “Convention Register” established under Article III. The similarity of the information to be provided allowed States to easily “switch” their registrations with little change to their established practices.

Though issues concerning registration became apparent to States Parties over the ensuing decades, it was only until 2004 that the issue of space object registration was taken up again by COPUOS’s Legal Subcommittee. The subsequent deliberations resulted in the adoption by the General Assembly of resolution 62/101, entitled “Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects”. The resolution aimed to harmonize existing registration practices while recommending types of information as well as practices that would facilitate the function of the Register. The resolution also served to increase awareness within the international community of space object registration.

II. General Assembly Resolution 1721B (XVI)

Since its establishment in 1961, nearly 6,000 space objects have been recorded in the “Resolution Register”. General Assembly resolution 1721B

² Convention on Registration of Objects Launched into Outer Space, Preamble.

³ *Ibid.*

(XVI) is still used by non-Parties to the Convention to voluntarily provide information on their space objects.⁴ Since 1976, voluntary registration information has been provided by Algeria, Azerbaijan, Brazil, Egypt, Israel, Italy, Luxembourg, Malaysia, Nigeria, the Philippines, Saudi Arabia, Thailand, Turkey and Venezuela. As of 31 December 2016, UNOOSA has issued 428 documents under resolution 1721B (XVI) with the most recent submission by Azerbaijan (A/AC.105/INF/428 of 7 December 2015).

III. Complementary Nature of the Two United Nations Registers of Objects Launched into Outer Space

As noted previously, the Secretary-General maintains two separate yet complementary Registers. Information provided in accordance with the Convention is disseminated under the United Nations documents series ST/SG/SER.E/ while information provided under resolution 1721B (XVI) is disseminated under the A/AC.105/INF/ series. After the Convention's entry into force, States Parties transitioned to providing information under the Convention, submitting information on space objects launched after that point while leaving earlier space objects in the Resolution Register. In some cases, States Parties have provided additional information (such as date of re-entry) under the Convention on objects carried on the Resolution Register. As such, an "overlap" exists between the two Registers. In another case, a State has "re-registered" all its space objects under the Convention. France in 2004⁵ registered all its space objects previously carried on the Resolution Register under the Convention. In such an occurrence, registration under the Convention takes precedence over resolution 1721B (XVI) and the space objects are removed from the Resolution Register and placed in the Convention Register with a notation of their former registration appended to the record.

Another instance of overlap can occur when a space object is registered by one State under resolution 1721B (XVI) and is also registered by another State Party under the Convention. A recent notable example of this practice is the space object "SPOT-7/Azersky". Originally launched in June 2014 and registered by France under the Convention in November 2015, the satellite was registered by Azerbaijan under resolution 1721B (XVI) in October 2015 following the space object's in-orbit purchase by Azerbaijan. A further 18 space objects have been similarly registered by two States.

To date, no State has indicated to the Secretary-General that it makes a legal distinction between its objects registered under resolution 1721B (XVI) and those registered under the Convention.

⁴ Some States of registry subsequently become Party to the Convention.

⁵ ST/SG/SER.E/445.

IV. Application of the Registration Convention by States Parties

As of 31 December 2016, there were 63 States Parties and 4 Signatories with three intergovernmental organisations (IGO) having declared their acceptance of rights and obligations provided for in the Convention: the European Space Agency (ESA), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) and the European Telecommunications Satellite Organization (EUTELSAT IGO). The most recent accession was by Venezuela in November 2016.

As of 31 December 2016, the following States have submitted information under Article IV of the Convention: Algeria, Argentina, Australia, Austria, Belarus, Belgium, Brazil, Canada, Chile, China, Czech Republic, Democratic People's Republic of Korea, Denmark, France, Germany, Greece, Hungary, India, Indonesia, Italy, Japan, Kazakhstan, Lithuania, Mexico, Nigeria, Norway, Pakistan, Poland, Republic of Korea, Russian Federation, Saudi Arabia, South Africa, Spain, Sweden, Turkey, Ukraine, United Arab Emirates, United Kingdom United States of America and Uruguay. Additionally, intergovernmental organizations ESA and EUMETSAT have also provided information under Convention.

Additionally, 31 States Parties and two IGOs have provided notifications on the establishment of national space object registries in accordance with Article II of the Convention. The most recent notification was made by Denmark.⁶ Several States Parties have informed UNOOSA that they are in the process of establishing national registries and informing the Secretary-General.

V. Status of Space Object Registration

Over 70 States and IGOs – “space nations” – operate (or have operated) objects in Earth orbit or beyond. Approximately 74% have registered their space objects. Historically, a growing divergence between “space nations” vs. States of registry exists. The rate of divergence has increased markedly in the last decade due to reasons including lower launch costs; commercial off-the-shelf cubesat technology allowing a greater number of non-governmental entities to develop, build and operate satellites; and greater participation by developing nations in the space sector.

Presently, over 7,500 functional space objects (satellites, planetary probes, landers and rovers, manned spacecraft, and space station flight elements) have been launched since 1957. Approximately 43% of those objects have re-entered the Earth's atmosphere leaving approximately 4,300 functional or formally functional objects in outer space. Of that number, nearly 85% have been registered. Presently, approximately 1,500 space objects are still

⁶ ST/SG/SER.E/36.

operational while the remainder orbit the Earth in their operational orbits or in graveyard/disposal orbits. As of 31 December 2016, over 6,800 (91%) of all functional space objects launched since 1957 have been registered with the Secretary-General under the Convention and resolution 1721B (XVI). The most recent registration submission was from Denmark.⁷

To date, 88% of functional space objects that are presently in Earth orbit or beyond have been registered. Nearly 88% of functional space objects that are in Low and Medium Earth Orbit (LEO/MEO) have been registered. Of all functional space objects that were in Earth orbit before re-entering the Earth's atmosphere, 96% were registered. In general, space objects on deep space, planetary exploration and national security missions are registered. Notably, all space objects carrying nuclear power sources have been registered. Crewed spacecraft are customarily registered⁸ and space station flight elements (including modules and robotic arms) have been registered.

VI. Non-Registration of Space Objects

Presently, only 9% of functional (or formerly functional) space objects have not been registered with the Secretary-General under resolution 1721B (XVI) or the Convention. Between 1957 and 2010, only a few functional space objects (between 0-14) were not registered per year.⁹ Since 2010, the number of unregistered space objects has increased significantly to over 60 space objects (approximately 27%) launched in 2014 remaining unregistered. In 2015, however, the number increased to 145 (66%) functional space objects launched that year remaining unregistered. The trend of an increased number of unregistered space objects reflects the growing number of entities (governmental, intergovernmental and non-governmental) operating in outer space and the profusion of satellites based on commercial off-the-shelf satellite technology.

A significant reason for the substantial increase in unregistered space objects can be a delay between a space object's launch and its registration. Another possible reason is that a "new" launching State may not be Party to the Convention or may not even be aware of space object registration. In cases where more than one nation is involved, especially for multi-national satellite "constellations", confusion amongst the launching States on which Party should be the "State of registry" in accordance with Article II of the Convention can also cause a space object to remain unregistered.

7 ST/SG/SER.E/785.

8 In cases of reusable spacecraft, each individual mission is registered.

9 The USA and USSR retroactively registered their satellites launched before adoption of resolution 1721B (XVI), i.e. Sputnik-1 & Explorer-1.

Other reasons include space activities that are carried out by a State's private sector without national regulation¹⁰ or the regulatory/registration legal national mechanisms are still being implemented by that State; a State's national policy is to only register space objects launched after the Convention's entry into force; a launching State is Party to the Convention but the space object is not "claimed" by a launching State;¹¹ and relevant intergovernmental organisations do not meet the criteria for declaring acceptance of the rights and obligations provided for in Article VII of the Convention.

VII. Registration Practices of States of Registry

VII.A. Overview

In general, registration practices of States of registry are uniform in the type of information provided irrespective of whether the information is submitted under the Convention or resolution. All States of registry provide information on their functional space objects while some States with launch capabilities also provide information on non-functional space objects such as launcher upper-stages. Most States provide information on when their space objects cease to exist in orbit in accordance with Article IV, paragraph 3 of the Convention.

Article IV, paragraph 2 of the Convention also allows States Parties to provide additional information on their space objects. The most common additional information provided by States includes the equatorial position of satellites in the Geostationary Satellite Orbit and the website address for a particular satellite mission.

VII.B. Space Debris

Only 23% of objects presently being tracked in Earth orbit are/were functional. The remaining object population comprises of over 2,100 rocket-stages and related objects while a further approximately 11,500 objects are *detritus* from space missions¹² collectively referred to as "space debris". The United States of America's Space Surveillance Network¹³ (the most widely used source of orbital data) identifies "Canada, China/Brazil, Commonwealth of Independent States, ESA, Eumetsat, France, Germany, Globalstar, India, International Space Station, Japan, North Korea, People's Republic of China, Sea Launch Demo, South Korea, UK, & USA" as having space debris.

10 Outer Space Treaty, Article VI.

11 A common misperception by some space nations is that military/national security satellites are not registered by major space nations.

12 An additional 21,000 tracked non-functional objects have re-entered the Earth's atmosphere.

13 www.space-track.org.

Though the Convention makes no reference or distinction between functional and non-functional objects or space debris, Article I states that “[T]he term “space object” includes component parts of a space object as well as its launch vehicle and parts thereof”. Some States of registry presently provide information on certain types of space debris.¹⁴ India and ESA provide registration information on their launcher upper-stages. France and the United States provide information on upper-stages and mission-related debris (both States provided registration on all their non-functional tracked objects but discontinued this practice in 2005). The Russian Federation has not provided information on any of its non-functional space objects and asserted in a 2004 report on its registration practices¹⁵ that “the Russian Federation does not register non-functioning objects launched into outer space such as boosters and upper stages of carrier rockets. Moreover, the non-registration of non-functioning objects was deemed lawful in the report of the Secretary-General of 2 March 1987 on application of the Registration Convention (A/AC.105/382).”¹⁶

VII.C. General Assembly Resolution 62/101 “Recommendations on Enhancing the Practice of States and International Intergovernmental Organizations in Registering Space Objects”

To improve the effectiveness of the United Nations Register of Objects Launched into Outer Space, the General Assembly adopted resolution 62/101 on 17 December 2007. Known as the “registration practices resolution”, it drew upon the best and common registration practices of States when registering space objects. Building upon Article IV, paragraph 2, the resolution made specific recommendations on what types of additional information would be beneficial to Member States and also made recommendations on the use of common designators, units of measure and time frames. Since its adoption, there have been substantial changes to registration practices of States of registry. Presently, a majority of States of registry use Coordinated Universal Time (UTC) as a common time reference

14 Due to a misinterpretation of the role of the Online Index of Objects Launched into Outer Space, there is a belief that the UN does not accept/recognise/enter non-functional objects into the Register. All objects registered by a State of registry are included in the Register. The Online Index is a reference tool that facilitates access to registration information for functional space objects only, hence non-functional objects do not appear.

15 A/AC.105/C.2/L250/Add.2.

16 This curious statement refers to a report prepared by UNOOSA for COPUOS’s Legal Subcommittee review of the Convention ten years after its entry into force. The report notes that one major launching State registered its functional and non-functional objects while other State generally register only functional objects. It should be noted that it is not within the purview of the United Nations to make any assertion as to the “lawfulness” of a State’s registration practices.

and the Committee on Space Research International Designation (known as “COSPAR ID” or “International Designator”) system as an universal means of identifying their space objects. A model registration submission form¹⁷ developed in accordance with the resolution has been adopted for use by 23 States of registry. Other States of registry have retained their own registration templates but have revised their practices accordingly. A notable change is the provision of actual dates of decay/re-entry/deorbit for space objects, which is not specifically required under the Convention.

VII.D. Additional Information Provided by States of Registry

Following the recommendations made in resolution 62/101, many States now provide additional information on their space objects. Recent examples of additional information provided include the notification by the Republic of Korea of the transfer of ownership of Koreasat-2 from the Korea Telecom Corp. (Republic of Korea) to Asia Broadcast Satellite Ltd. (Bermuda);¹⁸ the mission termination and transfer to graveyard orbit of satellites Bonum-1, Express-AM1 and Express-MD1 by the Russian Federation;¹⁹ and the change of orbital position of Inmarsat 4F2 by the United Kingdom.²⁰

VII.E. Provision of Related Information Outside of the “Registration Mechanism”

Due to the complexities of present space activities, there is a growing trend amongst States of registry of providing information on space objects outside the mechanisms of the Convention or resolution 1721B (XVI). The customary mechanism for providing such information is Article XI of the Outer Space Treaty which requires that the Secretary-General “immediately and effectively” disseminate information on space activities conducted by a State Party. States have generally provided information under these arrangements in cases where the State in question is not considered the “State of registry” as defined by the Convention but wishes to convey information on a particular space object to the international community. As an example, the United Kingdom regularly provides information on Inmarsat satellites²¹ that were launched by the intergovernmental organization Inmarsat IGO prior to its satellite operations being privatised as a company incorporated in the United Kingdom. In general, the type and nature of the information (changes in geostationary position, changes in supervision and decommissioning/disposal) provided under the Outer Space Treaty is comparable with that provided under the Convention.

17 <http://www.unoosa.org/oosa/en/spaceobjectregister/resources/index.html>.

18 ST/SG/SER.E/304/Add.1.

19 ST/SG/SER.E/746.

20 ST/SG/SER.E/594/Add.1.

21 Most recently in A/AC.105/1118.

VIII. Role of the United Nations Office for Outer Space Affairs (UNOOSA)

UNOOSA was originally established as a small expert group with the United Nations following the earliest discussions on outer space in the General Assembly. Shortly afterwards, its responsibilities were expanded to serve as the secretariat of COPUOS. UNOOSA's role further evolved with the appointment of the United Nations Expert on Space Applications and the establishment of the Programme on Space Applications, which promotes indigenous space capabilities within developing nations. Its role has continued to evolve and now UNOOSA is also responsible for the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER), serves as the secretariat of the United Nations System's coordination mechanism for outer space activities (UN-Space) and also serves as the Executive Secretariat of the International Committee on Global Navigation Satellite Systems (ICG) as well as the Space Mission Planning Advisory Group (SMPAG): an international group of space agencies concerned with Near-Earth Object threat mitigation. In addition, UNOOSA's Director serves as the Secretary-General's principal adviser on space-related matters.

Following the entry into force of the Convention, the Secretary-General delegated responsibility for the Register's maintenance to UNOOSA, building upon its previous responsibilities and expertise in discharging the Secretary-General's other treaty obligations under international space law. To effectively discharge the aforementioned responsibilities, on a daily basis, UNOOSA monitors orbital data sources and media sources for space object launches, re-entries and on-orbit events such as creation of space debris. UNOOSA also maintains an awareness of the full spectrum of space-related activities, including national space activities, current ballistic missile programmes, advanced space technology concepts, planetary protection and planetary defence.

With regard to its functions related to space object registration and information provided under other treaties, UNOOSA reviews received submissions to ensure the technical validity of information. In cases where there are apparent disparities, UNOOSA establishes a dialogue with the originator to determine if any amendments to the information are required. Similarly, where "duplicate registrations" occur in contravention of article II of the Convention, UNOOSA notifies both States of registry of the issue. Following the completion of the validation process, UNOOSA ensures that the information provided is made publicly available in all official languages of the UN through its website and the Online Index of Objects Launched into Outer Space.²²

22 http://www.unoosa.org/oosa/osoindex/search-ng.jsp?lf_id=

To ensure the integrity and provenance of information provided, UNOOSA only accepts information transmitted through official diplomatic channels (i.e. the diplomatic Permanent Missions accredited to the United Nations) and, on an exceptional basis, a designated entity of an intergovernmental organization such as the Legal Office or the Chief Executive Officer. Registration submissions provided directly by academic/private sector satellite operators are considered invalid and are not included in the Register. In such cases, the Office informs the authors that the submission is invalid and, when available, provides them details for their national registration focal point. The number of such invalid submissions have continued to increase in correlation with the growing number of non-governmental satellite operators. As an example, in 2016, the Office received “invalid” registration submissions for 24 space objects in contrast with 2 in 2006. The Office also provides technical assistance services to States and organizations relating to the effective implementation of their treaty obligations. In 2016, the Office provided technical advisory services on fifteen occasions to public and private entities on registration related issues.

IX. Future Outlook

The last few decades have seen a fundamental shift in space activities. When the first Register was established, no satellites had been placed in the geostationary satellite orbit: an orbit that is now one of the foundations upon which modern civilization exists. Similarly, when the Convention was concluded, governmental satellites far exceeded private sector ones. Today, that paradigm is inverted with constellations of industry satellites offering imagery/communication services and universities launching satellites built by their students.

Though the nature of space activities has rapidly evolved, the legal regime governing space activities has evolved at a more glacial pace. Though States recognise that the evolution of space activities has resulted – and will continue to result – in significant changes, the international community has struggled to fully address them. While States have taken measures to address some of these issue through the adoption of the COPUOS Space Debris Mitigation Guidelines in 2007,²³ the Safety Framework for Nuclear Power Source Applications in Outer Space in 2008²⁴ and General Assembly resolutions on registration practices and national space legislation,²⁵ agreement on other issues remains elusive. However, at its most recent session in June 2016, COPUOS agreed on a first set of guidelines for the

23 ST/SPACE/49.

24 A/AC.105/934.

25 A/RES/68/74.

long-term sustainability of outer space activities and will continue to deliberate on the other guidelines during the upcoming sessions.²⁶

X. UNISPACE+50 and Stronger Notification Procedures

The advent of the fiftieth anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space in 2018 (UNISPACE+50) has been seized by States as an opportunity to consider the current status and chart the future of the contribution of COPUOS to global space governance. In 2016, COPUOS agreed²⁷ to seven thematic priorities of UNISPACE+50, of which one is the “Enhanced information exchange on space objects and events”. The objective of this thematic priority is to define and develop requirements for enhanced information exchange and notification procedures under the legal regime of outer space, including the Register, taking into account the recommendations contained in the report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities (GGE)²⁸ and the future guidelines for the long-term sustainability of outer space activities specifically addressing risk reduction notification needs. To this end, COPUOS agreed that a new agenda item entitled “Enhanced information exchange on space objects and events” should be considered for establishment by its Scientific and Technical Subcommittee in 2017 under a multi-year workplan covering the period 2018-2020. The working group to be established to consider the topic is expected to coordinate its work with COPUOS’s Legal Subcommittee and the Scientific and Technical Subcommittee’s Working Group on the Long-term Sustainability of Outer Space Activities.

Among the initiatives being advocated for enhanced information exchange is the evolution of the Register to better serve the needs of States in ensuring the safety, security and sustainability of outer space activities. Such an evolution could see a fusion between the existing mandate of the Register to identify space objects with the need for a neutral space situation awareness mechanism providing risk reduction notifications under one “system of systems”. Other initiatives suggest further expansions to include satellite prelaunch notifications comparable to those disseminated under the Hague Code of Conduct against Ballistic Missile Proliferation.²⁹ It should be mentioned that in 2016 UNOOSA coordinated a special report of UN-Space in close cooperation with the United Nations Office of Disarmament Affairs

26 A/71/20.

27 *Ibid.*

28 In 2012, the Secretary-General established the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities. The report was released as document A/68/189.

29 www.hcoc.at.

(UNODA) relating to the implementation of the GGE report on transparency and confidence-building measures in outer space activities. The report was officially presented to COPUOS at its fifty-ninth session in 2016.³⁰ Several points were raised in that report on the further management of registration and transparency and confidence-building measures in the context of the safety, security and sustainability of outer space activities.

XI. Summary

For over five decades, UNOOSA has faithfully discharged the responsibilities of the Secretary-General under international space law. The primary responsibility, the UN Register of Objects has evolved from the first transparency and confidence-building measure for outer space activities to a vital mechanism of international space law. As the nature of space activities enters a new era, the necessity for space object registration has become even more important. Discussions in international *fora* such as the Committee on the Peaceful Uses of Outer Space are considering means to enhance the Register to ensure the long-term sustainability of outer space activities. UNOOSA believes that these discussions and the UNISPACE+50 process will not only raise awareness of the requirement for space object registration but also positively impact the existing registration practices of States and IGOs. In parallel to these discussions, UNOOSA will continue to ensure the Secretary-General's responsibilities are met and will work with States and organization in improving the effectiveness of the Register. As it has done in the past, UNOOSA will strive to meet the challenges of the next decade and continue to bring the benefits of outer space to all humanity.

30 A/AC.105/1116.