

Some Considerations on How to Improve the UN Register of Objects Launched into Outer Space in the View of Large Constellations

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Abstract

The UN Register being a realization of the obligation of the UN Secretary-General to maintain that Register (Art. III of the Registration Convention) under information concerning each space object provided by States (Art. IV of the Registration Convention), helps all States and other actors of space activities to receive information about different space objects and its characteristics. Considering challenges from large and mega-constellations, including probability of space debris creation from their potential collisions, it is assumed that it is necessary to think about additional mechanisms, which the UN OOSA can use as a holder of the Register. On the one hand, it is suggested to encourage States to provide information not only under binding documents, but in accordance with soft law documents (like the GA Resolution 62/101), on the other hand, to provide more actual and comprehensive information to the Register.

1. Introduction

Information in the modern world is a very important part of the human-being. Information is used everywhere, and many sources and platforms provide different types of information. Sometimes information is duplicated, sometimes it is unreliable. Space activities in this regard is not an exclusion. From the beginning of international legal regulation of space activities one of the key principles became a principle which enshrined a provision to furnish information about launching objects into orbit or beyond by States to the UN COPUOS via Secretary General.

Information on the space objects began to be recorded in national registers and transferred to the so-called international Register, which is currently maintained by the UN OOSA.

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A fact of the national registration became a legal basis for the jurisdiction and control over space object by a concrete State. This has been linked with responsibility and liability obligations, with concepts of a launching State and a State of Registry.

The UN Register has become the main universal register with such information.

However, if, at the dawn of the space age, any information on objects launched into space was generally sufficient, then, with the development of space technology and space applications and the growing number of participants in space activities, there was an objective need to define specific characteristics that would be recorded in a publicly accessible UN Register for participants in space activities.

It is filled both by data received from States in accordance with their obligations under the outer space treaties and on the basis of additional information provided by states at their own request under recommendations developed by the UN COPUOS, as well as from other sources. The information may be updated at the request of the State of registration.

The last possible detailed recommendations for providing additional information to the UN Registry were set out in the Resolution 62/101 in 2007, after which the issue of Registration was addressed in the Guidelines for the Long-term Sustainability of Outer Space of the UN COPUOS of 2019. When constellations of satellites became a sustainable global trend in space activities, they became a challenge for the global community in terms of ensuring the sustainability of space activities, especially in view of their location in the most used and polluted low-Earth orbit. Consequently, several UN COPUOS documents were prepared on their registration. Those documents reaffirmed the commitment to the existing system for registering space objects in terms of procedure and summarized the existing practices of States. Nevertheless, it must be remembered that precisely information on objects launched into space that is particularly valuable today in the eyes of States and, in general, of all participants in space activities. As is well known, the international registry today is not ideal and to some extent competes with other registries of information maintained at the national level.

Despite many advantages of such national registries, the UN registry has something that national registries do not have – universality and public accessibility, which remains stable no matter what. That is why, in the issue of regulating large constellation of satellites, it is planned to actively use the already existing mechanism – the UN registry and provisions of existing UN documents on outer space.

Taking into account the technical characteristics of satellite constellations and the order of their placement in different types of orbits, it is suggested that the list of information provided by States on such constellations, especially mega-satellite constellations, should be expanded and also made available in the registry of objects maintained by the UN Secretary-General.

This proposal to improve the UN Registry of space objects is discussed and justified in detail in the study presented herein.

2. Main Part

2.1. International Legal Basis of the UN Register of Objects Launched into Outer Space

The first time a call to States to furnish information about launching objects into orbit or beyond has been enshrined in the General Assembly Resolution 1721 B (XVI). This non-binding document has contained a call “to States launching objects into orbit or beyond to furnish information promptly to the COPUOS, through the Secretary-General, for the registration of launchings”, and the request to the Secretary-General “to maintain a public registry” of such kind of the information (para. 1), and to the UN COPUOS in cooperation with the Secretary-General “to provide for the exchange of such information <...> on a voluntary basis” (para. 3 (b)).

Lately, in the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space of 1963 States proclaimed that “the State on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object” (para. 7). A national registry has become a means to the *identification* of objects and component parts found beyond the limits of the State of registry (para. 7, sent. 3). A similar provision concerning national registry has been enshrined in Article VIII of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (hereinafter – the Outer Space Treaty). It states that:

A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object <...>. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish *identifying* data prior to their return.

These documents did not suggest detailed rules concerning the registration process, but they determined national registration as a tool for exchange of the information about launching objects in case of emergency. Registration has been connected with legal terms as ‘jurisdiction’ and ‘control’.

In 1975 the Convention on Registration of Objects Launched into Outer Space (hereinafter – the Registration Convention) has been adopted. According to the Cologne Commentary, the main goals of the Registration Convention are to assist in the identification of space objects and to contribute to the development of international law in the exploration and use of outer

space.¹ Moreover, the Convention formalizes the legal link between an object launched into outer space and the launching State in whose registry the object is registered in order to ensure jurisdiction and control over such an object.² Registration Convention included basic rules on the registration of objects launched into outer space. It linked the Outer Space Treaty of 1967 and the Registration Convention of 1975 in the questions of responsibility. There is a reference rule enshrined in the preamble: “States shall bear international responsibility for their national activities in outer space and *refers to the State on whose registry* an object launched into outer space is carried.”

Also, in the preamble it was said that there was a desire further *to establish and to maintain* “a central register of objects launched into outer space on a mandatory basis by the Secretary-General” (sent. 6), as well as to “provide for States Parties additional means and procedures to assist in the identification of space objects” (sent. 7). Finally, the preamble proclaimed a *believe* that:

A mandatory system of registering objects launched into outer space would, in particular, assist in their identification and would contribute to the application and development of international law governing the exploration and use of outer space.

For the first since the adoption of the General Assembly Resolution 1721 B (XVI), the Registration Convention proclaimed an intention to create a central register of objects launched into outer space. Neither the Declaration of 1963, nor the Outer Space Treaty of 1967 did not contain similar intentions. Although the United Nations has being started the series of the documents with the index “A/AC.105/INF.-...” since 1961 (after adoption of the General Assembly Resolution 1721 B (XVI)).³ The new series of the documents has been started since April 14, 1977, after the entering into force the Registration Convention – “ST/SG/SER/E/-...”⁴

In the Registration Convention there were adopted important provisions relating to the informing the Secretary-General about the establishment of the national register of space objects (Art. II para. 1), as well as the obligation of

1 B. Schmidt-Tedd, Preamble, in: S. Hobe, B. Schmidt-Tedd, K-U Schrogl (Eds.), Cologne Commentary on Space Law Volume II, BWV Berliner Wissenschafts-Verlag, Berlin, 2013, para. 18.

2 B. Schmidt-Tedd, Preamble, in: S. Hobe, B. Schmidt-Tedd, K-U Schrogl (Eds.), Cologne Commentary on Space Law Volume II, BWV Berliner Wissenschafts-Verlag, Berlin, 2013, para. 18.

3 B. Schmidt-Tedd, Article III, in: S. Hobe, B. Schmidt-Tedd, K-U Schrogl (Eds.), Cologne Commentary on Space Law Volume II, BWV Berliner Wissenschafts-Verlag, 2013, para. 211.

4 Ibid.

the Secretary-General to maintain an opened access Register (Art. III), and the obligation of States to furnish to the Secretary-General the concrete information (Art. IV (1)). Information shall include minimum requirements about each space objects but is not limited by it (Art. IV). State of registry may provide additional information from time to time (Art. IV para. 2). Concrete time limits have not been determined.

2.1.1. Who Is Responsible for the Register?

An obligation to maintain so called ‘*an international*’ Register has been imposed on the Secretary General. However, the UN OOSA fulfills this function during the long period of time.

The history of the UN OOSA dates to 1958, when a small group of experts was established within the UN Secretariat based in New York to provide secretarial services to the newly established *ad hoc* UN COPUOS. In 1962, UN OOSA became part of the Department of Political and Security Council Affairs, and in 1968 it was reorganized into the Division for Outer Space Affairs of the same Department. In 30 years the Division was reorganized into the Office for Outer Space Affairs, but within the Department of Political Affairs. In 1993, the Office was transferred to the United Nations Office at Vienna and took over the secretariat of the Legal Subcommittee of the UN COPUOS, which had previously been carried out by the Office of Legal Affairs in New York. Today, UN OOSA fully performs the functions of the Secretariat of the UN COPUOS, maintains a Register of objects launched into outer space, and is responsible for the implementation of various programs, seminars, conferences, etc.⁵

2.1.2. Information Contained in the Register

The UN OOSA collects and maintains a Register on the basis of the information furnished by States of registry in accordance with Art. IV. Article IV enshrines that States of registry should provide the following information as soon as practicable (para. 1):

- (a) Name of launching State or States;
- (b) An appropriate designator of the space object or its registration number;
- (c) Date and territory or location of launch;
- (d) Basic orbital parameters, including:
 - (i) Nodal period;
 - (ii) Inclination;

5 The COPUOS Briefing Book. Ed. by Ch.D. Johnson. Secure World Foundation, 2023. P. 46 – 54; Official website of the UN OOSA, <https://www.unoosa.org/oosa/en/ourwork/index.html> (accessed 10.08.23).

- (iii) Apogee;
- (iv) Perigee;
- (e) General function of the space object.

General function of the space object may differ, for instance: lunar exploration, test satellite, remote sensing satellite, crewed spacecraft, VDES technology verification and testing, and ship Automatic Identification System (AIS) signals detection, academic research, earth remote sensing, scientific applications, Technological applications, spacecraft engaged in practical applications and uses of space technology such as weather or communications, the dual-use space object is intended to perform tasks on behalf of the Ministry of Defence of the Russian Federation and to support the socioeconomic development of the Russian Federation, delivery to the International Space Station of fuel, water, oxygen, air, food, scientific equipment and other consumable materials required for the crew, scientific experiments and operation of the Station, etc.

Para. 2 of Art. IV contains a provision, which suggests States of registry to provide additional information about a space object: “Each State of registry may, from time to time, provide the Secretary-General of the United Nations with additional information concerning a space object carried on its registry”. Prof. B. Schmidt-Tedd in the Cologne Commentary notes that this provision is *a state practice* but not an obligation.⁶ Possible types of the information have been detailed in the Resolution 62/101 of 17 December 2007 “Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects.” It is suggested to divide these additional types of the information into three groups (as they are in the Resolution):

- 1) information for ensuring the uniformity;
- 2) additional appropriate information;
- 3) information with contact details of focal points.

Para. 3 of Art. IV contains an obligation for “each State of registry to notify the Secretary-General of the United Nations, *to the greatest extent feasible and as soon as practicable*, of space objects concerning which it has previously transmitted information, and which have been but no longer are *in Earth orbit*”. It is worth noting that additional requirements concerning types of the information are contained in the non-binding documents dedicated to the applied space activities.

The Principles Relating to Remote Sensing of the Earth from Outer Space of 1986 state that “a State carrying out *a programme of remote sensing* shall

⁶ B. Schmidt-Tedd, Article IV, in: S. Hobe, B. Schmidt-Tedd, K-U Schrogl (Eds.), Cologne Commentary on Space Law Volume II, BWV Berliner Wissenschafts-Verlag, 2013, para. 219.

inform the Secretary-General of the United Nation” in accordance with Art. IV of the Registration Convention of 1975 and Art. XI of the Outer Space Treaty of 1967 (Principle IX).

The Principles Relevant to the Use of Nuclear Power Sources in Outer Space of 1992 state to conduct safety assessment and made it publicly available prior to each launch (Principle IV) or to notify about a space object which is malfunctioning, with a risk of re-entry of radioactive materials to the Earth (Principle V).⁷

Moreover, the UN OOSA has gone further in the performance of its functions to provide comprehensive information about space objects launched into outer space since 1957. It additionally collects information from the Committee on Space Research (COSPAR), official sources, and mass media, etc.⁸

To distinguish different sources of information the UN OOSA uses black and green colors. “Names, international designators and other information that have not been provided under the Registration Convention and/or the Resolution 1721B (XVI) are contained within square brackets ([]) and are highlighted in green”⁹ (see Fig. 1, Fig. 2). Thus, the Online Register of Objects Launched into Outer Space consists of the register of space objects under the Registration Convention, the Resolution 1721 B (XVI), and other information.

International Designator	National Designator	Name of Space Object	State/Organization	Date of Launch	GSO Location	UN Registered	Registration Document	Other Documents	Status	Date of Decay or Change	Function of Space Object	Secretary's Remarks	External website
[2023-144A]	[STARLINK (USA) 30432]			[2023-09-16]		No			[in-act]			[Not registered with the United Nations. Date of launch is 2022-09-16 using UTC]	
[2023-144B]	[STARLINK (USA) 30477]			[2023-09-16]		No			[in-act]			[Not registered with the United Nations. Date of launch is 2023-09-16 using UTC]	

Fig. 1. Information which has not been provided under the Registration Convention and/or resolution 1721 B (XVI) in square brackets

- 7 B. Schmidt-Tedd, Article IV, in: S. Hobe, B. Schmidt-Tedd, K-U Schrogl (Eds.), Cologne Commentary on Space Law Volume II, BWV Berliner Wissenschafts-Verlag, 2013, para. 217.
- 8 B. Schmidt-Tedd, Article III, in: S. Hobe, B. Schmidt-Tedd, K-U Schrogl (Eds.), Cologne Commentary on Space Law Volume II, BWV Berliner Wissenschafts-Verlag, 2013, para. 212.
- 9 Outer Space Objects Index, https://www.unoosa.org/oosa/osoindex/index.jsp?lf_id= (accessed 10.08.2023)

PROCEEDINGS OF THE INTERNATIONAL INSTITUTE OF SPACE LAW 2023

International Designator	National Designator	Name of Space Object	State/Organization	Date of Launch	GSO Location	UN Registered	Registration Document	Other Documents	Date of Decay or Change	Function of Space Object	Secretariat's Remarks	External website
2023-090AV		Starlink-5150	USA	2023-06-23		Yes	ST/SG/SER/E/1145		in orbit	Spacecraft engaged in practical applications and uses of space technology such as weather or communications	The registration submission for this space object is presently being processed by the United Nations Secretariat	
2023-090AK		Starlink-5791	USA	2023-06-21		Yes	ST/SG/SER/E/1145		in orbit	Spacecraft engaged in practical applications and uses of space technology such as weather or communications	The registration submission for this space object is presently being processed by the United Nations Secretariat	
2023-090AJ		Starlink-6143	USA	2023-06-23		Yes	ST/SG/SER/E/1145		in orbit	Spacecraft engaged in practical applications and uses of space technology such as	The registration submission for this space object is presently being processed by the United Nations Secretariat	

Figure 2. Information which has been provided under the Registration Convention and/or resolution 1721 B (XVI). Black color.

Therefore, the Online Register of Objects Launched into Outer Space contains the following types of information: international designator, national designator, name of space object, state/organization, date of launch, GSO location, UN registered (yes/no), registration document, other documents, status (in orbit, on Moon, deorbited, etc.), date of decay or change, function of space object, secretariat's remarks, external website (see Fig. 3).

Online Index of Objects Launched into Outer Space

Important Note: Information in square brackets [] and highlighted in green has been obtained from other sources and has not been communicated officially to the United Nations. Reference to external websites does not imply endorsement by the United Nations Office for Outer Space Affairs (UNOOSA) of their contents. The views expressed are those of the authors and do not necessarily reflect the policies or views of UNOOSA. The hyperlinks are provided solely for informational purposes.

Search Object

found 16659 Objects

[FILTER BY ...](#)

[Clear All Criteria](#)

International Designator
National Designator
Name of Space Object
State/Organization
Date of Launch
GSO Location
UN Registered
Registration Document
Other Documents
Date of Decay or Change
Function of Space Object
Secretariat's Remarks
External website

Figure 3. Types of Information

Online Index of Objects Launched into Outer Space can be filtered by state/organization, UN registered (yes/no), status, in orbit (yes/no), launch facility, launch year, duplicate registration (yes, if it is) (see Fig. 4).

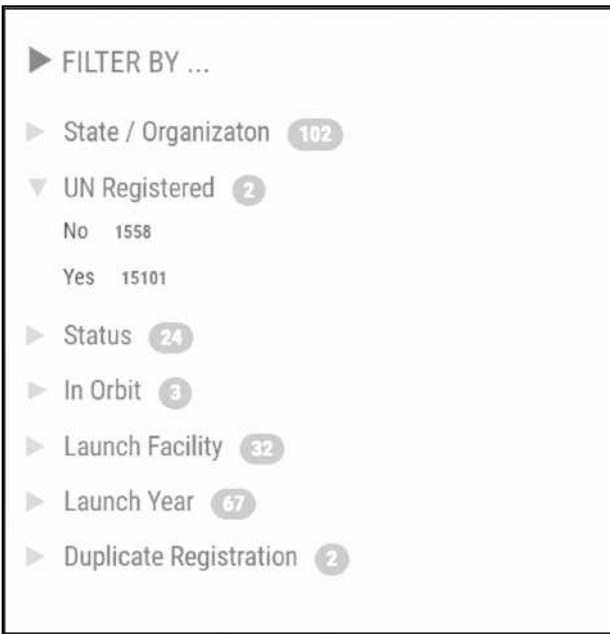


Figure 4 Filter for the information

2.1.3. **Lacunae of the Register**

The Register contains as much actual information as States furnish it to the Register under the Registration Convention of 1975 and the General Assembly Resolution 1721 B (XVI), and as the UN OOSA collected from the other sources.

At the same time there are some *lacunae* the elimination of which would improve the relevance of the information and to ensure sustainability of space activities.

Firstly, in the Registration Convention there are no concrete time limits when States should furnish the information to the Secretary-General. During the drafting of the Convention States suggested different variants about notification, for instance before or at the same as launch. Finally, the following phrase has been adopted: “as soon as practicable.”¹⁰

Secondly, information on the possible characteristics of a space object and its launch are of an open, non-exhaustive nature. Some States provide additional information considering the recommendations, some do not.

10 B. Schmidt-Tedd, Article IV, in: S. Hobe, B. Schmidt-Tedd, K-U Schrogl (Eds.), Cologne Commentary on Space Law Volume II, BWV Berliner Wissenschafts-Verlag, 2013, para. 214.

Thirdly, as it said on the official website of the UN OOSA, “space debris and other non-functional objects are presently not included” in the Register.

From the State of registry view fact of the registration deals with a launching State and helps to determine a liable (Art. VII of the Outer Space Treaty) or a responsible (Art. VI of the Outer Space Treaty) State for a damage. In that case a State should be a State Party to the Registration Convention. 77 States are State Parties to the Registration Convention on September 1, 2023;¹¹ Paraguay and Romania became last States which accessed to the Convention at the beginning of 2023.¹²

Therefore, it is important that the Guidelines for the Long-term Sustainability of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space of 2019 has highlighted the necessity to enhance the practice of registering space objects (Guideline A.5). It is underline that “a proper registration of space objects is a key factor in the safety and the long-term sustainability of space activities” (para. 1). Prof. S. Hobe mentions that “registration plays a role also for maintaining a safe orbital traffic. The more information is available on the location, size, function and lifetime of a space object, the higher are the possibilities to plan mission in its vicinity or to avoid possible accidents and collisions.”¹³

2.2. Challenges of Large Constellations

As it was analysed in the previous part, registration help to ensure sustainability of outer space activities, as the information provided to the UN Register helps to analyse and predict possible situations and collisions.

Last several years deployment of the large or mega-constellations of satellites became very popular. Nowadays the biggest mega-constellations of satellites are Starlink (SpaceX) and OneWeb (OneWeb).

Large constellation of satellites is a constellation that is composed of several hundreds and thousands of satellites orbiting the Earth.¹⁴

The advantage of a constellation of satellites is the ability to simultaneously conduct different types of space activities and provide full global or local coverage of the Earth’s territory.¹⁵

Low-Earth orbit constellation according to the practice are more prospecting than other types of the constellations. Lower altitude constellations may be

11 Status of International Agreements relating to Activities in Outer Space, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html>.

12 UN Doc. C.N.44.2023.TREATIES-XXIV.1 (Depositary Notification); UN Doc. C.N.18.2023.TREATIES-XXIV.1 (Depositary Notification).

13 S. Hobe, *Space Law, Nomos*, Baden-Baden, 2019. P. 86.

14 Arthur K. Lacombe, *Mega-Constellations: Technical Aspects*, in: A.N. Pecujlic, M. Tugnoli (Eds.), *Promoting Productive Cooperation Between Space Lawyers and Engineers*, IGI Global, Hershey PA, 2019, pp. 114-140.

15 A. Abashidze, I. Chernykh, M. Mednikova, *Satellite Constellations: International Legal and Technical Aspects*, *Acta Astronautica* 196 (2022) 176-185.

able to significantly reduce the propagation latency between earth stations links (taking into account that it depends on internal data processing delays or inter-satellite links).¹⁶

While there are many advantages of the mega-constellations of satellites, there are just as many problems: 1) a negative impact on astronomical research and a problem of so-called ‘noctalgia’¹⁷ and dark and quiet skies for science and society; 2) increased pressure on low-earth space that lead to the potential collisions 3) a high risk of collisions during the deployment phase of a satellite constellation; 4) necessity of an effective management of satellites included in constellations, considering potential harmful interference to radio communications used in certain radio frequency bands and associated orbits increases.

Considering that number of satellite constellations is increasing, a legitimate question arises about its registration.

In 2022 the UN COPUOS in the framework of the agenda item “Status and application of the five United Nations treaties on outer space” 2 documents have been published: “Registration of large constellations and megaconstellations” (A/AC.105/C.2/L.322) and Discussion paper by the Chair of the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space on the topic of registration of large constellations and megaconstellations (A/AC.105/C.2/2022/CRP.20).

After analysis of these document there should be singled out several important provisions:

- the problem of the lack of information in the registry is related to different State practice on the national regulation of space activities, because the information transmitting to the Secretary-General in accordance with Art. IV of the Registration Convention is from the national registry established pursuant to Art. II, para 1 (para 17 of A/AC.105/C.2/L.322);
- the new form prepared under the Resolution 62/101 of 17 December 2007 “Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects” by the UN OOSA “allows States to voluntarily provide other information, including the identity of the space object’s owner and operator” (para 19 of A/AC.105/C.2/L.322);

¹⁶ Ibid.

¹⁷ Note: *night grief*. See: P. Sutter, The loss of dark skies is so painful, astronomers coined a new term for it. 18 September 2023, https://www.space.com/light-pollution-loss-dark-skies-noctalgia?utm_term=6D6AF856-6544-4635-8181-BB010A74AD6B&utm_campaign=58E4DE65-C57F-4CD3-9A5A-609994E2C5A9&utm_medium=email&utm_content=89FAD488-1DAD-40B4-ABC9-DA934F0254C4&utm_source=SmartBrief (accessed 18.09.2023).

- “States of registry often do not indicate that an object is part of a large constellation or megaconstellation” (para. 23 of A/AC.105/C.2/L.322);
- “There is no discernible difference between the registration practices of States for single -satellite missions and those for constellations with fewer than 1,000 satellites” (para. 28 of A/AC.105/C.2/L.322);
- different state practice concerning large and mega-constellations;
- a minor delay in the information submission (days or weeks) due to “issues in matching a tracked object with a particular satellite when multiple satellites are launched together and while international designations are assigned to satellites” (para 36 of A/AC.105/C.2/L.322);
- registration system should not be changed but at the same time in the registration practice there may be possible adjustments (para. 7 of A/AC.105/C.2/2022/CRP.20).
- it is suggested to use the first registration of a space object (satellite) of a constellation as the focal point, the following-up registrations could refer to the first basic information. For these purposes it is suggested to use Part D of the UNOOSA registration template (Additional voluntary information) (para. 9 of A/AC.105/C.2/2022/CRP.20).

2.3. Principle of Information Sharing

Additional information as a tool for the improvement of the Register could be provided not only under provisions of the Registration Convention or under soft law document. The Outer Space Treaty contains a provision which does not connect with a launching State and so with the State of registry.

Art. XI of the Outer Space Treaty enshrines:

In order to promote international cooperation in the peaceful exploration and use of outer space, States Parties to the Treaty conducting activities in outer space, including the Moon and other celestial bodies, agree to inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such activities. On receiving the said information, the Secretary-General of the United Nations should be prepared to disseminate it immediately and effectively.

The previous documents dedicated to the registration process, or the content of the Registry were related to information. Information is a tool for ensuring sustainability of outer space activity. Nathan Mayer Rothschild said in the 19th century: “Whoever has the information controls the world.”

Art. XI of the Outer Space Treaty combines cooperation and information. Authors of the commentary to Art. XI of the Cologne Commentary wrote:

The rational regulation of transnational space activities, taking into account the principles of space law, namely the principles of international responsibility for national space activities (Art. VI), liability for damage (Art. VII) and registration of space objects (Art. VIII), requires not only the harmonization of national legislation or regulations, but above all the exchange of information in the spirit of Art. XI of the Outer Space Treaty.¹⁸

This Article highlights the role of the Secretary-General and the main role of the United Nations in general in openness and information accessibility. For instance, this Article is used by the UN OOSA to provide any types of information on its official website and to collect information from different sources for its Register.

Moreover, a phrase “of the nature, conduct, locations and results of such activities” cover different types of information: it could be technical information, plans of launches, orbital slots, etc.

Art. XI is disclosed in subsequent documents, such as the Registration Convention and before mentioned non-binding documents. It is interesting that the Registration Convention is considered to be *lex specialis* to Art. XI.¹⁹ Furthermore, Art. XI may be recognized as a legal basis for the provision of information under the Resolution 62/101 of 17 December 2007.

Art. XI contains broad wording without mentioning State of registry. It solves numerous of matters leading from concept of a State of registry and fill the gap concerning those situations when it is impossible to determine responsible State within provisions of Art. VIII and the Registration Convention or when there is a transfer of the ownership (see: ST/SG/SER.E/417/Rev.1, case of the Great Britain and Northern Ireland with Inmarsat Ltd. satellites).

Moreover, there are still few States Parties to the Registration Convention in comparison with the Outer Space Treaty (112 v. 77).

2.4. Case Study of the Information Sharing in the view of the Large Constellation

The lack of the information about space objects in outer space, unfortunately, leads to the dangerous situations. As it was stated UN Doc. A/AC.105/C.1/L.409/Add.4 “Information and views for consideration by the

18 J.-F. Mayens, T. Reuter, Article XI, in: S. Hobe, B. Schmidt-Tedd, K-U Schrogl (Eds.), Cologne Commentary on Space Law Volume I, BWV Berliner Wissenschafts-Verlag, 2009, para. 10.

19 Ibid. Para. 55.

Working Group on the Long-term Sustainability of Outer Space Activities”, “there are challenges brought by low-orbit satellite mega-constellations, such as the surge of close-encounter events and its impact on subsequent spacecraft launches as well as astronomical observations” (p. 4).

The most famous cases of close-encounter events are the Case of potential collision between ESA satellite and Starlink satellite, and close-encounter event between Starlink satellites and China Space Station.

In September 2019, the satellite of the European Space Agency could collide with the Starlink 44 satellite of the Starlink mega-constellation. The situation occurred due to planned de-orbiting of two Starlink satellites as a test of the spacecraft’s propulsion system. ESA conducted a maneuver to avoid a potential rendezvous. Hopefully, satellites did not collide.

During 2021 some Starlink satellites could collide twice with the Chinese space station (CSS). In both cases, the CSS for safety reasons took the initiative to conduct an evasive manoeuvre in the evening of that day to avoid a potential collision between the two spacecrafts. In the 3rd part concerning information-sharing for human spaceflight safety of the Note verbale USA stated that

Detailed consultations on measures to reduce the risk of collision between United States space objects and the human spaceflight activities of other nations should be conducted directly, through bilateral channels, to facilitate efficient and timely sharing of information and coordination of potentially urgent responses.²⁰

This idea is based on the bilateral cooperation by using the USA resource on the website www.space-track.org of the Government of the United States. USA said that it is required

To provide updated contact information on designated entities authorized to engage in timely exchanges of appropriate information on on-orbit human spacecraft operations, in particular those entities that are responsible for adopting precautionary and response measures for crewed missions.

This resource is a good example of sharing the information and could be used for the upgrade of the UN Register.

20 UN Doc. A/AC.105/1265 “Note verbale dated 28 January 2022 from the Permanent Mission of the United States of America to the United Nations (Vienna) addressed to the Secretary-General.”

3. Conclusions

In the age of the internet technologies and transparency, there is an increasing risk of duplication of information, on the one hand, and fragmentation of information, on the other hand. As it was shown in the cases, States are creating their own information systems to ensure the sustainability of space activities for safe manoeuvres, space debris mitigation, etc. Due to the growth of space assets transactions, the number of States that do not fall under the legal concept of a 'State of registry' as a launching State is increasing. However, such States will continue to have an obligation of responsibility for national activities under Art. VI. For these States Art. XI could become a legal bases for the information sharing with the UN OOSA as a holder of the Register.

The best variant of the improvement of the Register is to accession of States to the Registration Convention. Such States Parties should provide as much as possible information both under Art. IV of the Registration Convention and soft law documents (GA Resolution 62/101, the Guidelines for the Long-term Sustainability, etc.). The Register should contain actual and comprehensive information, for these purposes States should remember to update information as soon as possible.

Guideline A.5 Enhance the practice of registering space objects, para 5 is of great importance in that context while the UN OOSA accumulates information:

States and international intergovernmental organizations should support efforts by the Office to promote initiatives that would enable States to adhere to registration practices and consider implementing and sustaining the provision of registration information in furtherance of General Assembly resolution 62/101.

In support of keeping the system of registration of space objects it is suggested to use Art. XI for those States which are not States of registry.

A problem of the registration of mega-constellation is not the cornerstone now. However, for the comprehensiveness of the Outer Space Objects Index it is suggested to add a new column titled 'constellation'. For instance, Starlink satellites these days are shown in the Register one by one. Also, it is necessary to add above right a new filter titled a satellite constellation where it will be possible to find out different satellite constellations. Therefore, combination of new filters helps to recognize all satellites within one large or mega-constellation (Appendix A).

Additionally, to discuss the problems of mega-constellations all-encompassingly a new agenda item of the Legal Subcommittee of the COPUOS, tentatively titled "International legal aspects of the use of satellite constellations" can be adopted. Despite parts of satellite constellations are

space objects, large and mega-constellations is a new type of space activities, which is required to be thoroughly analyzed and the regulated.

4. Acknowledgements

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5. Appendix A (Improvements to the Register)

The screenshot shows the 'Online Index of Objects Launched into Outer Space' interface. It includes a search bar, a filter menu on the right, and a table of objects. Two callout boxes with arrows point to specific parts of the interface:

- Left Callout:** "To add a new column titled 'constellation' in the upper line" points to the header area of the table.
- Right Callout:** "Add a new filter titled 'constellation' where there will be different examples of constellation (such as, Starlink, OneWeb, GLONASS, etc.)" points to the 'FILTER BY ...' menu.

International Designator	National Designator	Name of Space Object	State/Organization	Date of Launch	GSO Location	UN Registered	Registration Document	Other Documents	Status	Date of Decay or Change
[2023-144A]	[STARLINK 30433]	[STARLINK 30433]	[USA]	[2023-09-15]		No			[in orbit]	registered with the United Nations. Date of launch is 2023-09-15 using UTC.
[2023-144B]	[STARLINK 30427]	[STARLINK 30427]	[USA]	[2023-09-15]		No			[in orbit]	Not registered with the United Nations. Date of launch is