

SPACE ARBITRATION AND HARMFUL INTERFERENCE DISPUTES

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ABSTRACT

The current and further predicted increase of objects launched into outer space brings with it endless opportunities but also growing risks. Among those risks is an increase in harmful interference with radio frequencies. Harmful interference can interrupt the functioning of satellite systems thereby causing significant financial losses to satellite operators and potentially causing more acute danger if the interrupted satellite transmissions have safety or security implications. International space law and especially the International Telecommunications Union provide substantive rules intended to prevent and resolve harmful interference. However, as with international space law in general, these rules, while substantive in nature, lack an efficient and binding dispute settlement mechanism available to private parties. To the extent that the prevention of harmful interference is often agreed in contractual instruments negotiated by different satellite operators, this article argues that the parties to these so-called coordination agreements should consider agreeing to refer any future disputes relating to their agreements to international arbitration thus ensuring the availability of an efficient dispute settlement mechanism for any harmful interference disputes they might face in relation to these agreements.

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I. DEFINING HARMFUL INTERFERENCE

The term “harmful interference” refers to interference with radio communication waves. The International Telecommunication Union (ITU) defines the term in Article 1(169) of its 2020 Radio Regulations and in the Annex to its Constitution as “interference which endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radio communication service operating in accordance with Radio Regulations.”¹

Harmful interference can have a substantial financial impact on satellite operators. Any degradation of the quality of the signal to or from a satellite at best diminishes its efficiency and at worst renders it useless.² As a consequence, harmful interference causes the degradation of available satellite capacity and prevents the satellite operator from being able to commercialize its full capacity. In turn, a satellite operator might no longer be able to serve as many customers as planned or might be in violation of existing contracts by not being able to guarantee the contractually agreed satellite capacity.³ In the worst case, harmful interference can render satellite services entirely useless.⁴

There are acknowledged to be two types of harmful interference: unintentional and intentional. Intentional harmful interference refers to the deliberate jamming of radio communications, for example to prevent certain information from reaching the public.⁵ Unintentional harmful interference can be caused by inadvertent errors in the operation of communication equipment, for example of

¹ Int’l Telecomm. Union Radio Regulations Articles (2020), <https://www.itu.int/hub/publication/r-reg-rr-2020/> [hereinafter Radio Regulations].

² FRANCIS LYALL & PAUL B. LARSEN, *SPACE LAW – A TREATISE* 189 (2nd ed. 2018).

³ Johan G. Kroon, *Harmful Interference from the Netherlands Radiocommunication Agency Perspective*, in *HARMFUL FREQUENCY INTERFERENCE IN REGULATORY PERSPECTIVE – LEGAL RULES FOR INTERFERENCE-FREE RADIO COMMUNICATION – 3RD LUXEMBOURG WORKSHOP ON SPACE AND SATELLITE COMMUNICATION LAW* 163, 164 (Mahulena Hofmann ed., 2015).

⁴ Francis Lyall, *The Role of Consensus in the ITU*, in *DISPUTE SETTLEMENT IN THE AREA OF SPACE COMMUNICATION – 2ND LUXEMBOURG WORKSHOP ON SPACE AND SATELLITE COMMUNICATION LAW* 33 (Mahulena Hofmann ed., 2015).

⁵ Lesley Jane Smith, *Contractual Responses to Loss of Satellite Based Services*, in *HARMFUL INTERFERENCE IN REGULATORY PERSPECTIVE – LEGAL RULES FOR INTERFERENCE-FREE RADIO COMMUNICATION – 3RD LUXEMBOURG WORKSHOP ON SPACE AND SATELLITE COMMUNICATION LAW* 65, 72-73 (Mahulena Hofmann ed., 2015).

Earth station antennas that are not correctly aligned.⁶ It can also be caused by poor quality equipment, for example when old equipment no longer complies with current satellite communication standards.⁷

In addition to physical collisions, the recent increase in satellites being launched into outer space, and the corresponding congestion of the lower orbits, also increases the risk of unintentional harmful interference.⁸ All active satellites use the radio communication frequency spectrum to transmit and receive operation signals.⁹ As a consequence, together with the increase of active satellites, the demand for radio spectrum is growing and harmful interference issues are increasingly becoming a problem.¹⁰ In the words of Jennifer Manner:

In near space, we are seeing a significant increase in low-Earth orbit and above satellite systems and space vehicles. For example, Elon Musk's SpaceX System will have upwards of 28,000 satellites. [...] With tens of thousands of satellites deployed in a single network talking to and from Earth and with other [non-geostationary orbit] and [geostationary orbit] satellites through vast networks of intersatellite links, the interference environment on the ground and in space is going to change. The possibility for aggregate interference in space and on the ground will increase. Compounding this is the real likelihood of increased use of the spectrum for communications for space tourism and sensing in low-Earth orbit, and for mining, living, and exploration beyond. [In deep space, we must consider planetary communications.] As more countries race for the moon,

⁶ Mitsuhiro Sakamoto, *ITU and Harmful Interference Prevention*, in HARMFUL INTERFERENCE IN REGULATORY PERSPECTIVE – LEGAL RULES FOR INTERFERENCE-FREE RADIO COMMUNICATION – 3RD LUXEMBOURG WORKSHOP ON SPACE AND SATELLITE COMMUNICATION LAW 31, 32-33 (Mahulena Hofmann ed., 2015).

⁷ Kroon, *supra* note 3, at 164-165.

⁸ See Laura Yvonne Zielinski, *The Rise of Satellite Arbitrations*, in THE GUIDE TO TELECOMS ARBITRATIONS 98, 103-104 (Wesley Pydiamah ed., 2022).

⁹ LYALL & LARSEN, *supra* note 2, at 189.

¹⁰ Tanja Masson-Zwaan, *Orbits and Frequencies: The Legal Context*, DISPUTE SETTLEMENT IN THE AREA OF SPACE COMMUNICATION – 2ND LUXEMBOURG WORKSHOP ON SPACE AND SATELLITE COMMUNICATION LAW 59 (Mahulena Hofmann, ed., 2015); Kroon, *supra* note 3, at 165.

Mars and beyond, that means increased spectrum use, with increased potential for harmful interference.¹¹

Confirming these bleak scenarios, after receiving 329 reports of harmful interference or infringements of the Radio Regulations in 2021, the ITU issued, in August 2022, a warning to its Member States regarding interference with radio waves-based satellite navigation services.¹² At the World Radio Conference in 2023, the ITU Radiocommunications Bureau “will inform the delegates of the severity of the situation and report on progress to date in addressing and mitigating harmful interference.”¹³

II. THE APPLICABLE LEGAL FRAMEWORK

A. *The International Telecommunications Union*

As mentioned above, almost all satellites launched into space use the radio communication frequency spectrum to transmit and receive operation signals. The radio communication frequency spectrum is, however, a scarce natural resource.¹⁴ In order to ensure its efficient use, it needs to be managed.

The global organization responsible for this management of the radio frequency spectrum and the associated satellite orbits is the ITU.¹⁵ The organization was founded in 1865 and has 193 Member States as of today.¹⁶ The ITU’s activities are defined and governed by the ITU Constitution,¹⁷ the ITU Convention,¹⁸ the Radio

¹¹ JENNIFER A. MANNER, SPECTRUM WARS: THE RISE OF 5G AND BEYOND 137 (2022).

¹² *ITU Issues Warning on Interference with Radio Navigation Satellite Service*, ITU NEWS (Aug. 23, 2022), <https://www.itu.int/hub/2022/08/warning-harmful-interference-rnss/>. See also *Managing Radio Frequency Spectrum Amid a New Space Race*, ITU NEWS (Nov. 12, 2021), <https://www.itu.int/hub/2021/11/managing-radio-frequency-spectrum-amid-a-new-space-race/>.

¹³ *Id.*

¹⁴ RAM S. JAKHU & PAUL STEPHEN DEMPSEY, EDS., ROUTLEDGE HANDBOOK OF SPACE LAW 111 (2017).

¹⁵ *Id.*

¹⁶ A list of current members can be found here: https://www.itu.int/en/ITU-R/terrestrial/fmd/Pages/administrations_members.aspx (last visited May 15, 2023).

¹⁷ Constitution of the Int’l Telecomm. Union [ITU], *available at* https://www.itu.int/dms_pub/itu-s/opb/conf/S-CONF-PLN-2022-PDF-E.pdf [hereinafter ITU Constitution].

¹⁸ Convention of the Int’l Telecomm. Union [ITU], *available at*

Regulations¹⁹ and the International Telecommunications Regulations (together the Administrative Regulations).²⁰ The legal framework also includes an Optional Protocol for dispute resolution concerning the interpretation or application of the Constitution, the Convention, the Radio Regulations and the International Telecommunications Regulations.²¹

According to Article 1 of the ITU Constitution, the purposes of the ITU are *inter alia* to maintain and extend international cooperation for the improvement and rational use of telecommunications, to promote and offer technical assistance to developing countries, and to improve the efficiency of telecommunication services.²² To this end, the ITU: allocates bands of the radio frequency spectrum; allots radio frequencies; and registers radio-frequency assignments and, for space services, any associated orbital position in the geostationary satellite orbit or any relevant characteristics of satellites in other orbits, all in order to avoid harmful interference.²³ According to Article 1(b) of the ITU Constitution, the ITU shall “coordinate efforts to eliminate harmful interference between radio stations of different countries.”²⁴

The allocation of frequency bands is recorded in an international table called the International Table of Frequency Allocations.²⁵ It can only be amended during the World Radiocommunication Conferences (WRCs) during which the ITU Radiocommunication Sector, the ITU’s organ responsible for the management of the radio spectrum, meets in plenary and adopts the Radio

https://www.itu.int/dms_pub/itu-s/opb/conf/S-CONF-PLEN-2022-PDF-E.pdf [hereinafter ITU Convention].

¹⁹ Radio Regulations, *supra* note 1.

²⁰ International Telecommunications Regulations [ITRs], *available at* <https://www.itu.int/en/wcit-12/Pages/itrs.aspx>. See TANJA MASSON ZWAAN AND MAHULENA HOFMANN, INTRODUCTION TO SPACE LAW ¶ 10.04. (4th ed. 2019).

²¹ Srinivasan Venkatasubramanian, *ITU and its Dispute Settlement Mechanism*, in DISPUTE SETTLEMENT IN THE AREA OF SPACE COMMUNICATION – 2ND LUXEMBOURG WORKSHOP ON SPACE AND SATELLITE COMMUNICATION LAW 23, 29 (Mahulena Hofmann ed., 2015); the Optional Additional Protocol to the International Telecommunication Convention, *available at* <https://search.itu.int/history/HistoryDigitalCollectionDocLibrary/4.10.43.en.101.pdf>.

²² ITU Constitution, *supra* note 18, art. 1.

²³ *Id.* at art. 1(2).

²⁴ *Id.*

²⁵ Radio Regulations, *supra* note 1, art. 5.

Regulations.²⁶ The WRCs take place every three to four years.²⁷ Between the WRCs, study groups meet to work on technical studies to prepare for the next WRC.²⁸

Only ITU Member States can vote during the WRCs but the study groups present an opportunity for private parties to participate in the development of recommendations and conduct studies based on which countries submit proposals to the WRCs to amend the International Table of Frequency Allocations.²⁹ Private parties also participate in these conferences as part of national delegations.³⁰

The allocation of the radio spectrum into different frequency bands is done in a way that ensures the most efficient use of the radio spectrum in line with the purposes of the ITU stated in Article 1 of its Constitution. This principle of efficiency also applies to the ITU Member States who must transpose the International Table of Frequency Allocations into national law.³¹ In this context, Article 44 of the ITU Constitution provides that “Member States shall endeavour to limit the number of frequencies and the spectrum used to the minimum essential to provide in a satisfactory manner the necessary services. To that end, they shall endeavour to apply the latest technical advances as soon as possible.”³²

This is important to avoid harmful interference as addressed in Article 45 of the ITU Constitution. According to Article 45:

All stations, whatever their purpose, must be established and operated in such a manner as not to cause harmful interference to the radio services or communications of other Member States or of recognized operating agencies, or of other duly authorized operating agencies which carry on a radio service, and which operate in accordance with the provisions of the Radio Regulations.

Further, the Member States recognize the necessity of taking all practicable steps to prevent the operation of electrical

²⁶ ITU Constitution, *supra* note 18, art. 13(1).

²⁷ *Id.* at art. 13(2).

²⁸ MANNER, *supra* note 11, at 42-44.

²⁹ Venkatasubramanian, *supra* note 21, at 25.

³⁰ *Id.*

³¹ *Id.* at 31.

³² ITU Constitution, *supra* note 18, art. 44.

apparatus and installations of all kinds from causing harmful interference³³

In addition to the International Table of Frequency Allocations, the WRCs also present an opportunity to revise the Radio Regulations themselves. According to Article 4 of the ITU Constitution, the Radio Regulations complement the ITU Convention and the ITU Constitution and are binding on all Member States.³⁴ In particular, the Radio Regulations help to achieve the objective of operating radio communications without harmful interference. In this regard, they provide both for the prevention and the resolution of harmful interference.³⁵

To avoid harmful interference, Article 4(2) of the 2020 Radio Regulations provides that “Member States undertake that in assigning frequencies to stations which are capable of causing harmful interference to the services rendered by the stations of another country, such assignments are to be made in accordance with the Table of Frequency Allocations and other provisions of these Regulations.”³⁶ Article 4(3) adds that “[a]ny new assignment or any change of frequency or other basic characteristic of an existing assignment shall be made in such a way as to avoid causing harmful interference to services rendered by stations using frequencies assigned in accordance with the Table of Frequency Allocations,” and Article 4(4) states that:

Administrations of the Member States shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations in this Chapter to the other provisions of these Regulations, except on the express condition that such a station, when using such a frequency assignment, shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the provisions of the Constitution, the Convention and these Regulations.³⁷

³³ *Id.* at art. 45.

³⁴ *Id.* at art. 4.

³⁵ Sakamoto, *supra* note 6, at 34-35.

³⁶ Radio Regulations, *supra* note 1, art 4.2.

³⁷ *Id.* at art. 4.4.

Mirroring Article 44 of the ITU Constitution, Article 15.1 of the 2020 Radio Regulation stipulates that “all stations are forbidden to carry out unnecessary transmissions, or the transmission of superfluous signals, or the transmission of false or misleading signals, or the transmission of signals without identification.”³⁸ Further, Chapter III of the 2020 Radio Regulations, comprising Articles 7 to 14, addresses the coordination, notification and recording of frequency assignments and plan modifications.³⁹ In particular, Articles, 7, 8, 9 and 11 provide for the registration and coordination of radio frequency assignments. New or replacement satellites have to be registered with the ITU and frequency assignments have to be recorded in an international frequency register, the Master International Frequency Register.⁴⁰ According to Article 8(1), “[t]he international rights and obligations of administrations in respect of their own and other administrations’ frequency assignments shall be derived from the recording of those assignments in the Master International Frequency Register”⁴¹ And according to Article 8.3 of the Radio Regulations, “[a]ny frequency assignment recorded in the Master Registry with a favorable finding under No. 11.31 shall have the right to international recognition.”⁴² International recognition means that “other administrations shall take it into account when making their own assignments in order to avoid harmful interference.”⁴³ In other words, a frequency assignment has the right to be protected from harmful interference if it is recorded in the Master International Frequency Register and used in accordance with the Radio Regulations.

A favorable finding under Article 11.31 refers to an assignment being in conformity with the International Table of Frequency Allocations and the other provisions of the Radio Regulations except those relating to conformity with the procedures for obtaining coordination or the probability of harmful interference⁴⁴ In turn, Article 11.32 refers to an assignment being in conformity with the procedures relating to coordination with other administrations

³⁸ *Id.* at art. 15.1.

³⁹ *Id.* at arts. 7-14.

⁴⁰ *Id.* at art. 8.1.

⁴¹ *Id.*

⁴² *Id.* at art. 8.3.

⁴³ *Id.*

⁴⁴ Radio Regulations, *supra* note 1, art. 11.31.

applicable to the radio communication service and the frequency band in question.⁴⁵ This means that an assignment needs to be coordinated with existing satellite systems to avoid harmful interference. Coordination can require adjustments to the technical characteristics of a satellite, such as power, coverage pattern or other matters that are then reflected in the filing with the ITU.⁴⁶

With regard to the order of priority of different assignments, in practice, it is a “first-come, first-served” system where those that come later have to coordinate so as not to interfere with those satellites that were registered before.⁴⁷ Article 7.5A explicitly states that “[i]f a frequency assignment is brought into use before commencement of the coordination procedure under Article 9 when coordination is required, or before notification when coordination is not required, the operation in advance of the application of the procedure shall, in no way, afford any priority.”⁴⁸

In accordance with Article 9 of the 2020 Radio Regulations, coordination under the Radio Regulations requires an administration which wants to bring into use an assignment to publish Advanced Publication Information, followed by a Coordination Request in the International Frequency Information Circular of the ITU Radiocommunication Bureau, which is published every two weeks.⁴⁹ The list of administrations and satellite networks with which coordination has to be completed before bringing a satellite into use or notify for recording in the Master International Frequency Register are contained in the Coordination Request publication.⁵⁰

Each year, the ITU publishes special sections for more than 250 coordination requests received from 50 different administrations.⁵¹ In each of the 250 special sections, the ITU indicates the affected administrations and affected satellite networks. At the

⁴⁵ *Id.* at art. 11.32.

⁴⁶ Gerry Oberst, *Dispute Resolution before the ITU: The Operator's Experience, in DISPUTE SETTLEMENT IN THE AREA OF SPACE COMMUNICATION – 2ND LUXEMBOURG WORKSHOP ON SPACE AND SATELLITE COMMUNICATION LAW* 43, 45 (Mahulena Hofmann ed., 2015).

⁴⁷ *Id.* at 44-50.

⁴⁸ Radio Regulations, *supra* note 1, art. 7.5A.

⁴⁹ *Id.* at art. 9.

⁵⁰ Ventakatasubramanian, *supra* note 21, at 27.

⁵¹ *Id.* at 28.

very least, 20 administrations and 200 satellite networks are identified for a satellite network filing with which coordination needs to be effected by a satellite operator before bringing into use a satellite network. Depending on the frequency bands used and nature of service, the number of administrations and satellite networks identified can be far greater than those numbers.⁵²

An administration is the State or State entity that discharges the ITU obligations on behalf of a public or private satellite operator.⁵³ A State can fulfill this role for several satellite operators. In practice, it means that the State in question is responsible for obtaining and protecting international rights for the use of orbital positions and frequency bands for satellites, for the benefit of the satellite operator.⁵⁴ In fact, compliance with the rules of the ITU in general mainly lies in the hands of the Member States, as the ITU has no direct means of enforcement.⁵⁵ In accordance with Article 45.1 of the ITU Constitution, it is the Member States of the ITU that are bound by its rules and that have to ensure compliance with the ITU regulations by private operators.⁵⁶

To notify an assignment on the Master International Frequency Register, an assignment must be in accordance with the International Table of Frequency Allocations and with the Radio Regulations, and it needs to be coordinated with the relevant satellite assignments.⁵⁷ However, while according to Article 8.3 the first two conditions are mandatory, the third is not: if coordination efforts fail, an operator may still insist on its network being entered into the Master International Frequency Register with an accompanying note indicating the administrations with whom coordination was impossible.⁵⁸ According to Article 11.41 of the 2020 Radio Regulations:

After a notice is returned under No. 11.38, should the notifying administration resubmit the notice and insist upon its reconsideration, the Bureau shall enter the assignment in the

⁵² *Id.*

⁵³ Radio Regulations, *supra* note 1, art. 1.2.

⁵⁴ Kroon, *supra* note 3, at 163.

⁵⁵ Smith, *supra* note 5, at 72.

⁵⁶ ITU Constitution, *supra* note 18, art. 45.1.

⁵⁷ Radio Regulations, *supra* note 1, art. 8.

⁵⁸ *Id.* at art. 8.3.

Master Register with an indication of those administrations whose assignments were the basis of the unfavorable finding. .

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Article 8.5 adds that:

If harmful interference to the reception of any station whose assignment is in accordance with No. 11.31 is actually caused by the use of a frequency assignment which is not in conformity with No. 11.31, the station using the latter frequency assignment must, upon receipt of advice thereof, immediately eliminate this harmful interference.⁶⁰

In conclusion, any new or replacement satellites need to be coordinated with all stations who have “priority” on the Master International Frequency Register. Registration is possible without having completed the entire coordination process. However, in case such a non-coordinated station creates harmful interference, this interference must be eliminated immediately. Only fully coordinated radio stations benefit from the full protection of the ITU regulations.

B. International Space Law

As regards the radio spectrum used by satellites, it is not just the ITU framework that is applicable but also international space law more generally. According to Professor Masson-Zwaan, “[t]he use and management of the orbit/spectrum must be seen in the wider context of the legal principles governing the use of outer space as contained in the UN outer space treaties, especially the 1967 Outer Space Treaty.”⁶¹

According to Article I of the Outer Space Treaty,⁶² the exploration and use of outer space “shall be carried out for the benefit and in the interest of all countries [...] and shall be the province of all [hu]mankind.”⁶³ Article II of the Outer Space Treaty clarifies that

⁵⁹ *Id.* at art. 11.41 (footnote omitted).

⁶⁰ *Id.* at art. 8.5.

⁶¹ Masson-Zwaan, *supra* note 10, at 62.

⁶² Treaty on Principles Governing the activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

⁶³ *Id.* at art. I

“outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”⁶⁴ Article III further states that the exploration of outer space shall be carried out “in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding.”⁶⁵

Finally, Article VI of the Outer Space Treaty provides that State Parties to the Outer Space Treaty “shall bear international responsibility for national activities in outer space . . . whether such activities are carried on by governmental agencies or by non-governmental entities, for assuring that national activities are carried out in conformity with the provisions [of the Outer Space Treaty],” and that the activities of non-governmental entities in outer space “shall require authorization and continuing supervision by the appropriate State Party to the Treaty.”⁶⁶ And, as further elaborated in the Liability Convention,⁶⁷ Article VII states that

[e]ach State Party to the Treaty that launches or procures the launching of an object into outer space . . . and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth [or in space].⁶⁸

The principle of space being for all humankind, the prohibition of national appropriation, and the encouragement of international cooperation can be applied to the use of the radio-spectrum, confirming the need to use the spectrum efficiently in coordination with other public and private users. They also indicate that the use of frequency bands does not confer an ownership right.

⁶⁴ *Id.* at art. II.

⁶⁵ *Id.* at art. III.

⁶⁶ *Id.* at art. VI.

⁶⁷ Convention on the International Liability for Damage Caused by Space objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter the Liability Convention]. The Liability Convention provides that a launching State shall be absolutely liable to pay compensation for damage caused by its space objects on the surface of the Earth or to aircraft, and liable for damage in space if at fault. The Convention also provides for procedures for the settlement of claims for damages.

⁶⁸ Outer Space Treaty, *supra* note 62, art. VII.

As concerns State responsibility for national space activities and State liability for damage caused by space objects, it could be argued that these principles could be extended to include damage caused by harmful interference with radio frequencies. According to Professor Masson-Zwaan,

[a] State could be held responsible for harmful interference under Article VI, and if damage occurs, it could be held liable for damage under Article VII. So far these articles have never been put to the test before an international tribunal, but it is not inconceivable that harmful interference could cause actual damage, giving rise to a claim under international law.⁶⁹

Professor von der Dunk agrees but adds that

[ultimately...] without either an authoritative interpretation at the international inter-State level of what Article XII of the [Liability] Convention is supposed to precisely mean or the judgment of an appropriate international court or tribunal on the issue, it is too early to determine exactly the extent to which the Liability Convention might present a useful tool for solving legal disputes on electronic interference with communication satellite operations and harm possibly resulting therefrom.⁷⁰

The only article in the Outer Space Treaty that explicitly mentions the term “harmful interference” is Article IX. While it does not mention it specifically in the context of the use of the radio spectrum, it arguably would apply to harmful frequency interference. According to Article IX, States must conduct their activities in outer space “with due regard to the corresponding interests of all other State Parties to the Treaty” and must conduct international consultations before conducting activities that would cause potentially harmful interference.⁷¹ Applying this to the radio spectrum, States must request consultations before carrying out a transmission that

⁶⁹ Masson-Zwaan, *supra* note 10, at 64.

⁷⁰ Frans G. von der Dunk, *The ‘Space Side’ to ‘Harmful Interference’ – Evaluating Regulatory Instruments in Addressing Interference Issues in the Context of Satellite Communications*, in HARMFUL INTERFERENCE IN REGULATORY PERSPECTIVE – LEGAL RULES FOR INTERFERENCE-FREE RADIO COMMUNICATION – 3RD LUXEMBOURG WORKSHOP ON SPACE AND SATELLITE COMMUNICATION LAW 87, 93 (Mahulena Hofmann ed., 2015).

⁷¹ Outer Space Treaty, *supra* note 62, art. IX.

might cause potentially harmful interference with transmissions of other States.

III. AVAILABLE DISPUTE RESOLUTION MECHANISMS

A. *In the International Telecommunications Union's Instruments*

As reviewed above, according to the Radio Regulations, to be notified on the Master International Frequency Register, an assignment should not cause harmful interference with a satellite system already notified. However, despite this rule, harmful interference does happen.

When a satellite operator experiences harmful interference, it reports it to its notifying administration.⁷² Section VI of Article 15 of the 2020 Radio Regulations sets out the procedure that administrations should follow when they observe harmful interference.⁷³ Member States have to exercise the “utmost goodwill and mutual assistance”⁷⁴ and give “due consideration” to all factors involved “including the relevant technical and operating factors.”⁷⁵ They “shall cooperate in the detection and elimination of harmful interference,” if necessary with recourse to the international monitoring facilities described in Article 16.⁷⁶ Of course, an administration first has to identify the space object at the origin of the harmful interference, and then the responsible administration for the object in question.⁷⁷ According to Article 15.34,

⁷² Only the administrations have rights under the ITU instruments and take steps to resolve the incident of harmful interference in accordance with the corresponding ITU provisions.

⁷³ Radio Regulations, *supra* note 1, art. 15.

⁷⁴ *Id.* at art. 15.22.

⁷⁵ *Id.* at art. 15.23.

⁷⁶ *Id.* at art. 15.25. In accordance with Article 16, administrations agree to continue the development of monitoring facilities and, to the extent practicable, to cooperate in the continued development of the international monitoring system, taking into account the relevant ITU-R Recommendations.

⁷⁷ Jean-François Mayence, *Harmful Interference in Telecommunications under International and National Space Law*, in HARMFUL INTERFERENCE IN REGULATORY PERSPECTIVE – LEGAL RULES FOR INTERFERENCE-FREE RADIO COMMUNICATION – 3RD LUXEMBOURG WORKSHOP ON SPACE AND SATELLITE COMMUNICATION LAW 101, 110-111 (Mahulena Hofmann ed., 2015).

[h]aving determined the source and characteristics of the harmful interference, the administration having jurisdiction over the transmitting station whose service is being interfered with shall inform the administration having jurisdiction over the interfering station, giving all useful information in order that this administration may take such steps as may be necessary to eliminate the interference.⁷⁸

Article 15.39 of the 2020 Radio Regulations provides that “if the harmful interference persists in spite of the action taken in accordance” with Section VI of Article 15, “the administration having jurisdiction over the transmitting station whose service is being interfered with may address to the administration having jurisdiction over the interfering station a report of irregularity or infraction.”⁷⁹ If these steps fail to produce favorable results, Article 15.41 allows the administration concerned to forward the details of the case to the ITU’s Radiocommunication Bureau (Bureau).⁸⁰ The Bureau shall then send “its conclusions and recommendations to the administration reporting the case of harmful interference” and to the administration believed to be responsible for the source of harmful interference, together with a request for prompt action.⁸¹

Most harmful interference incidents can be resolved without official dispute resolution. As many cases of harmful interference are caused by human error, malfunction of equipment etc., they are easily resolved via communication between the concerned operators and administrations in accordance with the Radio Regulations.⁸²

If the harmful interference persists despite the recommendations of the Bureau, either of the two administrations involved can escalate the case to the Radio Regulations Board (Board).⁸³ According to Article 10(1) of the ITU Convention, the Board shall “consider reports from the Director of the Radiocommunication Bureau on investigations of harmful interference carried out at the request of one or more of the interested administration; and formulate recommendations with respect thereto.”⁸⁴ According to Article 10(2), it

⁷⁸ Radio Regulations, *supra* note 1, art.15.34.

⁷⁹ *Id.* at art. 15.39.

⁸⁰ *Id.* at art. 15.41.

⁸¹ *Id.* at art. 15.46.

⁸² Sakamoto, *supra* note 6, at 36-37.

⁸³ ITU Convention, *supra* note 18, art. 10(1).

⁸⁴ *Id.*

shall “also, independently of the Radiocommunication Bureau, at the request of one or more of the interested administrations, consider appeals against decisions made by the Radiocommunication Bureau regarding frequency assignments.”⁸⁵

The Board can formulate recommendations but its process can take years and its enforcement powers are limited.⁸⁶ The Board’s decisions are public, and there is international pressure on the concerned administrations to resolve the harmful interference, so most cases brought to the Board are resolved,⁸⁷ but the recommendations of the Board do not include any sanctions against the harmful interference except for cases of harmful interference caused by an assignment recorded in the Master International Frequency Register under Article 11.41 of the Radio Regulations.⁸⁸ Article 11.42 provides that

“[s]hould harmful interference actually be caused by an assignment recorded under No. 11.41 to any recorded assignment which was the basis of the unfavorable finding, the administration responsible for the station using the frequency assignment recorded under No. 11.41 shall, upon receipt of a report providing the particulars relating to the harmful interference, immediately eliminate this harmful interference.”⁸⁹

Based on this provision, when an assignment recorded under Article 11.41 causes harmful interference to the assignment on which the unfavorable finding is based, the Board can decide to delete the entry in the Master International Frequency Register in accordance with Article 11.42A after its investigation:

In applying No. 11.42 with respect to satellite networks, administrations involved shall cooperate in the elimination of harmful interference and may request the assistance of the Bureau, and shall exchange relevant technical and operational information required to resolve the issue. Should any administration involved in the matter inform the Bureau that all efforts to resolve the harmful interference have failed, the

⁸⁵ *Id.* at art. 10(2).

⁸⁶ Sakamoto, *supra* note 6, at 38.

⁸⁷ *Id.* at 38.

⁸⁸ *Id.*

⁸⁹ Radio Regulations, *supra* note 1, art. 11.42 (footnote omitted).

Bureau shall immediately inform other involved administrations and prepare a report, together with all necessary supporting documents (including comments from the administrations involved), for the next meeting of the Board consideration and any required action (*including the possible cancellation of the assignment recorded under No. 41*), as appropriate. The Bureau shall thereafter implement the decision of the Board and inform the administrations concerned.⁹⁰

In case a dispute persists despite this procedure before the Bureau and the Board, the parties concerned can bring the matter to the next WRC in the hope of settling the dispute diplomatically.⁹¹ Alternatively, Article 56 of the ITU Constitution sets out a dispute settlement mechanism available to the ITU Member States. According to Article 56:

(1) Member States may settle their disputes on questions relating to the interpretation or application of this Constitution, of the Convention or of the Administrative Regulations by negotiation, through diplomatic channels, or according to procedures established by bilateral or multilateral treaties concluded between them for the settlement of international disputes, or by any other method mutually agreed upon.

(2) If none of these methods of settlement is adopted, any Member State party to a dispute may have recourse to arbitration in accordance with the procedure defined in the Convention.

(3) The Optional Protocol on the Compulsory Settlement of Disputes Relating to this Constitution, to the Convention, and to the Administrative Regulations shall be applicable as between Member States parties to that Protocol.⁹²

It follows from Article 56(2) that if all concerned administrations agree, they can also have recourse to arbitration in accordance with Article 41 of the ITU Convention, or in accordance with Article 56(3), if all concerned administrations are parties to the Optional Protocol on the Compulsory Settlement of Disputes relating to the

⁹⁰ *Id.* at art. 11.42A (emphasis added).

⁹¹ Ventakatasubramanian, *supra* note 21, at 28.

⁹² ITU Constitution, *supra* note 18, art. 56.

Constitution of the International Telecommunication Union, to the Convention of the International Telecommunication Union and to the Administrative Regulations, the Optional Protocol can be used. So far, neither Article 41 nor the Optional Protocol has ever been used in practice.⁹³

The dispute settlement mechanisms contained in the ITU instruments are limited to ITU Member States and are not available to private parties except through diplomatic protection.⁹⁴ In any event, as Elina Morozova and Yaroslav Vasyanin point out, as a consequence *inter alia* of the length of the proceedings, the non-binding nature of the Board's decisions and its inability to order the payment of damages, private satellite operators might not want to rely on the proceeding foreseen in the Radio Regulations and might instead prefer to resort to alternative dispute settlement mechanisms,⁹⁵ as further discussed below.

B. *In International Space Law*

International space law is constituted of five main international treaties developed in the context of the United Nations Committee on the Peaceful Uses of Outer Space: the Outer Space Treaty and the Liability Convention already mentioned above, as well as the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space,⁹⁶ the Convention on Registration of Objects Launched into Outer Space⁹⁷ and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.⁹⁸ As mentioned above, only the Outer

⁹³ Masson-Zwaan, *supra* note 10, at 62.

⁹⁴ As international treaties, the ITU instruments are not directly applicable to private parties.

⁹⁵ Elina Morozova & Yaroslav Vasyanin, *Mechanisms for Resolving Disputes Related to Violations of Coordination Agreements* (70th Int'l Astronautical Congress, 2019).

⁹⁶ Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119.

⁹⁷ Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15.

⁹⁸ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1362 U.N.T.S. 3 [hereinafter Moon Agreement]. The Moon Agreement has been ratified by too few States to gain the same relevancy as the previous space treaties. A list of the signatories of all the treaties can be found here: Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcommittee on its Sixty-First Session,

Space Treaty and the Liability Convention contain substantive rules that are relevant to the context of harmful interference.

The Liability Convention contains an explicit dispute resolution mechanism in the form of a Claims Commission (Articles XIV-XX), but its decisions are only recommendatory unless all of the parties to a dispute agree to render them binding.⁹⁹ In contrast, the Outer Space Treaty provides in its Article III that “States Parties to the Treaty shall carry on activities [...] in accordance with international law, including the Charter of the United Nations [...]” The United Nations’ Charter, in Article 33, Chapter VI, lists “negotiation, enquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other peaceful means of their own choice” as possible dispute settlement mechanisms.¹⁰⁰

C. *In Domestic Law*

In theory, space disputes, including over harmful interference, can be brought before domestic courts within national legal systems.¹⁰¹ However, it is doubtful whether domestic courts are the most appropriate forum for harmful interference disputes. Harmful interference disputes are very technical and national judges might not have the necessary knowledge of ITU regulations to judge such disputes efficiently.¹⁰² Moreover, harmful interference disputes are often international in nature, meaning that at least one of the parties would have to litigate in a court of a State and in a language that is not their own, in addition to any possible bias a court might have towards the party of its own nationality. Another difficulty of litigating harmful interference disputes in domestic courts can arise out of the impossibility to adequately protect confidential information as for example the information contained in coordination agreements.

Status of International Agreements Relating to Activities in Outer Space as at 1 January 2022, U.N. Doc. A/AC.105/C.2/2022/CRP.10 (2022).

⁹⁹ Liability Convention, *supra* note 67, art. XIX.

¹⁰⁰ U.N. Charter art. 33.

¹⁰¹ A claim before a domestic court does not require the prior consent of the opposing party, although there might be questions over which national court is competent to hear a particular dispute.

¹⁰² Morozova & Vasayanin, *supra* note 95, at 21.

Finally, in a domestic court it might be difficult to determine the applicable law to an international harmful interference dispute. As Elina Morozova and Yaroslav Vasyanin explain, “[a]nother legal challenge of adjudicating a dispute related to a coordination agreement would be to determine [the] governing law to be applied to each aspect of the dispute.”¹⁰³

IV. SPACE ARBITRATION AS AN EFFICIENT ALTERNATIVE

While the substantive law is clear on the need to prevent and resolve harmful interference, the result of a review of the available dispute settlement mechanisms to enforce these substantive rights is less clear. Both the dispute settlement mechanism of the ITU and the ones offered by general international space law present two fundamental deficiencies: they are not binding and not available to private parties. In a world in which there is a stark increase in space activities with a corresponding risk of disputes, including relating to harmful interference, and in which the private sector is becoming ever more involved, those are two serious disadvantages.

In the words of Gerry Oberst,

At the end of the day, administrations and satellite operators that find themselves in a “disagreement” or “dispute” concerning ITU rules do not have any clear path to resolution [within the ITU system]. As radio spectrum becomes increasingly congested and scarce globally, the number of instances where it is simply not possible to resolve the conflicting claims of administrations will inevitably increase, and the corresponding need for an accessible, fair and transparent dispute resolution mechanism, well-suited to ITU matters, should become increasingly apparent to all parties concerned.¹⁰⁴

A look at available international dispute settlement mechanisms draws the attention to international arbitration. It seems that international arbitration could be this “accessible, fair and transparent dispute resolution mechanism, well-suited to ITU matters.”¹⁰⁵ In fact, international arbitration is a flexible mechanism

¹⁰³ *Id.* at 20.

¹⁰⁴ Oberst, *supra* note 46, at 125.

¹⁰⁵ *Id.*

providing the parties to a dispute with a significant degree of autonomy over their proceedings.¹⁰⁶ This means that, in international arbitration, the parties are able to select their arbitrators, and therefore, have the possibility to choose individuals with experience and the necessary know-how to understand the dispute in question, including individuals with relevant experience in ITU matters. International arbitration also allows the parties to choose the place of arbitration and the language of their proceedings, to influence the procedural calendar and to commit to enhanced confidentiality.¹⁰⁷

Importantly, in addition to its flexibility and adaptability to both the highly technical nature of harmful interference disputes and the international aspects of disputes that often involve parties from different jurisdictions, international arbitration is both available to private satellite operators and results in binding decisions.¹⁰⁸ By nature, international arbitration awards are final and binding and can be easily enforced internationally through the United Nations Convention on the Recognition and Enforcement of Foreign Arbitral Awards, also known as the New York Convention.¹⁰⁹ Moreover, because international arbitration is a private dispute settlement mechanism, parties can voluntarily agree to refer their dispute to arbitration. This can be done once a dispute has already arisen, but is most commonly done beforehand, for example in the form of an arbitration clause included in a contract. As a consequence, international arbitration is not only available to States and public entities but also to private satellite operators.¹¹⁰

These advantages are well known and many space contracts already contain arbitration clauses. For example, the European Space Agency provides for arbitration in Clause 35(2) of its General Clauses and Conditions for ESA Contracts¹¹¹ and arbitration clauses also seem to be routinely included into commercial space contracts by companies such as SpaceX, Avanti, Boeing, Airbus and

¹⁰⁶ NIGEL BLACKABY ET AL., REDFERN AND HUNTER ON INTERNATIONAL ARBITRATION ¶¶ 1.04-1.12. (6th ed. 2015).

¹⁰⁷ *Id.*

¹⁰⁸ *Id.*

¹⁰⁹ The Convention on the Recognition and Enforcement of Foreign Arbitral Awards, June 10, 1958, 21 U.S.T. 2517, T.I.A.S. No. 6997, 330 U.N.T.S. 38.

¹¹⁰ BLACKABY, *supra* note 106, ¶¶ 2.31-2.41.

¹¹¹ European Space Agency [ESA], *Regulations of the European Space Agency: General Clauses and Conditions for ESA Contracts*, ESA/REG/002 (July 5, 2019).

Arianespace.¹¹² A study undertaken by Vivasat Dadwal and Madeleine McDonald confirmed that international arbitration is the preferred mechanism by both State and non-State actors in the resolution of publicly-known space-related disputes, especially in the satellite industry.¹¹³ In the past, satellite disputes that gave rise to international arbitrations have for example arisen out of the late delivery of satellites, the insertion of a satellite into a wrong orbit, defective satellites already in orbit, the lease of satellite capacity, the right to orbital positions and frequency bands, export control, and the cancellation of space contracts.¹¹⁴

As regards harmful interference disputes, arbitration clauses can be included in coordination agreements to provide for the possibility of arbitrating any dispute that might arise out of the violation of such agreement.¹¹⁵ Indeed, as mentioned above, new or replacement satellites must be coordinated.¹¹⁶ The results of this coordination process are usually recorded in so-called coordination agreements that are basically contracts signed by both operators.¹¹⁷ Unfortunately, coordination agreements are commonly drafted by technical experts and therefore rarely contain arbitration clauses.¹¹⁸ However, given the need for an efficient dispute settlement system for harmful interference disputes, foreseeing the possibility of arbitration can ensure the availability of a well-suited forum to settle a dispute if needed.

The fact of having agreed on an arbitration clause in their coordination agreement for example greatly benefitted Eutelsat S.A. (Eutelsat) and SES S.A. (SES) in 2012, when they were able to bring a dispute before an arbitration tribunal in a proceeding administered by the Court of Arbitration of the International Chamber of

¹¹² Rachael O'Grady, *Dispute Resolution in the Commercial Space Age: Are All Space-Farers Adequately Catered For?*, 3 ICC DISP. RESOL. BULL. 55 (2021).

¹¹³ Viva Dadwal & Madeleine McDonald, *Arbitration of Space-Related Disputes: Case Trends and Analysis* (71st International Astronautical Congress, 2020).

¹¹⁴ Jan Frohloff, *Arbitration in Space Disputes*, 35 ARB. INT'L ¶¶ para. 2.1.1-2.1.6 (2019).

¹¹⁵ Morozova & Vasayanin, *supra* note 95, at 23.

¹¹⁶ Radio Regulations, *supra* note 1, at art.; Oberst, *supra* note 46, at 45.

¹¹⁷ Morozova & Vasayanin, *supra* note 95, at 23.

¹¹⁸ *Id.*

Commerce (ICC).¹¹⁹ The dispute arose when SES, through an assignment from Media Broadcast GmbH, obtained the right to use the 500 MHz spectrum at 28.5° East, including frequencies that Eutelsat claimed were reserved to Eutelsat under an intersystem coordination agreement Eutelsat and SES had signed in 1999 (Coordination Agreement).¹²⁰ Eutelsat initiated ICC arbitration against SES on the basis of an arbitration clause contained in the Coordination Agreement itself.¹²¹ The tribunal issued a partial award in September 2013 holding that the Coordination Agreement did not bar SES from using the disputed bands if and when Eutelsat did not hold the regulatory right to operate in these bands.¹²² Eutelsat finally ceased to operate the disputed frequencies and the dispute was settled in 2014.¹²³

Industry-specific arbitration rules, such as the Optional Rules for the Settlement of Outer Space Disputes of the Permanent Court of Arbitration¹²⁴ further contribute to rendering international arbitration a well-adapted dispute settlement mechanism for the space industry, including for the settlement of harmful interference disputes.

V. CONCLUSION

In conclusion, with the increase in satellites being launched, harmful interference is becoming a growing concern for private satellite operators. While harmful interference is illegal under international law, and the International Telecommunications Union instruments contain detailed provisions on the prevention and resolution of harmful interference, both the ITU and the international space treaties lack an efficient dispute settlement mechanism that

¹¹⁹ Kyriaki Karadelis, *Eutelsat Settles ICC Satellite Dispute*, GLOB. ARB. REV. (Jan. 30, 2014), <https://globalarbitrationreview.com/article/eutelsat-settles-icc-satellite-dispute>; Morozova & Vasayanin, *supra* note 95, at 23.

¹²⁰ Frohloff, *supra* note 114, ¶ 2.1.6.

¹²¹ Based on information provided by Eutelsat S.A.

¹²² *Eutelsat statement on operations at 28.5° East*, Eutelsat Communications (Sept. 30, 1998) <https://www.eutelsat.com/files/live/sites/eutelsat-internet/files/contributed/news/press/en/PR%207313%20ICC-1.pdf>.

¹²³ Karadelis, *supra* note 119.

¹²⁴ Permanent Court of Arbitration, *Optional Rules for Arbitration of Disputes Relating to Outer Space Activities*, available at <https://docs.pca-cpa.org/2016/01/Permanent-Court-of-Arbitration-Optional-Rules-for-Arbitration-of-Disputes-Relating-to-Outer-Space-Activities.pdf>.

is easily accessible for private parties to enforce their rights. With domestic courts in turn often lacking the necessary experience to efficiently address space disputes, international arbitration can present an interesting alternative. Satellite operators should keep this in mind when drafting their coordination agreements.