In Search of the Most Appropriate Mechanism for Resolving the Disputes Arising from Large Satellite Constellations

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Abstract

The increasing number of satellite constellations poses many significant challenges. Given the continued growth of the amount of space debris and due to the potential harmful interference in orbits, as at least two consequences of the emergence of the large constellations, resolving the international disputes arising from launching satellite constellations is deemed to be one of the main concerns in this regard. This paper aims at answering the main question that considering the shortcomings of international space law dispute resolution mechanisms, how can disputes arising from large satellite constellations, be more appropriately settled. Among the space law treaties, except for Article XIV of the 1972 Liability Convention which foresees the establishment of a Claims Commission, there are no binding dispute settlement provisions. Due to the urgent necessity of dealing with these disputes, international arbitration is to be considered as the most appropriate mean for the dispute settlement of constellations.

1. Disputes Arising from Satellite Constellations: A New Wave of Space Disputes is Coming

Satellite constellations refer to "a number of similar satellites, of a similar type and function, designed to be in similar, complementary, orbits for a shared purpose, under shared control".[1] The emergence of these constellations poses new and significant challenges in the realm of space law. These challenges may result in arising a dispute among current space stakeholders, including States, international organizations and private

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1 LIoyd, Wood, "Satellite Constellation Networks", In *Interworking and Computing over Satellite Networks*, edited by Yongguang Zhang, Boston: Springer, 2003, P. 13.

enterprises. Having considered this issue, as stated by the Permanent Court of International Justice ("PCIJ"), in the *Mavrommatis Case*, "A Dispute is a disagreement on a point of law or fact, a conflict of legal views or of interests between two persons".[2] Despite the fact that this definition was slightly changed in the 2016 *Marshal Islands Case*,[3] for the purpose of this paper, the essence of the definition of dispute reflected in the established case of law of the ICJ is taken into consideration.

With regard to satellite constellations, the question now arises is why disputes arising from satellite constellations are distinct from disputes arising from other space activities. The creation of space debris on the one side and potential harmful interference on the other side are two main origins of disputes of constellations. This issue becomes more important, in particular due to the fact that most of the satellite constellations are located in Low Earth Orbits ("LEO"), where there is the highest density of international space traffic. In addition, as there is no space traffic management system, the detrimental impacts of the highest traffic density caused by satellite constellations will be aggravated. As an example, reference can be made to the potential adverse impacts of debris generated by the OneWeb constellation planned for involving 720 satellites and Starlink constellation planned for including 4.000 satellites.[4] This concern was also addressed in 2021, when Europe's leading space debris expert stated that Starlink satellite constellations operated by SpaceX is regarded as the main source of collision risk in LEO.[5] Given the adverse impacts of these two factors on outer space activities, disputes arising from large satellite constellations cannot remain unsettled. The main reason is that both these elements may not only threat the purpose of the Outer Space Treaty ("OST"), i.e., "the outer space should be the province of all mankind",[6] but also they endanger the long-term sustainability of outer space activities which has been an agenda item of the Committee on the Peaceful Uses of Outer Space ("COPUOS"), since 2010.[7]

2 PCIJ Reports, Case Concerning the Mavrommatis Palestine Concessions (Greece v. Britain), Judgment of 30 August 1924, P. 11.

3 ICJ Reports, Case Concerning Obligations Concerning Negotiations relating to Cessation of the Nuclear Arms Race and to Nuclear Disarmament (Marshall Islands v. United Kingdom), Judgment of 5 October 2016, Para. 41.

4 Serge, Trober, "New Space, New Dimensions, New Challenges: How Satellite Constellations impact space risk", Published by Swiss Re Corporate Solutions, 2018, P. 9.

5 Available at: https://www.space.com/spacex-starlink-satellites.html, Last visited at: 31 July 2022.

6 OST, 1967, Article I.

7 Gerard, Brachet, "The Origins of the 'Long-term Sustainability of Outer Space Activities' initiative at UN COPUOS", *Space Policy Journal*, 28(3), 2012, P. 164.

2. Application of the Most Appropriate Mechanism of Dispute Settlement to the Disputes Arising from Large Satellite Constellations

Disputes arising from satellite constellations may endanger the interests of both space-faring and non-space-faring nations. Indeed, these disputes are regarded as the concern of all States. Moreover, benefiting from satellite constellations may lead to creating a kind of acquired right for others, as the users of satellite constellations. In case of arising any dispute, therefore, the international peace and security may be threatened. This being said, the importance of resolving these disputes cannot be disregarded.

2.1. Lacunae of the Five Space Law Treaties in Dealing with Disputes of Satellite Constellations

Despite the fact that the five space law treaties are formulated in a way that they attempt to ensure the maintenance of peace and security in outer space, there is no compulsory dispute settlement provision in these instruments, except for Article XIV of the Liability Convention. It may be argued that the main reason behind this legal gap is that the OST is regarded as a type of softness. To explain it more, despite its hard instrumentum, the OST has a soft negotium, meaning that its content is soften.[8] The point, however, is that satellite constellations may lead to arising disputes among space stakeholders. The potential collision occurred in 2019 between the European Space Agency Earth Observation Satellite and a SpaceX satellite in the Starlink Constellation[9] is one of the best examples demonstrating the possibility of disputes arising from satellite constellations.

In respect of harmful interference, Article IX of the OST provides that should a State Party has reason that an activity or planned experiment by it or its nationals in outer space would cause potentially harmful interference with activities of other States, it shall undertake appropriate international consultations before proceeding with any such activity or experiment. It should be kept in mind that satellite constellations have emerged in an environment where the role of private enterprises has greatly increased. Therefore, the need for direct responsibility and liability of private enterprises is underlined. Furthermore, despite consultation is regarded as a political and non-binding mean of dispute settlement, the context of Article IX of the OST implies that this Article cannot be viewed as a dispute settlement provision. In short, it is to be viewed as a conflict avoidance provision.[10] Analyzing this

8 Jean d', Aspremont, "Softness in International Law: A Self-Serving Quest for New Legal Materials", *EJIL*, 19(5), 2008, P. 1084.

9 Available at: https://www.esa.int/Space_Safety/ESA_spacecraft_dodges_large_constellation, Last Visited at: 25 August, 2022.

10 G.M., Goh, Dispute Settlement in International Space Law: A Multi-door Courthouse for Outer Space, Doctoral Thesis, International Institute of Air and Space Law: Leiden University, 2007, P. 94.

Article, it can be seen that no dispute settlement mechanism is foreseen for the time when activities of one satellite constellation interfere with other space objects

As discussed earlier, in addition to harmful interference, debris is another origin of disputes relating to constellations. As collision between debris of constellations and other space objects cause damages, any dispute arising from this incident falls within the scope of Article XIV of the Liability Convention. According to this provision, if a dispute is not settled through diplomatic negotiations as set forth in Article IX of the Liability Convention, a Claims Commission can be established at the request of either party within the time-limit of one year. This Article presents some shortcomings. The main important one is rooted in the non-binding nature of decision of the Commission. In accordance with Article XIX (2), the decision has recommendatory nature and it should be implemented in good faith; otherwise, the Parties agree for its binding character. In addition to the non-binding character of the Claims Commission, to date, no dispute has been submitted to it. With regard to satellite constellations, in 2009, the deactivated Russian Satellite Kosmos 2251 crashed into the American Satellite Iridium 33, both of them were part of large satellite constellations.[11] As a consequence of this collision, the Iridium 33 Satellite was destructed and over 2000 pieces debris were created. Given the shortcomings of the five space law treaties with regard to dispute settlement mechanisms, this dispute was not settled.[12] It shows that the settlement of disputes arising from satellite constellations is very difficult. This situation is further complicated, in particular due to the presence of private enterprises.

2.2. The International Telecommunication Union ("ITU") Mechanisms for the Settlement of Disputes arising from Satellite Constellations

Needless to say, the large number of satellites forming satellite constellations may increase the congestion of LEOs.[13] Naturally, this would lead to increasing the possibility rate of frequency interference in LEOs. This process, undoubtedly, causes disputes between space stakeholders, notably between private sectors and other space actors. Due to the role of the ITU in

11 Damian M., Bielicki, "Legal Aspects of Satellite Constellations", *Air & Space Law*, 45(3), 2020, P. 259.

12 Ewan, Wright, "Legal Aspects Relating to Satellite Constellations" in *Legal Aspects Around Satellite Constellations*, edited by Annette Froehlich, Switzerland: Springer Publishing, 2019, P. 32.

13 Alice, Riviere, "The Rise of the LEO: Is There a Need to Create a Distinct Legal Regime for Constellations of Satellites?", in *Legal Aspects Around Satellite Constellations*, edited by Annette Froehlich, Volume I, Switzerland: Springer Publishing, 2019, P. 43.

allocating and allotting frequencies[14] and orbital slots, the examination of the ITU mechanisms for dispute settlement is of crucial importance. Of course, these mechanisms are merely applicable to States. Negotiation is the main method specified by Article 56 of the ITU Constitution.[15] However, it was foreseen that should the dispute is not settled by negotiation or other mechanisms mutually agreed by disputants, the arbitration procedure of Article 41 of the ITU Convention will be enforceable.[16] According to what was mentioned herein, it can be seen that the existing gaps cannot be fully addressed by the ITU dispute settlement mechanisms.

2.3. Settlement of Disputes arising from Satellite Constellations through the 1998 International Law Association ("ILA") Draft Convention on the Settlement of Space Law Disputes ("Draft Convention")

One of the major legal gaps of dispute settlement mechanism of space law treaties is that they are confined to States as space stakeholders. This shortcoming is aggravated due to the emergence of private enterprises in the realm of space activities including launching and operating satellite constellations. Moreover, given the non-binding nature of mechanisms foreseen by space law treaties, the existence of binding dispute settlement mechanism is of crucial importance. There is no doubt that, by searching for the most appropriate mechanism of dispute settlement, this lacuna is to be filled.

In the 1996 ILA Helsinki Conference, it was agreed to adapt the 1984 version of the Draft Convention prepared by Professor Bockstiegel. Accordingly, the "Final Draft of the Revised Convention on the Settlement of Disputes related to Space Activities" was adopted in the 1998 ILA Taipei Conference.[17] The provisions of this final Draft proposed to establish a new International Tribunal for Space Law, before which intergovernmental organizations and private entities have *locus standi*, in addition to States. This Draft foresees both binding and non-binding mechanisms for space law dispute settlement. Needless to say, covering legal gaps of space law treaties, this instrument may make a valuable contribution in resolving disputes regarding satellite constellations. It is worth mentioning, however, that this instrument is to be regarded as a step towards progressive development of international space law. Coming this Convention into effect, therefore, depends largely on the will of space stakeholders.

14 Ram S., Jakhu, Joseph N. Pelton, *Global Space Governance: An International Study*, Switzerland: Springer International Publishing, 2017, P. 151.

15 Constitution of the ITU, 1994, Article 56.

16 Ram S, Jakhu, "Dispute Resolution under the ITU Agreements", Discussion paper submitted to the PCA Advisory Group, 2010, P. 2,4; Convention of the International Telecommunication Union, 1992.

17 The Final Draft of the Revised Convention on the Settlement of Disputes Related to Space Activities, 30 May 1998.

2.4. Resorting to General International Law Mechanisms for Resolving Disputes of Satellite Constellations

Article 3 of the OST provides guidance that all the dispute settlement mechanisms stipulated by Article 33 of the United Nations Charter, including negotiation, inquiry, mediation, conciliation, arbitration and judicial settlement are applicable to the disputes arising from space activities. Needless to say, the dispute settlement mechanisms stipulated by Article 33 are merely applicable to inter-State disputes. Indeed, disputes between private enterprises or between States and private enterprises are excluded from the scope of this Article. Therefore, for the purpose of determining the mechanism which can be applicable to these latter disputes, as well as the former ones, the application of both political and legal means of dispute settlement over disputes arising from satellite constellations are analyzed.

2.4.1. Negotiation

Generally, in the realm of inter-state disputes including space-law ones, negotiation is regarded as the primary mean for dispute resolution.[18] In the sphere of disputes regarding satellite constellations, the obligation to negotiate was reflected in the space law treaties. To preventing from any harmful interference, Article IX of the OST stipulates the obligation to enter into consultations. Accordingly, to deal with the liability of States in case of damages arising from collisions, Article XIV of the Liability Convention provides the obligation to negotiate. As discussed earlier, however, the former is solely regarded as conflict avoidance provision and the latter is a mean to giving effect to the jurisdiction of the Claims Commission.

Additionally, even if negotiation is resorted as a conflict avoidance mean or as a perquisite of submitting dispute to the Commission, it is important mentioning that the outcome of negotiation is not binding, unless the parties specify otherwise. Thus, it may be the case that a given dispute with regard to satellite constellations is not settled. It should be noted that, however, all of the mentioned considerations relate to inter-State disputes and not disputes between private enterprises or between States and private enterprises. Furthermore, given the State-centric context of Article IX of the OST, it seems that the obligation of private enterprises to negotiate under this Article would be unlikely.

18 Henry R., Hertzfeld, Timothy G. Nelson, "Binding Arbitration as an Effective Means of Dispute Settlement for Accidents in Outer Space", Proceedings of the International Institute of Space Law, 2013, P. 131.

2.4.2. Inquiry

Inquiry, as another non-binding mechanism for dispute settlement, refers to the mean contribute to "facilitate a solution… by means of an impartial and conscientious investigation".[19] While the outcome of the inquiry will not be binding, given the technical aspects of space-related disputes including those related to constellations, inquiry is of essential importance. Although this mean is used in other areas with technical features, including air law, its application in space law is limited.

In the realm of space disputes, the sole case of conducting a type of inquiry can be seen in Kosmos 954 incident, in which the US took some steps in making inquiries with the USSR to find the origin of damages. However, due to the reluctance of the USSR, no agreement was made between Canada and the USSR to solve their dispute by means of inquiry. In short, despite the fact that inquiry is not based on legal principles, resorting to it alongside a certain binding dispute settlement mechanism may play a vital role in resolving disputes of satellite constellations. This, however, largely depends on the cooperation of space States. Additionally, similar to other State-centric mechanisms set forth in Article 33 of the United Nations Charter, inquiry cannot be an appropriate mechanism for disputes arising from satellite constellations. The main reason behind this issue is that satellite constellations are mostly launched and operated by private enterprises and not States.

2.4.3. Good Offices and Mediation

Having provided a channel of communication by a third party, good offices contribute to peaceful settlement of disputes through facilitating direct negotiation between disputants. Contrary to good offices, in mediation the mediator involves actively in resolving the dispute, the process of negotiation and making proposals. Similar to other political means, these two mechanisms have no binding effect. Additionally, with regard to disputes arising from satellite constellations, as well as other space related disputes, disputants can hardly agree on a third party who is competent and has no interest in the concerned dispute. For instance, in case of any dispute between SpaceX and Oneweb with regard to harmful interference between Starlink and OneWeb constellation, it is not clear whether there is any qualified and competent authority to settle the dispute. Can such disputes be settled by either the ESA, Amazon, Russia or China? The negative answer to this question illustrates how complex it is to resolve the disputes arising from satellite constellations through good offices or mediation.

19 Convention for the Pacific Settlement of International Disputes, adopted at the 1907 Peace Conference, Article 9.

2.4.4. Conciliation

The conciliation can be done through conciliation commission foreseen in a certain instrument. In this regard, the 1995 United Nations Model Rules for the Conciliation of Disputes ("Model Rules") between States adopted by the General Assembly Resolution 50/50 is a good example for conciliation clauses. According to the preface of the Resolution 50/50, the Model Rules can be applied by the States whenever their disputes have not been solved through direct negotiations.[20] However, as the Model Rules are confined to inter-State disputes, they cannot be an appropriate model for disputes arising from satellite constellations among private enterprises. Additionally, the solution provided by commission does not have binding effect.[21] Considering Article XIV of the Liability Convention, it can be understood that the function of claims commission is partially akin to conciliation commission. Given these shortcomings, there is an urgent need for searching for the most appropriate dispute settlement mechanism.

2.4.5. The Most Probable Way of Resolving Disputes Arising from Satellite Constellations by Resorting to the International Court of Justice

As of today, no dispute has been directly submitted to the ICJ. The reason of this issue is that the five space law treaties contain no provision on conferring obligatory jurisdiction to the ICJ. Therefore, submission disputes arising from satellite constellations to the ICJ, in the same vein as other space-related disputes, is quite unlikely.

In the fiftieth anniversary of the International Court of Justice, some proposals were raised with regard to the establishment of a special chamber for space law disputes. This can be done in accordance with Article 26 of the ICJ Statute. Examining the previous experience in the framework of the ICJ regarding environmental issues, it can be understood that in the period of 13 years of existence of Chamber for Environmental Matters, from 1993 to 2006, no environmental law disputes had been submitted to this Chamber.[22] Therefore, at first sight, it concludes that a special chamber of space law disputes may not be effective. Nonetheless, it may be concluded that the space disputes, albeit the inter-state ones, can be settled by the ICJ. Of course, due to the lack of *locus standi* by non-state actors, i.e., private enterprises and international organizations, the ICJ may not be an appropriate mean for disputes arising from constellations. This problem is partially emanated from the State-centric approach of international law as well as the ICJ.

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20 A/RES/50/50, United Nations Model Rules for the Conciliation of Disputes between States, 1995, Preface.

21 Rebecca M.M., Wallace, *International Law*, London: Sweet & Maxwell Limited, Fourth Edition, 2002, P. 287-288.

22 Available at: https://www.icj-cij.org/en/chambers-and-committees, Last Visited at: 28 July, 2022.

Despite the fact that the rights of private enterprises may be protected by States through diplomatic protection, it is worth mentioning that as stated in the *Barcelona Traction Case*, bringing a claim on this basis remains as a discretionary power of States. This view was also confirmed by Article 2 of 2006 Draft articles on Diplomatic Protection.[23] This being said, better protection may be offered if private enterprises are entitled to bring their claims directly before the ICJ and ask for reparation of damages caused by satellite constellations.

On the other hand, as international organizations do not have *locus standi* before the ICJ, the most probable way of resolving disputes of satellite constellations is requesting advisory opinions of the Court in accordance with Article 96 of the United Nations Charter. In respect of disputes arising from satellite constellations, both the General Assembly, as the principal organ of the United Nations by which the COPUOS was established, and the ITU as a specialized agency of the United Nations are authorized to request advisory opinions of the Court. Nevertheless, to date, no advisory opinions have been requested by the ITU or the General Assembly in this regard. Needless to say, whereas advisory opinions do not have binding character principally, they may, albeit indirectly, play a vital role in solving disputes of constellations resulted from harmful interference. In this regard, reference can be made to the[24] *dispute concerning delimitation of the maritime boundary between Mauritius and Maldives in the Ocean Sea*. In view of the Special Chamber of the International Tribunal for the Law of the Sea, "determinations made by the ICJ in an advisory opinion cannot be disregarded simply because the advisory opinion is not binding… those determinations do have legal effect".[25]

Notwithstanding the foregoing, currently, even if the ICJ is used for the settlement of inter-state space law disputes, given the special features of disputes arising out of satellite constellations and the involvement of actors other than States, notably private enterprises, the ICJ is to be deemed as an interim measure until an appropriate mechanism is evolved.[26]

23 Draft articles on Diplomatic Protection, Official Records of the General Assembly, Sixty-first Session (A/61/10), 2006, Article 2.

24 ICJ Reports, Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion of 8 July 1996, P. 14.

25 International Tribunal for the Law of the Sea, Dispute Concerning Delimitation of the Maritime Boundary Between Mauritius and Maldives in the Indian Ocean (Mauritius/ Maldives), Judgment of 28 January 2021, Preliminary Objections, Para. 203, 205.

26 George Paul, Sloup, "Peaceful Resolution of Outer Space Conflicts through the International Court of Justice: The Line of Least Resistance", *DePaul Law Review*, 20(3), 1971, P. 697.

2.4.6. Arbitration as the Most Appropriate Mechanism for Resolving Disputes of Satellite Constellations

Out of different forms of arbitration, *ad hoc* arbitration can be one of the appropriate mechanisms for resolving disputes arising from satellite constellations. This kind of arbitration is a form of arbitration that is solely used for resolving a specific dispute referred to it. In the realm of international law, there are many cases which were settled through *ad hoc* arbitration. Furthermore, considering disputes between private enterprises and States, including dispute between *Texaco and Libya*, which have been successfully settled by mixed arbitration, it is predicted that this kind of arbitration may be another appropriate option for resolving disputes arising from satellite constellations. Moreover, permanent arbitrations may be used as an appropriate mechanism for the settlement of disputes arising out of constellation. The space court established by the United Arab Emirates is one example in this regard. According to the United Arab Emirates, this space arbitral tribunal is created to settle the commercial disputes and it will be based at the Dubai International Financial Centre Courts.[27] Clearly, the establishment of this Court highlights the necessity of the settlement of disputes between private enterprises including disputes of satellite constellations.

Among different forms of arbitration, the Permanent Court of Arbitration (PCA), established by the 1899 Convention for the Pacific Settlement of International Disputes is the mechanism which can be viewed as the "most" appropriate mechanism for resolving disputes of satellite constellations. In the framework of the PCA, attempts made for formulating the arbitration rules governing space-law disputes cannot be neglected. The "Optional Rules for Arbitration of Disputes Relating to Outer Space Activities"[28] became effective in 2011 is to be regarded as a legal basis for submitting disputes regarding satellite constellations to the PCA. Taking as a model the 2010 UNCITRAL Arbitration Rules, the Optional Rules for Arbitration of Disputes Relating to Outer Space Activities ("PCA Rules") were formulated to filling the gaps of the existing space law instruments. Particularly, the PCA Rules may play a vital role in enhancing the effectiveness of the Liability Convention.[29] The reason is that given the non-binding nature of the mechanisms provided by this Convention and as experience has shown, it is predicted that in most cases, disputes arising from satellite constellations remain unsettled. Accordingly, related provisions of the Liability Convention

27 Available at: https://www.courthousenews.com/dubai-creates-space-court-for-out-of-this-world-disputes/, Last Visited at: 25 August, 2022.

28 PCA, Optional Rules for Arbitration of Disputes Relating to Outer Space Activities, 6 December 2011.

29 Maureen, Williams, "Dispute Resolution regarding Space Activities", in *Handbook of Space Law* edited by Frans von der Dunk and Fabio Tronchetti, USA: Edward Elgar Publishing, 2015, p 995.

including Article III can hardly be enforced. For these reasons, it may be argued that the PCA is to be viewed as the most appropriate mechanism for resolving disputes arising from satellite constellations. In this regard, specialized panel of arbitrators established under Article 10 (3) of the PCA Rules may make a significant contribution in resolving disputes arising from satellite constellations.[30]

As a first step, the issue of applicability of the PCA Rules to disputes arising from the satellite constellations is to be examined. Considering the introduction of the PCA Rules stipulating that outer space disputes refer to the disputes having an outer space component,[31] it can be understood that all disputes arising from satellite constellations originated from space debris or harmful interference fall within the scope of these Rules. Taking the main question of this paper into account, it is to be considered on what basis the PCA is to be viewed as the "most" appropriate mean for resolving disputes arising from satellite constellations.

By reiterating Article 10 of the 1998 ILA Convention, introduction of the PCA Rules provides that dispute settlement procedures specified in this instrument are available to States, international organizations and private parties. Up to now, in case of any dispute between private enterprises involving in launching satellite constellations, they resort to those mechanisms which cannot be viewed as dispute settlement means. Filling a complaint with the FCC by SpaceX on the collision between Oneweb Satellite and a Starlink Satellite is a perfect example in this regard. Despite the role of the FCC in facilitating communication of private enterprises, it does not have capacity to render a decision or award with binding feature. Thus, although, to date, no disputes in this respect have been settled by the PCA,[32] since then, private enterprises can recourse to the PCA for these kinds of disputes.

Furthermore, according to Article 34 of the PCA Rules,[33] all awards shall be binding on the parties and the parties shall carry out them without delay. Having mentioned these two concerns together with other merits of using the PCA, including the expertise of arbitrators in the realm of space activities compared to other tribunals and courts including the ICJ, it is established that the PCA, relying on the PCA Rules, would be the most appropriate mechanism for dealing with disputes of satellite constellations. It should be kept in mind, however, that given the optional nature of these Rules, resorting to the PCA on the basis of the PCA Rules is still dependent on the will of space stakeholders for incorporating arbitration clause in their agreement or contracts.

30 PCA, *Supra*, Article 10.

31 PCA, *Supra*, Introduction.

32 Viva, Dadwal, Madeleine, Macdonald, "Arbitration of Space-Related Disputes: Case Trends and Analysis", presented at 71st International Astronautical Congress (IAC), 12-14 October 2020, P. 7.

33 PCA, *Supra*, Article 34.

Summing up, despite all forms of arbitration including those discussed here may be an appropriate mechanism for resolving the disputes arising from satellite constellations, the PCA is to be viewed as the "most" appropriate mechanism. The main reason behind this issue is that in addition to advantages of other forms of arbitration (including the capacity of all space stakeholders to bring their claims before arbitration and benefiting from the binding arbitral award), basing on the PCA Rules which are in line with the 1998 ILA Convention, establishing the panel of space arbitrators who have expertise in this area and having competent at the international level, the lacunae of other dispute settlement mechanisms may be filled more appropriately by the PCA.

3. Conclusion

Today, detrimental consequences of activities of satellite constellations, notably those operated by large private enterprises including SpaceX and OneWeb, may result in arising disputes among exiting space stakeholders. Needless to say, due to the necessity of maintaining outer space for all mankind including next generations, having an appropriate dispute settlement mechanism is crucial.

Given the shortcomings of the dispute settlement mechanisms on the one hand and due to the presence of private enterprises in the area of satellite constellations on the other hand, it can be concluded that arbitration, from *ad hoc* to permanent one, is to be viewed as an appropriate mechanism for resolving disputes arising from satellite constellations. In addition, considering the advantages of the PCA including lying on the PCA Rules, it can be concluded that the PCA is to be regarded as the "most" appropriate mechanism for resolving disputes of satellite constellations which are originated from space debris and harmful interference.