The Standard of Due Diligence in Operating a Space Object

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Abstract

This paper studies the standard of due diligence in the application of Art. III of the Liability Convention. Since there is not an established definition of "fault" in international law, it is confirmed that there is a common understanding that fault/negligence is understood as a violation of the required standard of behavior, or due diligence, of a reasonable person in the circumstances. Then, it is examined if only international standard including international soft law could function as a standard of due diligence, or national licensing rules reflecting the emerging international soft law rules, and even purely national rules not necessarily reflecting the progressive development of international law could be included in elements of deciding the contents of due diligence. The tentative answer will be given that such national rules could be included especially when not a diplomatic channel but a national court is selected as a forum. Reasons for that include that a space operator is a member of the exclusive club of a state-of-the–art technology, and leading spacefaring nations tend to have more exacting licensing conditions than other Sates, as well as internationally wrongful act does not seem a precondition for a launching State acknowledged at fault and therefore liable based on Art. III of the Liability Convention.

I Introduction

This article studies the factors and standard of "due diligence" in operating satellites both by governmental or non-governmental actors so as to clarify the conditions to pay compensation of damage in outer space.
As launching and operating a space object is an activity of hazardous nature, a special regime to protect the potential victims had been developed at the UN Committee on the Peaceful Uses of Outer Space (COPUOS) during 1960's

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and 1970's. In particular, the 1972 Liability Convention[1] has created a unique two-tier liability system concerning damage caused by space object. It provides that a launching State shall be absolutely liable for damage caused by its space object on the surface of the Earth or to aircraft in flight (Art. II) and that damage caused to a space object elsewhere than on the surface of the Earth shall be addressed based on fault liability (Art. III). Such dichotomy is explained by the premise that the launching State of a damaged space object is not an innocent victim but is supposed to know the risk of operating a space object in outer space. Hence, it is decided that physical damage[2] caused to a space object in outer space will not always have to be compensated.[3]

Damage caused by the collision between functional satellites, and a functional satellite and a non-functional satellite as space debris seems to be a typical case that Article III will be applied at this stage of the exploration and use of space. However, it may be considerably difficult to identify "fault" to enable the application of Art. III as is the Iridium33-Cosmos2251 collision case in February 2009. There must be two essential reasons that make the identification of fault difficult: first is the limited capability to track the movement of space objects, or the lacking of appropriate capability of space situational awareness (SSA) offered to international society; and, second is the lack of shared legal standard to determine "fault" within the context of Article III of the Convention. Needless to say, it is not only the fault the identification is considerably difficult. As experienced by Iridium-Cosmos collision, the identification of the liable launching State may be an obstacle to the treaty application, and damage may not be always recognized when a non-functional satellite is involved in a collision. However, as such issues have been dealt with by previous works[4], this article focuses on the issue of "fault" in operating space objects in outer space.

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1 Convention on International Liability for Damage Caused by Space Objects, opened for signature 29 March 1972; entered into force 1 September 1972. 961 UNTS 187.

2 "Damage" has been limited to that of physical and material. Art. I (a) of the Liability Convention.

3 Hungary and the USSR maintained that damage caused in outer space shall be also compensated based on absolute liability system, while France and Canada stated that fault liability shall be retained. See, e.g., Soji Yamamoto, "Space Development," in *Future Society and Law* (in Japanese) (Chikuma, 1976), p. 89; A/AC.105/C.2/SR. 91 (1968), pp. 2, 4, 12-13; A/AC.105/C.2/SR.92 (1968), pp. 6-7.

4 Analysis of the first satellites collision case is found, e.g., Frans G. von der Dunk, "Too-Close Encounters of Third-Party Kind: Will the Liability Convention Stand the Test of the Cosmos 2251-Iridium33 Collision?," *Proceeding of the International Institute of Space Law 2009 (2010)*, pp. 199-209; Ram Jakhu, "Iridium-Cosmos Collision and Its Implications for Space Operations," in Kai-Uwe Schrogl et al., eds., *Yearbook on European Space Policy 2008/2009 (2010)*, pp. 254-275; Martha Mejía-Kaiser, "Collision Course: 2009 Iridium-Cosmos Crash," *Proceedings of the International Institute of Space Law* 2009 (2010), p. 274-284.

II "Fault" as the Violation of "Due Diligence"

1 What is Fault?

What does "fault" mean for the purpose of the application of the Liability Convention? No definition exists in the Convention, for it was agreed during the drafting stage not to define the term so as to avoid fruitless discussions which could hamper the successful adoption of the Convention.[5]

Nor does a clear-cut definition exist in customary international law.[6] In addition to "fault," in civil law system, Anglo-American "negligence" has been extensively used in multilateral judicial process and scholarly works in international law. Difference in the concept of two terms is sometimes explained as "fault" underling the subjective psychological attitudes whereas "negligence" emphasizing the aspect of actions as the violation of "due diligence" or "duty of care" under the circumstances. Fault is often assessed by the Roman concept of "culpa," which is the failure to act "as the reasonable man under the circumstances."[7] Negligence is said to require "the existence of a duty, based on law or custom, and negligence means the breach of that duty."[8]

Can the two terms be understood as almost the same notion or must it be clearly discerned? It is reported that the United States government equated fault to negligence in the ratification process of the Liability Convention at Senate Committee on Aeronautics and Space Sciences.[9] Besides, that the notion of "due diligence" played an important role in international law since the Alabama Claims seems to be a key to answer that question. Based on such jurisprudence, due diligence is thought to be an objective requirement for conduct and its violation is regarded as negligence especially by the scholars who support objective responsibility theory. Likewise, scholars who support fault responsibility interpret due diligence as the test to decide fault (culpa). It is highly suggestive that Prof. Ian Brownlie pointed out that the "fault" is used to mean a breach of legal duty, an unlawful act at the tribunals and by international lawyers.[10] It seems that due diligence can be a reference point for determining both fault and negligence in the present international law, and therefore, the difference of the

5 Carl Q. Christol, "International Liability for Damage Caused by Space Objects," *American Journal of International Law,* vol. 74 (1980), pp. 368-369.

6 Max Planck Encyclopedia of Public International Law (1987) defines "fault" as a set of blameworthy psychological attitudes of the author of an act or omission including either without intent to cause an unlawful consequence (culpa) or with it (dolus).

7 Swiss Reinsurance, *Space Debris: On Collision Course for Insurance?* (2012), p. 23.

8 *Ibid*.

9 U.S. Senate, 92nd Congress, Report on the Liability Convention, Analysis and Background Data 27 (1972), cited in *ibid*., pp. 23, 37.

10 Ian Brownlie, *Principles of Public International Law*, 7th ed. (Oxford Univ. Press, 2008), p. 439.

function of fault and negligence has been narrowed to the extent both terms can be used almost interchangeably in international law.[11]
Likewise, at present, the common elements in the function of fault and negligence have been increasingly recognized in major legal systems.[12] It may be said that this finding is shared with Prof. Irmgard Marboe through the detailed comparative analysis of domestic civil laws of France, Germany, the United Kingdom, the United States, and also the Principles of European Tort Law so as to identify general principles of law in this field.[13] She concludes that "there is a common understanding on what represents 'fault' in various jurisdictions. It is a violation of the required standard of behaviour of a reasonable person in the circumstances."[14]
Common trend found in identifying fault is the clarification of the contents of the required standard of conduct rather than the traditional emphasis of psychological attitude even in civil law jurisdictions. May it be called due diligence, duty of care, standard of care, reasonable care under the circumstances, etc., determining concrete and objective requirements of actions or omissions seems a predominant practice today.[15] For the purpose of this article, fault and negligence are used interchangeably and understood that the breach of due diligence will result in fault/negligence of an actor.

2 International Minimum Standard vs The Standard of National Treatment

In order to clarify a standard of conduct, attention has to be paid to the two categories of standard developed in international law in relation to the appropriate treatment of the alien. The first is "the international minimum standard" corresponding to a case of a reasonable man of average ability in the same group of people, which is called *diligentia boni patis familias* or *diligentia diligentis parties familias* (due care of a prudent manager, la diligence d'un bon père de famille) in legal maxims. In contrast, the contents and degree of due

11 See, e.g., the Alabama Claims (1872), the Spanish Zone of Morocco Case (1925), the Trail-Smelter Case (1941), and the Corfu Channel Case (1949). In the field of international space law, for instance, Dr. Martha Mejía-Kaiser wrote that "fault of the space operator needs to be proved typically in the form of negligence. Negligence is rooted in the failure to use due care in a given situation" in Mejía-Kaiser, *supra* note 4, p. 277.

12 See, e.g., Tomoyuki Yuyama, "Fault and Due Diligence in International Law of State Responsibility (1) (in Japanese)", *Kagawa Law Review*, vol. 22, no. 2 (2002), pp. 127-178.

13 Irmgard Marboe, "The Importance of Guidelines and Code of Conduct for Liability of States and Private Actors," in *idem* ed., *Soft Law in Outer Space* (Böhlau, 2012), pp. 125-135

14 *Ibid*., p. 135.

15 See, e.g., Yuyama, *supra* note 12; Tomoyuki Yuyama, "Fault and Due Diligence in International Law of State Resonsibility (3) (in Japanese)," Kagawa Law Review, vol. 24, nos. 3 & 4, (2005), pp. 35-99.

diligence are sometimes determined especially by the emphasis of the subjective ability, concrete surrounding situation and special circumstances. Due diligence in this type is called *diligentia quam in suis* (with the same care he/she would exercise over his/her own property) and thought to correspond to "the standard of national treatment" to protect the alien under the jurisdiction or control of a State.[16] The degree of obligatory diligence of the latter may be lower or higher depending on the State concerned in a certain circumstance, but normally it is deemed lower in the light of the historical development of international law.
If the standard of due diligence in operating a satellite domestic standard of a certain national law. Such judgment may be influenced by the forum in which fault/negligence will be determined. Different from a diplomatic channel to be resorted to in accordance with the Liability Convention, it is expected that a domestic court will more liberally rely on national rules, binding and non-binding, which have been imposed to a space operator. That is partly because of the few established binding international rules for the satellite traffic. National laws of the either or both countries to enter into a negotiation, or even the law of the third country based on some connections (such as the prior agreement of the two launching States) may be applied to fill the gap of international law.[17]
It, of course, has to be underlined that international legally-binding rules, represented either in treaty or customary international law, constitute the most important factor to identify fault/negligence, and then non-binding soft law rules may be taken into consideration depending on the type of actors. As satellite operators are expected to be equipped with highly sophisticated, state-or-the-art technical capability and presumed that they are aware of the ultra-hazardous nature of the launch and operation of a satellite, they are *prima facie* members of exclusive professional community, and consequently, they are thought to be under their own specific rules and practices, similar to the seamanship.[18] Thus, even non-binding guidelines and code of conduct could be taken into consideration to assess if they are faulty/negligent. Such soft law rules are, often times, closely related to the national standard, for international technically-based guidelines have been translated in national licensing regime. Likewise, national standard of most advanced space powers can also be developed into international standards and recommendations. It has to be noted that such entwined non-binding rules could blur the difference between the international

16 See, e.g., Brownlie, *supra* note 10, pp. 524-528.

17 The similar consideration in applying Art. XII of the Liability Convention would be required to analyze the standard of due diligence to determine fault.

18 Prof. Marboe finds that "[i]n order to assess if the standard of care has been violated, a number of factors have to be taken into consideration. These include the expertise to be expected of a person carrying on activity-which can be assessed on the basis of technical and professional standards, such as the 'state of the art' of the respective industry, the foreseeability of the damage as well as the availability and the costs of precautionary or alternative measures." Marboe, supra note 13, p. 135.

minimum standard and the standard of national treatment. This may be affirmatively should be that of "due care of a prudent manager" or "the same care the person would exercise over his/her own property" is closely related with the question as to whether the required standard of action can be well translated as a pure international standard or would have to borrow understood as the internationalization of soft law professional standard in development.
In the next section, the possible reason to take the standard of national treatment will be studied from a different standpoint.

III Is Fault Liability Really Retained in Art. III?

The Liability Convention provides that "[i]n the event of damage being caused elsewhere than on the surface of the Earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible." Thus, even if a launching State acts without any fault, it shall be also liable as long as its private persons for whom it is responsible act in violation of due diligence, or the required standard of conduct under the circumstances.
It is a common understanding that fault-based liability specified in Art. III reflects the maintenance of the traditional liability system in international law of responsibility, but it may be doubtful if it really retains State liability due to fault. The deviation from the traditional liability theory must be recognized. That will be elaborated in this section to better clarify the standard of due diligence.
The slight deviation recognized by the first reading of Art. III is that even if a launching State acts without any fault, it shall be also liable as long as its private persons for whom it is responsible act in violation of due diligence. Does not such abandonment of the no-act-of-the-state exception amount to abandon the fault liability approach in traditional sense? In customary international law, States are not regarded as being responsible for the transboundary damage and therefore not liable as long as it has adopted and enforced appropriate effective national laws and/or regulations, to the extent practicable under the circumstances, to ensure that its activities would not cause significant injury to the environment outside its jurisdiction and/or control.[19]
Elements of due diligence imposed on to States concerning "ultra-hazardous" or abnormally dangerous activities, are concretized in: 1) effective national legislation, 2) effective control and continuing supervision by the relevant governmental agencies, and 3) law enforcement in case of a violation.[20]

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19 See, e.g., The American Law Institute, *Restatement of the Law Third the Foreign Relations Law of the United States*, vol. 2 (1986), Section 601, pp. 103-120.

20 Kimio Yakushiji, "Transboundary Harm and State Liability for International 'Lawful Act' (in Japanese)," *Journal of International Law and Diplomacy*, vol. 93, nos. 3 & 4 (1994), p. 130.

In contrast, under the Liability Convention, even if Space Activities Act of State X contains appropriate licensing systems, controlling and supervision provisions and law enforcement provisions in conformity with international standards and State X faithfully conducts its obligation, that State will be liable in case its private operator is found the failure to observe a reasonable standard of care required from satellite operators.[21] It may be interpreted that non-observance of due diligence by the private operator itself would inevitably imply the fault/negligence of State X and therefore, liability for fault is retained. However, that stretches too far, almost to breaking point, the connection which must exist between the conduct of a State's organs and its international responsibility to observe due diligence, and such explanation would be tantamount to sophism. The fundamental nature of the fault liability in outer space has to be clarified to assess the degree of required standard of conduct for operators of space objects, governmental or non-governmental. Is a launching State liable for it has committed an internationally wrongful act due to its fault and thus being internationally responsible? Or rather, is it that a proposition that "a launching state which is assessed at fault shall be liable to make compensation" itself makes a "primary rule"? In other words, the second interpretation implies that a launching State can be liable due to fault without being internationally responsible. If the second interpretation is taken, only the failure to pay compensation will render that launching State in a position that committed an internationally wrongful act. The latter interpretation implies that the Liability Convention created a unique liability regime not only to the damage on the surface of the Earth and to aircraft in flight but also to that taken place in outer space in that fault plays a role of triggering payment without being held internationally responsible.

While it seems peculiar at first glance, the latter interpretation may be corroborated by the subsequent development of international law. It is true that the drafting history of the OST and the Liability Convention cannot be read as a whole to support the second interpretation.[22]

However, it may also be said that a future direction could be found in early proposals and discussions by some of the delegations. The notion of strict liability concerning damage in outer space was supported as early as since mid 1960's in

21 This is the logical consequence of the unique State responsibility regime of the UN space treaties on outer space. Outer Space Treaty (OST) provides that States shall be internationally responsible for even activities carried on by its non-governmental entities and a launching State shall be internationally liable for the commercial private launch as established in the OST. See, Arts. VI and VII 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, signed 27 January 1967; entered into force 10 October 1967; 610 UNTS 205.

22 R. Lefeber, *Transboundary Environmental Interference and the Origin of State Liability* (Martinus Nijhoff, 1996), p. 162.

relation to the interpretation of Art. VII of the OST,[23] and the single approach of non-fault liability both on the Earth and in outer space was voiced during the drafting of the Liability Convention.[24] Half a century later, the notion of liability disconnected from breaches of a legal duty seems to have firmly rooted independent of a specific space treaty provisions due, in part, to the longstanding efforts at the International Law Commission (ILC) to adopt an agreement on the international liability for injurious consequences out of acts not prohibited by international law, started more than a decade later of the adoption of the Liability Convention.[25] A list of treaties providing for liability without responsibility has become longer all the time and has been accompanied by the emerging *opinio juris* while it has not been completely matured into customary international law yet.

If international wrongful act is not acknowledged by fault/negligence, does it substantially influence in deciding the standard of due diligence? It may be answered in the affirmative in the sense that focus could be placed on reasonable and equitable allocation of damage than on the observance and non-observance of the established international law. In other words, it could be said that the standard of due diligence does not have to be strictly limited by the internationally established rules, especially by legally-binding ones. Rather, national standard, either laws or domestic soft law rules, to a certain category of operators could be taken into consideration to assess the observance of due diligence. Taking note of that, in order to answer this question, the next section will deal with the standard of due diligence in the Iridium33 – Cosmos2251 collision case.

IV Iridium33-Cosmos2251 Collision Case

As mentioned in section I, it is useless to consider to which party fault is attributable in this case, for the launching State of Iridium33 cannot be clearly identified unless the USA regards itself as such State, which did not happen, at least in a very public way. However, presupposing that the USA is a launching State of Iridium, a hypothetical case study will be carried out.

At the time of the collision, Iridium was a fully functioning Satellite while aging,[26] and Cosmos had been non-functioning, without being controlled from

23 Bin Cheng, "The 1972 Convention on International Liability for Damage Caused by Space Objects", in *idem*, ed., *The Studies in International Space Law* (Clarendon Press, 1997), p. 291.

24 See, *supra* note 3.

25 Prevention of Transboundary Harm from Hazardous Activities, A/RES/62/68 (6 December 2007); Allocation of Loss in the Case of Transpoundary Harm Arising out of Hazardous Activities, A/RES/61/36 (4 December 2006).

26 It was launched from Baikonur, Kazakhstan by Russian Proton Rocket in 1997. Russia furnished information to the UN Secretary General, but Iridium33 was not registered with UN registry.

the ground since 1995. Reasons for the collision remain to be disclosed, but various experts have pointed out that it was Cosmos that crossed the path of Iridium. Damage to Iridium must have been inflicted by the erratically floating Cosmos in terms of causal connection. If so, it has to be studied if it is a negligent action of Russia not to de-orbit of its military satellite that lost its function only after two years of the operation. The international and national standard and regulations under which both satellites were operated are listed below to examine to which side fault is found.

1 International Standard

There are few traffic rules in outer space different from other areas on the surface of the Earth and in the air. It was not until 2006 when the first comprehensive report on space traffic management was published by the International Academy of Astronautics (IAA).[27] A few rules existed when Cosmos2251 was launched in 1993 include the 1993 Resolution to recommend to re-orbit a end-of-life satellite from the geostationary orbit (GEO) adopted at the International Telecommunication Union (ITU) after seven-year study.[28] In the same year, Inter-Agency Debris 27. Coordination Committee (IADC) was established to which both USA and Russia became original members, and information exchange and consultations among participating space agencies developed into its Space Debris Mitigation Guidelines in 2002.[29] UNCOPUOS Space Debris Mitigation Guidelines endorsed in 2007 consist of seven succinct resolutions[30] which could only be fully implemented by the help of a set of IADC technical requirements including its Guidelines, mitigation methods and procedures as well as standards made at the non-governmental International Organization for Standardization (ISO).[31]

Thus, as of today, there are not legally-binding rules how to mitigate space debris and how to operate and control a satellite from the ground. There are only technically-based soft law guidelines.[32]

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27 IAA, *Cosmic Study on Space Traffic Management* (2006).

28 Recommendation ITU-R S.1003 (1993). This Recommendation was amended in 2003 as ITU-R S.1003-1 in line with IADC guidelines (2002) 5.3.1. see, also, *infra* note 29.

29 IADC, IADC Space Debris Mitigation Guidelines, IADC-02-01 (15 October 2002). The latest version was adopted in 2007. <www.iadc-online.org/index.cgi?item=docs_pub>.

30 A/62/20 (2007), II.C.3, paras. 116-128 & Annex (pp. 47-50). See, also, A/RES/62/217 (1 January 2008).

31 ISO, Systems and Operations TC20/SC14, <www.iso.org/iso/iso_technical_committee.html?commid=46614>.

32 In this regard, it may merit mentioning that the UNCOPUOS Space Debris Mitigation Guidelines is not even a General Assembly Resolutions but only was endorsed as technical rules.

2 Possibility of Russian Fault

Granting that the IADC Guidelines and COPUOS Guidelines are included in the professional standard of care, measures specified below would have to be observed by the satellite operators. As for Cosmos2251, the operator "should" re-orbit a satellite, preferably by direct re-entry, from the Low Earth Orbit (LEO)[33] into the atmosphere within 25 years after the completion of its mission.[34] COPUOS Guidelines recommends that "spacecraft—that have terminated their operational phases in orbits that pass through the LEO regions should be removed from orbit in a controlled fashion. If this is not possible, they should be disposed of in orbits to avoid their long-term presence in the LEO region."[35]

Considering the date of the launch and the end-of-life of Cosmos, it seems clear that Russia did not violate any regal rule or professional rule of behavior by leaving that space debris in outer space. (As a reference, the first space debris mitigation guideline of the Russian Space Agency was released in 2000.[36])

Then, it has to be studied if Russia knew the movement of Cosmos before it entered the path of Iridium. As Art. IX of the OST obligates States Parties to conduct all their activities in outer space "with due regard to the corresponding interests of all other States Parties" and to "undertake international consultations" when it has reason to believe that its planned space use would "cause potentially harmful interference with activities of other States Parties," Russia is thought to be under the legal obligation to inform the danger to the US if it had a substantial knowledge of the movement of Cosmos.[37]

However, there is no established evidence that Russia recognized such danger while the capability of its Space Surveillance System (SSS) said to be only slightly inferior to that of the US.[38]

3 Possibility of the US Fault

(1) Fault of the Iridium, LLM

As with the case of Russia, Iridium was not under the legal obligation of specific space traffic management rules as of February 2009. However, since Iridium was a functioning satellite, how to observe rules of the professional code of ethics would have to be taken into consideration in assessing if it met with

33 The accident was taken place at about 790 kilometers altitude.

34 Objects Passing through the LEO Region, 5.3.2 of the IADC Guidelines.

35 Guideline 6: Limit the Long-Term Presence of Spacecraft and Launch Vehicle Orbital States in the Low-Earth Orbit (LEO) Region after the End of Their Mission

36 Rosaviakosmos, Rosaviakosmos Standard OCT 134-1023-2000 (2000).

37 Since the third sentence of Art. IX refers to the future space use, it may be said that Russia is not obligated to proceed to consultation with USA. However, even in that case, the obligation of international cooperation specified in the first sentence would nevertheless obligate it to inform it to the USA.

38 Dunk, *supra* note 4, p. 204; Nicholas L. Johnson, "Space Traffic Management: Concept and Practice," *Space Policy*, vol. 20 (2004), p. 82.

due diligence. As for Iridium33, the recommendation of IADC Debris Mitigation Guidelines with respect to "Preventions on On-Orbit Collisions" would be applied: it sets out that if reliable orbital data is available, and if the collision risk is not considered negligible, avoidance manoeuvres of spacecraft may be considered.[39] In addition, according to the UNCOPUOS Guidelines, an on-orbit avoidance manoeuvre should be considered if orbital data indicating a potential collision is available.[40]

As a requirement for operating a space object, Iridium was also under a series of domestic administrative standards, recommended practices and administrative rules and conditions.[41] It is uncertain. This is the issue of choice between "minimum international standard" and the "standard of national treatment." The operator of Iridium was under such domestic conditions. In terms of national debris mitigation efforts, NASA adopted its safety standard guidelines in 1995[42] to be followed by the governmental mitigation standard practices two year later.[43] As a commercial satellite, Iridium was not directly controlled by the governmental standard, but through the licensing regime, the private actor such as Iridium could be subject to the contents of governmental standard, considering the time Iridium33 was launched.

Governmental regulations on the satellite operations in the LEO started about a decade later comparing with regulations in GEO satellites. It was not until 1994 when the US Federal Communications Commission (FCC) noted space debris issues in granting its license.[44] However, when Motorola Satellite Communications was granted a license to operate 66 Iridium satellites constellation in 1995, FCC did not assign or coordinate orbital altitudes for LEO constellations. The FCC also did not impose post-mission requirements to LEO constellation operators. It was left up to the individual operators to determine end-of-life disposal methods,[45] and Motorola voluntarily pledged

39 5.4 of the IADC Guidelines.

40 Guideline 3: Limit the Probability of Accidental Collision in Orbit.

41 It is uncertain that that such non-biding domestic rules could be a factor to asses the breach of due diligence on the part of Iridium.

42 NASA, NASA Safety Standard 1740.14 Guidelines and Assessment Procedures for Limiting Orbital Debris (1995), <http://orbitaldebris.jsc.nasa.gov/library/NSS1740_14/nss1740_14-1995.pdf>.

43 NASA & Department of Defense (DoD), U.S. Government Orbital Debris Mitigation Standard Practices (1997). <www.nesdis.noaa.gov/CRSRA/files/USG_Orbital%20Debris_Standard_Practices.pdf>.

44 K. Kensinger, S. Duall & S. Persaud, "The United States Federal Communications Commissions Regulations Concerning Mitigation of Orbital Debris", Proceedings of the Fourth European Conference on Space Debris (2005), p. 571.

45 AIAA, *Special Project, MEO/LEO Constellations: U.S. Laws, Policies and Regulations on Orbital Debris Mitigation* (1999), pp. 2-3, 18; 47; USC. Sec. 151 et seq; 47 CFR Part.25 (1997).

the post-mission de-orbit procedures.[46] About the time when Iridium LLC was transferred a license in 2001,[47] the FCC dealt with orbital debris mitigation issues on a case-by-case basis in accordance with its rules,[48] and the Commission had just announced that it intended to commence a rulemaking proceedings concerning orbital debris mitigation issue.[49]

Iridium made a pledge when requesting a license that "[i]f an appropriate information or service is available, consideration will be given to maintaining an ongoing situational awareness capability designed to provide a warning of the collision risk posed by tracked objects" and "[i]dentify, satellite station keeping maneuvers will be used to minimize the possibility of collision."[50] As such promise was made approximately the time when the IADC guidelines were to be adopted, the degree of due diligence on collision avoidance that Iridium was subject to could be equal to the de-orbiting requirements of LEO satellites reflected in 5.3.2 of the IADC Guidelines.

The FCC subsequently amended licensing rules in 2002, which obligated applicants to disclose end-of-life orbital debris de-orbit plans as a part of the licensing conditions.[51]

The Commission, in 2004, adopted the comprehensive orbital debris mitigation rules,[52] by which space operators requesting FCC space station authorization shall submit an orbital debris mitigation plan under its licensing rule[53] starting 19 October 2005.[54] By that amendment, a de-orbit plan which enables the reentry in the atmosphere within 25 years became obligatory to obtain a license in most cases.[55]

The FCC stated that it would examine applicants' plans in light of the US Government Standard Practices and the IADC Debris Mitigation Guidelines.[56]

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46 The procedures specifies: 1) when a satellite reaches end-of-life, the satellite would be lowered from at 780 km by 10 km; and 2) a satellite would complete a series of perigee-lowering burns until no fuel is left. The satellite perigee would be at 250 km and from that orbital position, one year later, the satellite would reenter the atmosphere and burn up. AIAA, *supra* note 38, p. 4.

47 Iridium LLC took over the operation of Iridium satellite in 2001 after Motorola went bankruptcy in 1998.

48 47 CFR Sec. 25.143 (b)(1); 15 FCC Red at 15205, cited also in FCC, DA 01-1636 (17 July 2001), p. 8.

49 15 FCC Red at 16188, cited in *ibid.*

50 47 FCC, *ibid.*, p. 10.

51 47 CFR Part. 25 (2002).

52 CFR, secs. 25.143(b), 25145(e) & 25.217(d). Public Notice 04-1724, Report No. SPB-208 (16 June 2004); FCC, FCC 04-130 (21 July 2004).

53 CFR, Sec. 25.115.

54 70 Fed.Reg. 59.276 (12 October 2005); DA 05-2698 Report No.SPB-112 (13 October 2005), p. 2.

55 FCC 04-130, *supra* note 52, pp. 35-38.

56 Ibid.

It is true that the amended and stricter FCC rules after 2002 would not be imposed to the operator of 66 Iridium satellites, but through its volunteer pledge to observe re-entry plans were as strict as what were to become internationally standardized technical guidelines among advanced experts in this field, or the 2002 IADC Guidelines, it may be said that Iridium would be found to act negligently of its required standard if the following conditions were satisfied: 1) availability of information: reliable orbital congestion data were available; 2) predictability: the collision with other space object was foreseeable; and 3) reasonableness to expect Iridium, LLC to maneuver to avoid the collision under that specific circumstance. It is concluded from previous works that it is not proved that the operator of Iridium has obtained appropriate data from Commercial and Foreign Entities (CFE) pilot programs and from other sources. Thus, it is also concluded that it is not proved that a possible collision was predictable.[57] It was possible that maneuvering from the ground could have ended the function of that already aging satellite.[58] Hence, even if the Iridium LLC had recognized a possibility of a collision, it may be concluded that such maneuver cannot be expected from a private company, considering the proceeds it has generated and the fact that only third-party legal liability insurance policy was bought.[59] The assessment of the reasonableness to expect Iridium to act in a certain way is subject to a certain margin of discretion. As a professional entity engaging in a state-of-the-art technology with hazardous nature, the degree of the due diligence should be higher than that of a careful person of average abilities outside the space industry. It remains uncertain if the standard of due diligence for Iridium is deemed as only international rules such as IADC and COPUOS guidelines and ISO standards or includes the contents of its voluntary pledge to the FCC based on the US practice.

(2) Fault of the USA

If the Iridium, LLC was not faulty, that does not automatically mean that the USA is not. US Air Force is said to have provided accurate and precise SSA data only to human space program and intelligence satellites prior to the satellites crush, and it was only after the crash when US Air Force started to provide

57 Mejía-Kaiser, *supra* note 4, esp. pp. 278-279; Jakhu, *supra* note 4, esp. pp. 257-258; Dunk, *supra* note 4, esp. p. 204; T.S. Kelso, "Analysis for the Iridium33-Cosmos 2251 Collision," AAS 09-368 (2009), pp. 2-4. US House of Representatives Committee on Science and Technology Subcommittee on Space and Aeronautics, Hearing Charter: Keeping the Space Environment Safe for Civil and Commercial Users (28 April 2009), pp. 13-14; Tiffany Chow, SSA Sharing Program: SWF Issue Brief (10 November 2010), p. 9; A/AC.105/C.2/L.255 Corr.2 (14 April 2005); National Defense Authorization Act of 2004, Public Law 108-136, 10 U.S.C.sec.2274(i). Also, see, <www.space-track.org>.

58 James E. Dunstan & Bob Werb, *Legal and Economic Implications of Orbital Debris Removal: A Free Market Approach* (8-10 December, 2009), p. 5.

59 *Ibid*.

more precise data to even non-SSA sharing program partners when it recognized above a certain collision possibility.[60] That resulted in more than nearly 50 times avoidance maneuvers by the private operators by March, 2010.[61] If US Air Force was able to provide better warning signals just after the accident, it is natural to assess that it could have been able to do that just before that.
Granting that the USA did not do its best in providing SSA information, does it make the USA a negligent launching State? To answer it, the evidence available about the US SSA capability is too insufficient, and the judgment about the US national security policy would have to be made precisely on this point. Accordingly, this question would be never even questioned.

V Conclusion

From the case of Cosmos-Iridium collision, it seems that if national licensing conditions including voluntary-submitting conditions will be taken into consideration remains to be solved. If national regulations are deemed to be the reflections of already established soft law rules in international society, then, there may be an affirmative answer to that question. Otherwise, if a diplomatic negotiation is engaged in accordance with the Liability Convention, it is doubtful if such elements will be thought. The international minimum standard in that case, may be noted. If a national court is chosen to settle the dispute, then, the analysis of domestic conditions may well be conducted as a subsidiary means. In any case, international soft law be taken into consideration among satellite business operators.
As a standard of due diligence in operating a satellite, a possible list will be the following lists while it will differ depending on the forum in which fault is examined:

1 UN treaties on outer space
2 The 2007 UNCOPUOS Space Debris Mitigation Guidelines;
3 The 2002/2007 IADC Space Debris Mitigation Guidelines;
4 Regional Space Debris Mitigation Standard such as European Code of Conduct for Space Debris Mitigation;
5 National rules as a reflection of the international legal rules and non-legal soft law rules as a professional ethics; and
6 National rules as a progressive development of and more exacting than the international soft law rules.

Since it seems that the fault liability applied in outer space does not presuppose a internationally wrongful act, the degree of due diligence could be higher to more appropriately allocate the loss from damage. Thus, there will be the possibility including the national licensing conditions one of the standard to indentify due diligence.

60 Mejía-Kiaser, *surpa* note 4, p. 278.
61 Chow, *supra* note 57, p. 5.