

**LEGAL REGIME FOR GNSS FOR CNS/ATM FOR INDIA:
Application of Articles VI & VII Outer Space Treaty to the GAGAN SBAS**

Dr.Ranjana Kaul¹
Partner, Dua Associates
(Law Offices)
New Delhi, India
ranjanakaul@duaassociates.com

Abstract

Indian aviation has grown at a phenomenal pace during the last two decades since liberalization in 1990-1991. Today, India has emerged as the 9th largest civil aviation market in the world². From 1990 to 2010, Indian aviation grew from 2 to 14 scheduled airlines operating domestic and international routes (excluding cargo airlines); from 23 to 39 non scheduled operator; from 235 to 735 aircrafts; from 50 to 83 operational airports; from a passenger handling capacity of 66 million to 235 million; and growth in air cargo from 3 million to 4.5 million tons. India now ranks 4th after US, China and Japan in terms of domestic passenger traffic which is expected to grow at a rate of 9%-10% annually to achieve 150 million- 180 million passengers by 2020, despite the 2008-2009 down turn in the global economy³. India has 125+ civil airports, through which 99 domestic and 79 international ATS routes operate in, out and through Indian airspace and oceanic airspace that comprises Indian FIR⁴. The rationale for transition to a technologically superior, efficient and accurate Air Navigation Service delivery mode is clear. The importance and urgency find technological solutions to deal with the convergence of air space and outer space is evident from the decision of the International Civil Aviation Organization⁵ to achieve transition from the current traditional aeronautical navigation tools for air traffic management to the Global Navigation Satellite Systems ('the GNSS')⁶, including the Space-Based Augmentation System (SBAS) as part of the Satellite-Based Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM)⁷ for civil aviation. The challenge for India is to match the rapidly growing demand for air transportation with satisfactory levels of modernization, safety and security, upgrading technology and expanding infrastructure, including airports, runways and Air Traffic Management capabilities. A critical component to deal with the challenge is the decision to make the transition to satellite based

¹ B.A.(Bombay University); MA; PhD. (University of Poona) LLB (University of Delhi); LL.M (Institute of Air & Space Law, Faculty of Law, McGill University, Montreal, Canada); Partner, Dua Associates, (Advocates & Solicitors) , New Delhi, India.

² A Report on Aviation Industry in India: www.icmrindia.org

³ Ibid.

⁴ Flight Information Region or FIR refers to airspace of defined dimensions within which flight information service and alerting service are provided by the Air Traffic Control centers responsible for specific FIR for the purpose of air traffic management. To enable Contracting States to fulfill sovereign obligation required in terms of Article 28 of the Chicago Convention, 1944, ICAO formulated Standards and Recommended Practices (SARP) for Air Traffic Rules and Procedures in respect to international civil aviation. Contracting States are required to harmonize and implement SARPS through respective air navigation service providers (ANSP). The Indian FIR comprises 2.2 million sq. kilometers of continental airspace or Indian airspace and 3.8 million sq. kilometers of oceanic airspace over the Indian Ocean. www.aai.aero

⁵ International Civil Aviation Organization : www.icao.int ('ICAO')

⁶ Global Navigation Satellite System (GNSS) is the standard generic term for satellite navigation systems that provide autonomous geo-spatial positioning with global coverage. Also refer to:

Kaul, *Liability implications of the use of Global Navigation Satellite Systems (GNSS) for Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM) in civil aviation, with special focus on India*, Annals of Air & Space Law (2008), McGill University, Montreal, Canada.

⁷ Following the 1990 Gulf War, the US made available the GPS technology for civilian use worldwide, used only for military purpose until then.

navigation for CNS/ATM for civil aviation. This will be achieved through the GAGAN⁸ SBAS, a joint venture project between Indian Space Research Organization⁹, the national space agency, and Airports Authority of India¹⁰, the national air navigation service provider ('ANSP'). We know that ISRO and AAI are each governed by different international legal regimes that give rise to distinct treaty rights and obligations. As such, preparatory to establishing a liability regime for GAGAN, it becomes necessary to understand and reconcile these obligations, and to identify aspects that may overlap or be in conflict. Such an analysis would ensure harmonious implementation of the treaty obligations attached to the functioning of ISRO and AAI through national laws. In order to contribute to that debate, this paper will specifically examine and distinguish the application of Articles VI and VII of the Outer Space Treaty, 1967¹¹ to ISRO in context to provisions of the Chicago Convention, 1944¹² applicable to the ANSP, in respect of the GAGAN SBAS project, aimed at providing satellite navigation for CNS/ATM for civil aviation in the Indian FIR.

⁸ GAGAN: is an acronym for the Indian GPS interoperable Geo Augmentation Navigation Satellite. The acronym 'GAGAN' means 'sky' in Sanskrit, the root or mother language for all Indian languages.

⁹ Indian Space Research Organization: ['ISRO'] www.isro.org

¹⁰ Airports Authority of India: ['AAI']: is a public sector undertaking, is established by Airports Authority of India Act, 1994 ['AAI Act']. AAI functions under the administrative control of the Ministry of Civil Aviation. The AAI is the sole Air Navigation Service Provider for the Indian airspace and over the Indian Ocean FIR. As the ANS provider AAI operates ground installation at all airports and at 25 other locations to ensure the safety of aircrafts.

AAI is also an airport operator. It manages 125 airports, that include 11 are international, 81 domestic and 8 customs airports and 25 civil enclaves in defense airfields. www.aai.aero

¹¹ Outer Space Treaty, 1967: *Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies*. Opened for signature at Moscow, London and Washington, on 27 January, 1967. *Source* : 610 UNTS 205. 199 states have ratified and 27 have signed the treaty. ['OST'] www.oosa.unvienna.org

¹² Chicago Convention, 1944: *Convention on International Civil Aviation, signed at Chicago, on 7 December 1944* (ICAO doc.7300) ['Convention'] www.icao.int

GAGAN SBAS & Indian Regional Navigation Satellite System (IRNSS)

The rapid transformation of the Indian aviation sector dictated the urgent need to find appropriate technology solutions. Since the management of Indian airspace is a sovereign function in terms of Article 28¹³ of the Chicago Convention, the decision by the government of India to implementation of the GAGAN SBAS to provide CNS/ATM over the Indian FIR was a step in that direction. GAGAN, the GPS aided /interoperable, Indian geo-augmentation navigation satellite system is jointly owned by ISRO and AAI in terms of the Memorandum of Understanding dated 25th August 2001¹⁴. ISRO and AAI are developing the entire system, through all stages of Technology Demonstration System ('TDS') and Final Operation Phase (FOP), at an estimated cost of USD 170 million¹⁵.

GAGAN will be implemented in three phases. In the first phase, completed in 2007, ISRO successfully implemented the Technology Demonstration System (TDS) using the newly

established ground segment, consisting eight Indian Reference Stations (INRS), linked to the Master Control Centre near Bangalore¹⁶. This was followed by Preliminary System Acceptance Testing (PSAT) resulting making the 4F1 navigation transponders interoperable with INMARSAT to enable testing and validation of the Signal-in-Space (SIS). After a delayed start to the second phase in 2009 because of failure of two ISRO launch missions¹⁷, the GSAT-8 satellite¹⁸ was eventually launched on Ariane-5 launch vehicle on May 22nd 2011 from Kourou, French Guyana. By June 2011, the new Navigation Control Centre completed the In- Orbit Testing (IOT) of the 24 Ku-band GAGAN transponders, thus putting the payload into the pre-operational service stage. It is expected that the process of certification for compliance of GAGAN Signal-in-Space, with ICAO SARP for safety-of-life applications, including air traffic control, will be completed by 2013. After successfully complete the trials and certification processes, Director General of Civil Aviation will issue necessary certification¹⁹.

The second GAGAN payload will be hosted on the GSAT-10 satellite, scheduled for launch in 2012. A third payload on board GSAT-12 is scheduled for launch in 2013. Once GAGAN SBAS is fully operational²⁰, ISRO and AAI will be responsible for clearly defined aspects for its management. Thus, AAI will continue to perform the functions of the ANSP under provisions of the Convention²¹

¹³ Ibid:

“ Article 28 : Air navigation facilities and standard systems

Each contracting State undertakes, so far as it may find practicable, to: (a) Provide, in its territory, airports, radio services, meteorological services and other air navigation facilities to facilitate international air navigation, in accordance with the standards and practices recommended or established from time to time, pursuant to this Convention; (b) Adopt and put into operation the appropriate standard systems of communications procedure, codes, markings, signals, lighting and other operational practices and rules which may be recommended or established from time to time, pursuant to this Convention; (c) Collaborate in international measures to secure the publication of aeronautical maps and charts in accordance with standards which may be recommended or established from time to time, pursuant to this Convention.” www.mcgill.ca ; www.icao.int

The international obligation under Article 28 is harmonized in section 12(2) of the AAI Act, 1994

“It shall be the duty of the Authority to provide air traffic service and air transport service at any airport and civil enclaves.” www.aai.aero

¹⁴ www.hinduonnet.com Article dated 29th November 2002

¹⁵ www.isro.org

¹⁶ Kaul & Jakhu: Regulation of Space Activities in India, Ed.Jakhu, Springer (2010) pp.185

¹⁷ ISRO had failure of two launch missions – GSAT-4 and GSAT-6 in 2010 which delayed the GAGAN project by one year. www.isro.org

¹⁸ GSAT-8 is primarily a communications satellite launched to serve needs for DTH television. www.isro.org

¹⁹ GAGAN is tasked to improve GPS signal performance to precision of better than 7.5 to 2 meters integrity in comparison to GPS precision of 20 to 15 meters and ICAO requirement of 10-7 meters integrity. www.aai.aero

²⁰ When GAGAN is fully operational, India will be the fourth country in the world to adopt the SBAS aimed at enhancing accuracy and integrity of GPS signals to meet precision approach requirements in the civil aviation. The US (WASS & LAAN), Japan (QZSS) and the European Union (EGNOS) are also using similar technologies. Refer to www.aai.aero and www.isro.org

²¹ The ICAO has clarified that provisions of the Chicago Convention are compatible and consistent

read with the AAI Act, operate and maintain the ground segment and will be responsible for periodically checking the validity of the Signal-In-Space (SIS) system for compliance with ICAO SARPs. On its part, ISRO will continue to provide technological, maintenance and replenishment support to the GAGAN space segment; provide continuing supervision, be internationally responsible and be internationally liable under provisions of the OST, in terms of the established State Practice.

In a parallel development in 2006, the Indian government approved a proposal to establish the Indian Regional Navigation Satellite System (IRNSS)²². It is planned that GAGAN which will form part of IRNSS that will, itself, form part of the GNSS²³.

US-India Civil Space Cooperation & Civil Aviation Cooperation Program

The rapid transformation of the Indian aviation sector and the urgent need to find appropriate technology solutions coincided with a 'thaw' in India-US relationship²⁴. The Civil Space

with the deployment of the GNSS for CNS/ATM in civil aviation, as a replacement for or supplementary to the existing air navigation systems. Also refer to Kaul & Jakhu: supra n.16 at pp.187

²² ISRO: Refer to Supra n.9

Also refer to Kaul & Jakhu: Supra n.16 at pp185-186.

Indian Regional Navigation Satellite System (IRNSS) will consist of a constellation of seven satellites and a large ground segment. Three of the seven satellites in IRNSS constellation will be placed in Geostationary Earth Orbit and four in Geosynchronous Orbits inclined at 29° to the equatorial plane. All the seven satellites will have continuous radio visibility with Indian control stations.

Also see report at http://space.skyrocket.de/doc_sdat/irnss.htm

²³ On 19 July 2011 the Indian External Affairs Minister S.M. Krishna and US Secretary of State Clinton issued The Strategic Dialogue Statement in terms of which the two countries have agreed to expand the previous work in the field of global navigation satellite systems with the goal of providing compatibility and interoperability between the US GPS system and Indian Navigation systems, and those of other countries. www.newdelhi.usembassy.gov

²⁴ The US-India engagement was first reflected in the 2001 Joint Statement by President Bush and then Prime Minister Vajpayee initiated a discussion

Cooperation and the Aviation Partnership engagements between the two countries have accelerated the processes of transition of civil aviation in India to the satellite navigation mode. In 2005 President Bush and Prime Minister Manmohan Singh included satellite navigation, for the first time, as part of the US-India Civil Space Cooperation²⁵, through mechanisms such as the U.S.-India Working Group on Civil Space Cooperation (JWG) The 2007 US-India Joint Statement for Cooperation outlined cooperation in the use of GPS and space based positioning navigation and timing systems and applications²⁶. The latest announcement came on 19th July 2011 when the Indian Foreign Minister Krishna and the US Secretary of State Clinton issued the Strategic Dialogue Statement which aims to expand work in the GNSS and provide compatibility and interoperability between GPS and the Indian Regional Satellite System. The 2009 US-India Aviation Partnership Summit²⁷ crystallized

on civil space cooperation, followed by the 2004 Next Steps in Strategic Partnership (NSSP) aimed at expanding engagements on civilian nuclear activities, civilian space programs and high-technology trade based on a series of reciprocal steps.

²⁵ The JWG held its inaugural meeting in Bangalore on June 29-30, 2005, and identified new and expanded areas for civil space cooperation. Progress has been made since on several issues, including negotiating of the Memorandums of Understanding to place two instruments provided by the U.S.NASA on India's Chandrayaan-1 lunar mission, negotiations on space launch agreements, and discussions on promoting interoperability between Indian and U.S. civil space-based positioning, navigation and timing <http://www.spaceref.com/news/viewpr.html?pid=19182>

²⁶ India and the U.S. held a technical coordination meeting of the radio navigation satellite service providers of the Indian Regional Navigation Satellite System (IRNSS), the GPS Aided GEO Augmented Navigation System (GAGAN), the Global Positioning System (GPS), and the Wide Area Augmentation System (WAAS), on January 22-24, in Bangalore, India. Experts from both countries discussed matters related to cooperation of their Global Navigation Satellite System plans, International Telecommunications Union filings, and compatibility and interoperability of the respective systems.

<http://www.pnt.gov/public/docs/2008/india.shtml>

²⁷ The US-India Aviation Summit was held in Washington DC in December, 2009 with the objective of identifying areas in the civil aviation sector where the two countries would cooperate. www.aaae.org

specific areas of cooperation in the aviation sector, including GAGAN. In July 2011, the AAI signed a MOU with USTDA²⁸ for the implementation of a GBAS (Ground Based Augmentation System) pilot project near Chennai, South India. The project is funded by USTDA under the US-India Aviation Cooperation Program. The USTDA will provide training, certification and implementation assistance. The GBASS will provide GNSS landing system (GLS approach) to multiple runways at an aerodrome meeting the precision CAT-I approach requirements and upgrade to CAT-II & III services in the future²⁹.

Outer Space Treaty 1967³⁰ & Chicago Convention, 1944³¹

In light of this background, this paper will focus on the applicability of the Outer Space Treaty, in general and Article VI and Article VII, in particular, to the GAGAN SBAS space segment. However, such an analysis will remain out of context without reference to the legal regime applicable to the civil aviation sector in context to GNSS and GAGAN. As already been mentioned, ISRO will remain responsible for the GAGAN space segment, an activity it must carry out in compliance with the OST and related space law treaties. The AAI, the national ASPN, must fulfill the mandate of the Chicago Convention and related ICAO SARPs. Equally, each entity will also be, simultaneously, amenable to the jurisdiction of national legal regimes or to State Practice, as the case may be. Thus, it is clear that each entity will fulfill specific obligations and discharge a specific function under provisions of different international treaties, even though GAGAN is a consequence the ISRO/AAI joint venture. It is important to remember, in this context that, while the OST makes ISRO international responsible and liable

for damage caused by the GAGAN space segment, the Chicago Convention does not impose international liability on AAI. Be that as it may, the success of GAGAN necessarily depends on harmonious interconnections between ISRO and AAI in several critical aspects.

Outer Space Treaty & GAGAN

The GAGAN project for providing CNS/ATM to civil aviation which will eventually become part of the GNSS, has its mission rooted in the overall international development supported by the COPOUS³² and ICAO³³ to transit globally to satellite navigation for CNS/ATM to facilitate the safety, accuracy and efficiency of international civil aviation.

The ISRO is charged with the mandate to establish the GAGAN space segment. As a State Party, Indian space activities, whether conducted by a government entity or a non-government entity, require compliance with the international space law regime. Therefore, the applicability of the OST to the GAGAN space segment is a given proposition. ISRO is tasked to perform the primary and foundational task of building and launching the GAGAN payloads. ISRO is also tasked to build, launch, operate and maintain in proper orbits and to ensure efficient in-orbit performance of the satellites. There can be no dispute about the applicability of Article VI³⁴ which makes India

³² Action Team on the Global Navigation Satellite Systems established by the Committee on Peaceful Uses of Outer Space (COPUOS) Report 2004 www.oosa.unvienna.org

³³ ICAO Policy on the GNSS: www.oosa.unvienna.org. Also see ICAO GNSS Manual (doc.9849) www.icao.int

³⁴ Outer Space Treaty 1967: Supra n.11

Article VI: States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States

²⁸ United States Trade Development Agency

²⁹ Reported in The Times of India, Friday 22 July 2011 www.timesofindia.com

³⁰ India has ratified the Outer Space Treaty, 1967, the Rescue Agreement, 1968, the Liability Convention and the Registration Convention, 1974. India is a signatory to the Moon Agreement 1979. www.oosa.unvienna.org

³¹ India has ratified the Chicago Convention, 1944. The provisions of the Convention are implemented through the Aircraft Act, 1937 (as amended in 2009); Aircraft Rules, 1934 (as amended in 2010) and the Airports Authority of India Act, 1994. All statutes may be accessed at www.dgca.nic.in

internationally responsible for the activities conducted in space by ISRO and the applicability of VII³⁵ which makes India internationally liable for damage caused by the GAGAN space objects (payload/ launch vehicle/components) on Earth, in airspace and in outer space to another State Party or third party.

Applicability of Article VI

In specific context to Article VI, India bears international responsibility to ensure that GAGAN space segment activities are carried out under due authorization, continuous supervision and in conformity with the provisions set forth in the Outer Space Treaty. The responsibility under Article VI pertains only to the mission or operational aspect of the satellite during its lifetime in its allotted orbit slot, to ensure that OST objectives are met and that no activity is conducted in outer space that is unauthorized, unsupervised, uncontrolled and in breach of the Treaty. Given the global institutional support for the GNSS, including the SBAS systems, it is evident the GAGAN space segment fulfills the requirement of Article VI. It may be noted, however, that 'international responsibility' under Article VI does not extend to the performance efficiency of a specific task for which a satellite is placed in orbit. In specific context to GAGAN, information available in public domain suggests that although ISRO and AAI are jointly carrying out the certification of Signals-in-Space in compliance with ICAO SARPs, thereafter, it will be the function and responsibility of AAI to check the validity of the SIS.

As a Contracting Party to the Chicago Convention, India is required to fulfill its sovereign obligation to provide aeronautical navigation services for international civil aviation over the Indian FIR in

terms of Article 28³⁶. As such, when GAGAN becomes operational, AAI, the national ANSP, will continue to fulfill that role. However, in order to provide SIS for CNS/ATM, AAI will have to necessarily rely on third party suppliers of (i) signals-in-space; and (ii) the space segment and its components. In other words, AAI will be entirely dependent on ISRO for the SIS, which in turn will be dependent on the US GPS signals³⁷. In this context, it is also important to note that in terms of Article 15³⁸ of the Convention, the ANSP is

³⁶ Chicago Convention 1944: Article 28 : Refer to Supra n.12

³⁷ Kaul & Jakhu: Supra n.16 Refer to discussion on 'liability' in para 8.6.5.2 on pp.188

³⁸ Chicago Convention: Refer to Supra n.12

“ Article 15 : Airport and similar charges

Every airport in a contracting State which is open to public use by its national aircraft shall likewise, subject to the provisions of Article 68, be open under uniform conditions to the aircraft of all the other contracting States. The like uniform conditions shall apply to the use, by aircraft of every contracting State, of all air navigation facilities, including radio and meteorological services, which may be provided for public use for the safety and expedition of air navigation.

Any charges that may be imposed or permitted to be imposed by a contracting State for the use of such airports and air navigation facilities by the aircraft of any other contracting State shall not be higher, (a) As to aircraft not engaged in scheduled international air services, than those that would be paid by its national aircraft of the same class engaged in similar operations, and (b) As to aircraft engaged in scheduled international air services, than those that would be paid by its national aircraft engaged in similar international air services. All such charges shall be published and communicated to the International Civil Aviation Organization: provided that, upon representation by an interested contracting State, the charges imposed for the use of airports and other facilities shall be subject to review by the Council, which shall report and make recommendations thereon for the consideration of the State or States concerned. No fees, dues or other charges shall be imposed by any contracting State in respect solely of the right of transit over or entry into or exit from its territory of any aircraft of a contracting State or persons or property thereon.”

Refer Supra n.8: The international obligation under Article 15 is harmonized in section 22(b) of

Parties to the Treaty participating in such organization. [Article VI]

www.oosa.unvienna.org

³⁵ *ibid*

Article VII: Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, 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, in air or in outer space, including the moon and other celestial bodies.[Article VII]

entitled to collect airport and similar charges for users of the air navigation signal services. As such, AAI will continue to earn revenue from users for GAGAN ANS services. However, the ISRO/AAI MOU is silent as to revenue sharing arrangement, if any, and as to vesting of liability, joint or several, in each or either entity in respect to disruption or failure of the GAGAN SIS³⁹.

Applicability of Article VII

Article VII makes India internationally liable for damage caused by its space objects or components to another State Party or third party. Thus India is internationally liable for damage caused by GAGAN space segment⁴⁰ to another State Party or third party. However, the full dimension of liability expressed Article VII can be understood only when read with the Liability Convention, 1972⁴¹ Articles I⁴²; II⁴³; and III⁴⁴ and with the

the AAI Act: “To charge fees, or rent- for providing air traffic services, ground safety services, aeronautical communications and navigational aids and meteorological services at any airports and at any aeronautical communication station” www.aai.aero

³⁹ The author has not found any information on this subject in public domain.

⁴⁰ GSAT-8; GSAT-10;GSAT-12 satellites; GAGAN payloads; launch vehicles and components thereof.

⁴¹ Liability Convention,1972: ‘*Convention on the international liability for damage caused by space objects*’ opened for signature at London, Moscow and Washington on 29 March 1972, Source: 961 UNTS. 74 countries have ratified and 27 countries have signed the convention. [‘Liability Convention’] www.oosa.unvienna.org

⁴² *Ibid* :Article I “For the purposes of this Convention:

(a) The term “damage” means loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations;

(b) The term “launching” includes attempted launching;

(c) The term “launching State” means:

(i) A State which launches or procures the launching of a space object;

(ii) A State from whose territory or facility a space object is launched;

(d) The term “space object” includes component parts of a space object as well as its launch vehicle and parts thereof.

Registration Convention, 1974⁴⁵. Thus, currently India is internationally liable if the GSAT-8 or its component causes damage in-orbit to the space object of another State Party. However, in the case of the proposed GSAT-10 and GSAT-12, India will bear absolute liability for damage caused the launch vehicle/satellites on the surface of the Earth and to an aircraft in flight, as well as fault based liability regime if damage is caused in-orbit to another State Party.

National Legal Regime & Implementing Treaty Obligations

A question arises as to the domestic legal framework in terms of which India can, if required, fulfill treaty obligations in context to Article VI and Article VII. This discussion must be qualified by a caveat that India has not, as yet, articulated a national civil space policy⁴⁶ or enacted national space laws. However, India has consistently fulfilled international space law treaty obligations as directed by the Constitution of India⁴⁷. In specific context to international space law treaty obligations, State Practice is based on provisions of

⁴³ *Ibid* : Article II “A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight.”

⁴⁴ *Ibid* : Article III “In 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.”

⁴⁵ Registration Convention, 1974: ‘*Convention on Registration of Objects launched into Outer Space*’. Adopted by the General Assembly of the United Nations, at New York, on 12 November 1974, Source: 1023 UNTS 15. 37 countries have ratified and 4 have signed the Convention. [‘Registration Convention’]

⁴⁶ In fact, the only reference point to understanding India’s vision and objectives for the exploration and use of outer space is found in the Citizen’s Charter of the Department of Space (DoS).

The Citizen’s Charter has been issued by the Department of Space and is available at www.isro.org

⁴⁷ Constitution of India : [Constitution] www.indiacode.nic.in

Constitution Article 51⁴⁸ which directs the Executive to *promote international peace* as India's objective in the international sphere and provides basis for implementing international space treaty obligations. The principle laid down by Article 51 is also founded on the *pacta sunt servanda* rule enshrined in the Vienna Convention⁴⁹. As such, the absence of specific national space laws, *per se*, has not detracted from Government's competence to fulfil treaty obligations, through exercise of executive power by the President of India, either directly or indirectly under provisions of Article 53⁵⁰, without invoking power of the Legislature under Article 253⁵¹.

⁴⁸ Ibid : Constitution Part IV: Directive Principles of State Policy

"Article 51: Promotion of international peace.

This Article embodies the object of India in the international sphere. But it does not lay down that international treaties or agreements entered into by India shall have the force of municipal law without appropriate legislation. In order to be binding on municipal Courts, legislation [see under Schedule VII, List I(14),*post*] would be required if a treaty – (a) provides for payment to a foreign power, which must be withdrawn from the Consolidated Fund of India; or

(b) affects the justiciable rights of a citizen

(c) requires the taking of private property [Art.31(1), taking of life or liberty [Art.21], such as extradition or imposition of a tax[Art.265], which under the Constitution can be done only by legislation; or

(d) modifies the laws of the State

In the absence of contrary legislation, municipal Courts in India would respect rules of International law, but if there is any express legislation contrary to a rule of International law, Indian Courts are bound to give effect to the Indian law. Thus, Rules of international law as to immunity of a foreign state from being sued in India has been modified by provisions of the Code of Civil Procedure, e.g. Section 86. But in interpreting a statute, the Court would so construe it, if possible, as will not violate any established principle of International law." www.indiacode.nic.in

⁴⁹ Vienna Convention on the Law of the Treaties, 1968: Article 26: "Every treaty in force is binding upon the parties to it and must be performed by them in good faith" www.un.org

⁵⁰ Constitution of India: refer to Supra n46 & 47 Part V: The Union: Chapter I: The Executive: The President and Vice President

"Article 53: The executive Power of the Union

In fact, India has consistently conducted activities involving the use and exploration of outer space for peaceful purpose "*for the benefit and in the interest of all countries, irrespective of their degree of economic or scientific development*"⁵² based on the recognition that Outer Space is the '*province of all mankind*'⁵³ which is not subject to "*national appropriation by claims of sovereignty, by means of use or occupation or by any other means*"⁵⁴; and where placement of WMD in- orbit⁵⁵ is prohibited. India supports the principle that Outer Space is the Common Heritage of Mankind. In fact, it is a matter of record that since the inception of its space programme, treaty obligations under Article VI or Article VII have never been invoked against India.

Thus, it is clear that India is compliant with the mandate of Article VI in context to the deployment of the GAGAN space segment consisting of GAST-8; GSAT-10 and GSAT-12 satellites and payloads. However, difficulty may arise in context to fulfilling international obligation if Article VII is invoked against India requiring the payment of compensation, if the GAGAN space segment causes damage to the space object of another State Party or to an aircraft in flight or on the surface of the Earth. To understand the problem, we must refer to Article 51 which forms the basis of current State Practice in respect to space treaty obligations. It may be noted that the general application of Article 51 is restricted by Four Exceptions which specify that certain treaty

(1) The Executive power of the Union shall be vested in the President and shall be exercised by him directly or through officers subordinated to him in accordance with this Constitution.

(2); (3)....."

⁵¹ Ibid, supra: Part XI: Relations Between the Union and the States

"Article 253: Legislation for giving effect to international agreements

Notwithstanding anything in the foregoing provisions of this Chapter, parliament has power to make any law for the whole or any part of the territory of India for implementing any treaty, agreement or convention with any other country or countries or any decision made at any international conference, association or other body."

⁵² Outer Space Treaty 1967: Article 1: refer to Supra n.22

⁵³ Ibid Preamble

⁵⁴ Ibid Article II

⁵⁵ Ibid Article VI

obligations can be fulfilled only in terms of specific domestic law. The Exceptions to Article 51 are as under:

- (1) A treaty obligation which provides for payment to a foreign power, which must be withdrawn from the Consolidated Fund of India⁵⁶; (*emphasis provided*); or
- (2) A treaty obligation that affects the justiciable rights of a citizen⁵⁷; or
- (3) A treaty obligation which requires the taking of private property, taking of life or liberty, such as extradition or imposition of a tax, which under the Constitution can be done only by legislation⁵⁸; or
- (4) A treaty obligation that modifies the laws of the State⁵⁹.

The Exceptions must be understood in context to the fact that Article 51 does not accord the force of municipal law to international treaties or agreements entered into by India, without appropriate national legislation. This position was conclusively decided by the Supreme Court of India in *Varghese v. Bank of Cochin*⁶⁰ and *Civil Rights Committee v. Union of India*⁶¹. Thus, although courts in India respect rules of international law in the absence of contrary legislation, Indian Courts are bound to give effect to the domestic law if there is express legislation contrary to a rule of international law, although in so doing they are directed to interpret law in such a way, if possible, as will not violate any established principle of international law. The Article VII obligation when read with the Liability Convention, requiring India to pay compensation if the GAGAN launch or space segments cause damage, falls within the Exception 1 to Article 51. It is a well established principle that the absence of specific domestic law to facilitate discharge of

liability in liquidated damages is not a defence in law and cannot absolve international liability under the Outer Space Treaty and Liability Convention. It needs no reiteration that principles of international law are crucial to the management of national activities in outer space. Thus it would be in national interest, if India's commitment to fulfill international space treaty obligations, is reflected in enactment⁶² of specific domestic space laws.

That being said, a discussion on Article VII *liability* in context to the GAGAN space segment would be incomplete without a comment on AAI *liability* as the ANSP of GAGAN aeronautical navigation signals. The AAI is governed by two domestic legal and regulatory regimes that have a direct bearing on the statutory liability of the ANSP: (i) Airports Authority of India Act, 1994; and (ii) the Airports Economic Authority of India Act, 2008⁶³. Section 33 of the AAI Act⁶⁴ grants protection to AAI officers *acting or intending to act in good faith for any damage sustained by any aircraft or vehicle in consequence of any defect in any of the airports, civil enclaves, heliports, airstrips, aeronautical communication stations or other things belonging to or under the control of the Authority*. In 2004, the validity of immunity from prosecution of AAI officers granted by section 33 was called into question, in a claim filed under the Consumer Protection Act, 1986⁶⁵, by the National Consumer Disputes Redressal Commission in *Geeta Jethani vrs. Airports Authority of India & Ors*⁶⁶. The Commission held that because AAI, the airport operator of the Delhi airport, collected a user charge for *service* provided from passengers, *it could not escape liability for deficiency in service* within the meaning of the Consumer Protection Act. The Supreme Court of

⁶²Constitution: refer to Supra n.46; 47; & 49

Part XI: Relations Between the Union and the States

“Article 253: Legislation for giving effect to international agreements

Notwithstanding anything in the foregoing provisions of this Chapter, parliament has power to make any law for the whole or any part of the territory of India for implementing any treaty, agreement or convention with any other country or countries or any decision made at any international conference, association or other body.”

⁶³ Airports Economic Regulatory Authority of India Act, 2008 [‘AERA Act’] www.aera.gov.in

⁶⁴ AAI Act: refer to Supra n.10

⁶⁵ Consumer Protection Act, 1986 can be accessed at http://ncdr.nic.in/1_1.html

⁶⁶ 2004 (3) CPJ 106 (National Commission)

⁵⁶ The issue decided by the Allahabad High Court in *Moti Lal v. U.P.*, 1951 All.257 F.B

⁵⁷ The issue was decided by the Supreme Court of India in *Maganbhai v. Union of India*, A.1969 SC783 (789,807) and in *Beubari Union, in re.*, A 1960 SC 845

⁵⁸ The issue in reference to extradition was decided by the Supreme Court of India in *Ali Akbar v. U.A.R.*, A1966, S.C.230 (para 30)

⁵⁹ The issue was decided by the Supreme Court of India in *State of W.B. v Jugal*, A 1969 SC 1171(para 6)

⁶⁰ A 1980 S.C.470

⁶¹ A 1983 Kant.85(Para 18)

India dismissed an appeal by AAI and upheld the order passed by the National Commission in favor of the claimants. Thus a legal precedent has been established to pierce the veil of immunity from prosecution to AAI for services for which it collects user charges. As such, a question may arise in the future as to the liability of AAI as the ANSP for the GAGAN SIS.

The second recent national law which may have bearing on the liability of the ANSP is the Airports Economic Regulatory Authority of India Act, 2008⁶⁷. The Airports Economic Regulatory Authority ('Authority') is mandated to undertake determination of tariff for aeronautical services⁶⁸ at major airports⁶⁹ in India effective 1st April 2011. As such, ANS, whether provided in the traditional mode or via GAGAN, is subject to tariff regulation. The process of determination of tariff requires the

⁶⁷ Airports Economic Authority of India Act, 2008 established the Airports Economic Regulatory Authority of India to determine tariff for aeronautical services provided at major airports in India. [AERA Act] www.aera.nic.in

⁶⁸ Ibid: section 2(a) defines "aeronautical services" as under:

(a) "aeronautical service" means any service provided-

- (i) for navigation, surveillance and supportive communication thereto for air traffic management;
- (ii) for the landing, housing or parking of an aircraft or any other ground facility offered in connection with aircraft operations at an airport;
- (iii) for ground safety services at an airport;
- (iv) for ground handling services relating to aircraft, passengers and cargo at an airport;
- (v) for the cargo facility at an airport;
- (vi) for supplying fuel to the aircraft at an airport; and
- (vii) for a stake-holder at an airport, for which the charges, in the opinion of the Central Government for the reasons to be recorded in writing, may be determined by the Authority;

(emphasis provided)

⁶⁹ Ibid: section 2(i) defines "major airport" as: "major airport" means any airport which has, or is designated to have, annual passenger throughput in excess of one and a half million or any other airport as the Central Government may, by notification, specify as such.

Authority to take into consideration a detailed evaluation of a regulated service, in reference to its quality and efficiency as well as in context to certain other parameters⁷⁰. Thus, in view of recent developments in law, the liability of AAI, the ANSP of GAGAN SIS, seems inescapable.

In this connection, it is important to recall that the role of AAI in the GAGAN project is limited to: (i) joint financial investment with ISRO; (ii) participation with ISRO in the tests and certification processes to demonstrate in-orbit efficient functioning of GAGAN payloads and for obtaining DGCA certification indicating compliance of the Signals-In-Space with relevant ICAO SARP; (iii) periodically checking validity of SIS; (iv) to operate and maintain its ANS ground stations; and (v) collecting user charges for SIS provided to civil aviation and other users. In a word, therefore, the role of AAI, as the ANSP, will be essentially that of a pass-through entity for augmented GPS SIS beamed directly into aircrafts via the GAGAN payloads/satellites by ISRO. Although jurisprudence in respect to liability of the national ANS provider has not yet developed in India, it will be interesting to see whether or how it develops after GAGAN becomes operational. Thus, even though the liability regimes for the space segment and ground segment of GAGAN are different, a question may arise in the future as to joint and several liability of ISRO and AAI, in the event of an aircraft accident caused on account of degraded/absent GAGAN signals-in space.

In conclusion, it is suggested that it would be appropriate for India to address the need for enacting a specific space law, especially in context to Article VII, not only in respect of GAGAN but also other Indian space assets. More importantly, it would be to the advantage of ISRO and AAI to understand and resolve *liability* issues in respect of the GAGAN SBAS sooner, than later.

⁷⁰ AERA Act, 2008, Section 13: refer to *Supra* n.67