

Legal Aspects of Space Activities of ICAO in Implementing FANS

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Abstract

ICAO (International Civil Aviation Organization) has provided legislative and managing role in assuring safe international air navigation system. Implementing FANS, satellite-aided air navigation, communication, and surveillance system, ICAO is going to enlarging its scope of activities to space law area.

Space activities of ICAO relating to FANS shall be analyzed as regards its consistency with various air law and space law principles. Secondly, legislative function for air navigation, such as technical standardization, needs to be studied in that such function differs from the function of INTELSAT or INMARSAT as operator of satellite systems. This paper proceeds on this issue through analyzing the scope of legislative function of the ICAO with respect to space activities in the FANS.

Various issues shall be discussed including the feasibility of such function in developing space law area, where rule-making authority has been recognized mainly in favor of sovereign nations

In conclusion, this international organization comply with space law requirement but also may contribute to promoting constructive coordination of space law with other laws in diverse areas.

I. Introduction

The International Civil Aviation Organization ("ICAO") established the Future Air Navigation Systems ("FANS") Committee in 1983 to determine how to achieve improvements in the communications, navigation and surveillance systems for the management of air traffic. FANS Committee identified the use of satellite technology as the way to achieve the required aims and objectives. ICAO endorsed these concepts at the 10th Air Navigation Conference in September 1991, and a derivative of the FANS Committee ("FANS II") proceeded in developing detailed plans for transitioning to the new technology.

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This system implies an application of two distinctive legal order. While the rules of air law acknowledging the sovereignty of the State over the air space regulate the aircraft navigation, the legal principles and codified rules of space law endorsing the freedom of navigation in the outer space apply to the activities utilizing outer space.

This duality raises a legal issue on the delineation, if necessary, of the application scope of each respective legal order. As shown in the experiences of other space activities, newly developed space technology shall be fitted into a legal order existing in this area. In this respect, the FANS implementation relates as well to the review on the competence of the ICAO who has been responsible for all the technical rules and regulations as well as for building the legal framework which made possible the orderly development of civil aviation.

Review on this subject, therefore, should be made with respect to the scope of applicable air and space law, the contents of which shall be more elaborated in connection with the possible forms of the FANS implementation. It is of equal importance to examine, on the basis of such analysis, the competence of the ICAO on this new technology implementation

II. Scope of Applicable Air and Space Law

FANS implementation involves the use of ground facilities as well as of satellites orbiting in outer space. As far as its main purposes consist in assuring air navigation, communications and surveillance services for aircraft navigation, FANS implementation would be within the scope of air law. The regulation of operations regarding the satellites for aeronautical mobile satellite communications and for positioning system, however, would be beyond the scope of air law, as the principle of freedom of navigation has been established for satellites. There exists no legal problems when FANS would be implemented and regulated within the context of the air law. Issues, however, arise as to the choice of law, concerning the operations of satellites utilized for the air navigation, between air law acknowledging the complete and

exclusive sovereignty of State over the air space and the space law establishing the principle of freedom of navigation in the outer space.

§ 1. Applicability Issues

One of the first issues which arose in the evolution of air law and the space law was the determination of the vertical limits of air space over the territory. Since in 1959 the UN Ad Hoc Committee on the Peaceful Uses of Outer Space started to pay attention to the question of the meaning of the term "outer space", discussions in the UN on this issue were primarily divided between those in favor of a functional approach ("functionalists"), and those seeking the demarcation of a boundary ("spatialists").

A doctrine favoring the exclusion of the sovereignty in the outer space gained an initiative stance, claiming the physical reasons that the relationship of space object with the State overflowed can't be of territorial nature, and the practical reasons that guaranteeing the security of the State overflowed would be possible more effectively by the exclusion of dangerous action in the outer space than by acknowledging the extension of the territorial sovereignty to outer space. The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies ("Outer Space Treaty")¹, following this tenet shown in the UN Resolutions does not define outer space but tends to refer to the activities. Functional approach seemed to provide a solution preferred in this Treaty.

According to the functionalists, air law would be defined as a law whose coverage is confined to the navigation regarding terrestrial and national objects, and taking place partially or entirely in the air.² Space law regulates the activities regarding cosmic, astronomical and space objectives. In the context of this approach, space objects operating for terrestrial objectives would be subject to national control of overflowed State. Experience gained in the area of remote sensing, and satellite espionage has proven controversial issues subsisted regarding satellites with terrestrial mission; the States have shown their attitude to disapprove the application of space law to such satellites. Acknowledging the freedom of space navigation to the satellites with terrestrial mission would be possible solely when specific

conditions related to the nature, the purpose and the operation of the mission are satisfactorily fulfilled. Those things being considered, it is not excluded in the context of functionalists approach that subjective interpretation and biased application of some criteria occur in determining whether the mission of spacecraft is within the concept of space activities to be regulated by space law or terrestrial nature to be covered under the air law.

On the other hand, the air law has established somewhat limited scope of application. For the spatialists approach, a vertical limit of air space would mean a vertical limit of air law. In accordance with the article 1 of the Chicago Convention on International Civil Aviation ("Chicago Convention")³, complete and exclusive sovereignty of every State is recognized over the air space above its territory. The use of the word "recognize" is an acknowledgment of sovereignty over air space existing as a general principle of law. There exists, however, no demarcation established in the context of the air law. Furthermore, this international treaty confines its scope only to civil aircraft other than state aircraft such as used in military, customs and police services. Most writers on the law of outer space have taken the position that the definition of "aircraft" contained in the Chicago Convention does not apply to satellites or other space vehicles.

In consequence, air law in the codified form does not provide a solution to the problematic definition of space law application coverage. Although it has provided legal basis of defining territorial air space which conforms to the territoriality of modern inter-State structure, air law has not presented legal demarcation between air space and outer space. For such reasons, the effort has been made for the purpose of explaining that legal basis of space law application to the activities with terrestrial objectives (such as satellite telecommunications, satellite remote sensing, etc.) lies in the development of customary law. It would be recognized that such effort has been possible in both ways. For the spatialists, a demarcation between air space and outer space would exist in the orbit. For the functionalists, there exist some activities which have already been regulated under the space law.

At the present status of the evolution of space law and air law, the best effort for examining the scope of legal requirement applying to the FANS would lie in doing an comprehensive analysis on composing elements of the FANS so as to clarify the scope and the contents of each applicable law.

§ 2. Air Law Application

The rules of air law regulating the aircraft navigation lay down some principles for ensuring the development of international civil aviation order. They are regarding an universal accessibility to the benefit coming from this order, secondly, the recognition of the rights and responsibilities of States within their sovereign air space, and thirdly, the ICAO responsibility for international standards and procedures.

A. Universal Accessibility to FANS

The aims and objectives of civil aviation, as stated in the Preamble of the Convention on International Civil Aviation as well as its article 44, consist in ensuring the safe and orderly growth of international civil aviation throughout the world. For these goals to be carried out actually, an accessibility without discrimination should be assured to the FANS.

In the "Guidelines to Assess the Adequacy of Provision of Aeronautical Mobile-Satellite Service (AMSS) for Air Navigation Services" ("FANS Guidelines"), developed through the FANS Committee Working Group, the ICAO has noted that universal accessibility to air navigation safety services must be available without discrimination.⁴ Also, legal principles as a guiding line presented by the ICAO Secretariat to the 10th Air Navigation Conference emphasize that "the CNS system must be accessible to all States without discrimination".⁵ Guaranteeing an accessibility without discrimination means also the equality of sovereign rights of States regarding each sovereign air space.

B. The Rights and Responsibilities of States within Their Sovereign Airspace

Article 1 of the Chicago Convention stipulates that every State has complete and exclusive sovereignty over the airspace above its territory. In this regard, FANS Guidelines note that the

rights and responsibilities of States to control operations of aircraft within their sovereign airspace must not be compromised.⁶

This Guideline is based upon the contents of several other Articles of the Convention especially relating to air navigation. In Article 5, each contracting State acknowledges the rights of innocent flight and technical landing of aircraft (civil aircraft) not engaged in scheduled international air services; on the other hand, each contracting State nevertheless reserves the rights to require such aircraft to follow prescribed routes, or to obtain special permission for such flights. Article 6 make it clear the rights of State as to scheduled international air services over or into the territory of a contracting State. The right of State on the navigation of aircraft is clearly stated in the Article 11 which set forth, firstly, the application of the laws and regulations of a State to the operation and navigation of the aircraft engaged in international air navigation within its territory, and secondly, the obligation of such aircraft to comply with such laws and regulations within the territory of that State. The State has also the rights to issue and maintain the regulations with which the use of radio transmitting apparatus in the aircraft flying over that State's territory should comply.

Also, each State should take responsibility to adopt all practicable measures for facilitating and expediting air navigation between the territories of contracting State⁷, and to provide in its territory air navigation facilities in accordance with the standard systems to facilitate international air navigation.⁸

C. ICAO Responsibility for international standards and procedures

For the past 50 years, the main technical accomplishment of the ICAO has been agreement of its member States reached on the necessary level of standardization for the operation of safe, efficient and regular air navigation and services. Such standardization has been achieved primarily through the adoption by the ICAO Council of specifications known as International Standards and Recommended Practices (SARPs). In accordance with the Article 37, each member State undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, and procedures, which

relates to aircraft, personnel, airways and auxiliary services facilitating and improving air navigation. In this respect, Guideline c) notes that "arrangements must preserve, facilitate and not inhibit ICAO responsibility for the establishment of appropriate Standards, Recommended Practices and Procedures in accordance with Article 37 of the Chicago Convention".⁹

§ 3. Space Law Application

The FANS identified the use of satellite technology as the way to enhance communications, navigation and surveillance performance for aircraft navigation. Aeronautical mobile satellite communications can provide high quality voice and data communications between the ground and aircraft. The data communications would enable surveillance to be performed in a manner incomparable to the existing systems. The utilization of spacecraft for such purpose invokes the question on the determination of the applicable law.

If spatialists approach were adopted for instance, such satellites are supposed to operate in the orbit where territorial sovereignty claim has not been seriously opposed, and consequently they would operate beyond the orbit existing and recognized over the upper limit of sovereign air space. On the other hand, from functionalists point of view, such activities should be examined as to the nature of its missions. A confusion may arise resulting from subjective interpretation of such mission. Question may be issued as to whether to admit the freedom of navigation to those spacecrafts. A legal rationale for applying space law in other space activities may be referred to here.

A. Scope of Space Law Application

It should be remarked that once recognized as space activities free from territorial sovereignty claim, any activities have enjoyed as well the freedom of navigation in the outer space. Most of the activities taking place today in the so called outer space have obtained an approval as to their status from functionalists point of view as well as from the spatialists point of view, otherwise it may be in alternate position of doctrines that actual activities have been effectuated and

followed by legal thinking. That's maybe because such activities conform to the requirement set in the Outer Space Treaty. Although it does not give a definition of outer space nor definition of space activities, this Treaty has codified an agreement among States regarding the rights and obligations imposed on the States for the space activities. As advanced by most writers on space law, space activities presently performed have satisfied such requirements. Most prominent example is the freedom of passage of spacecraft granted through the tacit agreement of the States on the condition that those spacecraft should be utilized for the peaceful purpose, in the interest of all States, and that national appropriation of outer space should be excluded.¹⁰ The development of customary law might be a suitable qualification as to such context. Such development has been made in the area of satellite telecommunications, and the satellite remote sensing. Communications satellites are regulated by the relevant regulations guaranteeing equal access to the geostationary orbit, while every State has the right to place its own satellite on the geostationary orbit. Remote sensing satellites assure its sensing operation over the territory of States overflown, while non-discriminatory distribution of data is guaranteed.¹¹ The process and the logic in acknowledging such activities as space activities enjoying the freedom of navigation would be referred to in the application of space law to the FANS.

In this context, some specific elements of the FANS would be taken into consideration for the review of legal aspects of the FANS in the light of space law application. They are regarding the status and qualification of space segment operator, the scope of satellite utilization, a regime of service offerings enabled by the utilization of satellite, a liability related to the establishment and operation of space segment, other than those issues related to aircraft navigation to be regulated by air law.

As the scope of space law requirement would be delineated by such specific issues, the relevant space law principles shall include the supervision and the responsibility by State regarding space activities, and the use of outer space in the interest of all States.

B. Supervision and Responsibility by the State

Article 6 of the Outer Space Treaty stipulates an obligation of national government to supervise and take international responsibility regarding its nationals' space activities. This principle has been confirmed through other international agreements followed.

Two questions could be raised regarding the FANS. First one is regarding the extent of State responsibility related to the ATC services. As far as the ATC services are to serve and promote public interest regarding safe and efficient air navigation, ATC services providers are generally national agency whose operations are regulated by national government under appropriate administrative law. The legal relationship of ATS agency with each national government, however, can't be simplified as such one common to every State. Moreover, regional ATS agency based on regional cooperation and private agency tend to be more active in this area. In this respect, the scope of requirement of this principle on this subject is to be defined.

Secondly, the concept of international responsibility to be assumed by State government has not yet been defined in the space law. An agreement has not yet reached on the issue whether it includes a responsibility arising from every unlawful act of its nationals, and a damage to third party on the other hand, or it is confined to just a responsibility arising from the damage to the third party, on the other hand. This question has been raised particularly in relation to remote sensing and the problem of the subsequent processing, interpretation and dissemination of the data which take place on the earth rather than in outer space. The UN General Assembly resolution 41/65 adopted in 1986 says that in its Principle XIV "States operating remote sensing satellites shall bear international responsibility for their activities," and this resolution also defines in its Principle XII a dissemination of information on a non-discriminatory basis and on reasonable cost terms. The problem is whether this international responsibility assumed by the State extend to the mode of the dissemination of the information.

In the case of direct broadcasting satellites¹², a question is raised "Does the responsibility assumed by State under Article VI (of the Outer Space Treaty) extend to the content of broadcasts made by private concerns under their jurisdiction, at least to the same extent as if the broadcasts were made by the States themselves, or are States merely obliged to ensure that the broadcasting activity is carried out in accordance with international law and pertinent international agreements?"¹³ The same kind of questions apply mutatis mutandis to other private and commercial activities in outer space, such as the manufacturing industry, salvage claims and so forth.¹⁴

C. The Use of Outer Space in the Interest of All States

Article 1 of the Outer Space Treaty in 1967 stipulates that the use of outer space shall be carried out for the benefit and in the interest of all countries. It is a codification of the principle that has been asserted from the beginning of the space exploration through divers UN General Assembly Resolutions. While space law has diversified and broadened its contents and scope, the use of outer space has been taking various shapes in its application areas, including space exploitation and space exploration. Compliance of the space activities with respect to this principle has been referred through various forms and degree of substantial specification as an effort for its realization.

In the space exploitation such as satellite communications and the remote sensing, which respectively require global coverage of its activities, it has been advanced that this principle is duly respected through non-discriminatory distribution and access to its products and services.

Non-discriminatory distribution has been applied as a mode of operation in the satellite remote sensing and satellite communications area. As to remote sensing, non-discriminatory distribution of the data is set as a legal principle through the UN Resolution.

As to satellite communications, international organization has been established for promoting and facilitating satellite communication services to

every States. It is the INTELSAT¹⁵ and INMARSAT¹⁶ that function on the basis of non-discriminatory rights of access granted to its all member States such that this organization gives effect to the Article 1, para.1 of the Outer Space Treaty.¹⁷ Their services also have been provided via financial mechanism allowing same kind and quality of services to be available and to every States on the reasonable price, whether State concerned is in dense traffic area or not.

It would be difficult, however, to ascertain whether it is appropriate to define such experiences as constituent elements of customary law which can apply to the FANS or not. Such ambiguity comes mainly from an uncertainty whether non-discriminatory distribution or access is merely a mode of operation or a form of realization giving effect to this principle. In other words, it may be claimed that this principle would be realized under different forms. For such reasons, it would be premature to claim and predict an analogy between those space application experiences and the FANS implementation and to expect that non-discriminatory distribution of products and services would be also applied as a proper mode of operation in the FANS. It is undeniable, however, that the spirit and foundation of the air law upheld by the ICAO provides a basis to the FANS Committee for claiming an "universal accessibility to FANS" as a guideline and principle which shall be taken into account in the further study of the institutional and legal aspects of the FANS. In other words, a legal basis of such accessibility is already present in international civil aviation order. Therefore, this concept would be realized through ensuring an universal accessibility to the FANS, as non-discriminatory distribution in the other space application experiences.

It is noted here that space law principle is not incompatible with the principles of air law, and that a compliance with respect to this principle may be assured through upholding "universal accessibility to the FANS". It is undeniable, however, that the acknowledgement of the sovereign rights over the air space under the rules of air law and the freedom of navigation of spacecraft under the rules of space law represent undoubtedly distinct legal regime. The FANS implementation concerns two distinctive legal order. For that reason, it is necessary to review

the legal aspects of the FANS implementation in the light of the applicable air law and space law to its various forms.

III. FANS Implementation Scenarios

The FANS implementation implies various scenarios and options to be taken by the States at present stage of development. Some scenarios being still at its hypothetical status, actual efforts as well have been undertaken by the States including aviation community.

§ 1. Case 1 : FANS Implementation in the AMSS Scenario

FANS Committee has postulated four illustrative scenarios of the provision of the satellite communications services to be used as typical examples for developing institutional arrangements.

A. First Scenario: single-State autonomy

a. Overview

First Scenario would basically be the simplest, with the least degree of shared provision and the largest degree of single-state autonomy. The space segment is provided by transponders wholly owned or leased by a State's national ATS provider agency, the transponders are on-board a satellite operated by another agency. The satellite transponders accommodate all aeronautical communications or aeronautical safety communications only. This satellite is the only one designated for ATS in that particular State. The air traffic services satellite communications are provided through a ground earth station situated in the State and owned and operated by the national ATS agency. As all facilities, save possibly the satellite configuration, are under direct technical control of the ATS provider, it has sole responsibility for system control and service provision and carries the full liability.

b. Legal Issues

Several issues may arise in this Scenario. First issue is related to the largest degree of single-

State autonomy, where each State assures FANS services through its own space segment dedicated to its own use. While FANS services offerings by State ATC authority should be compatible with the Articles 12 and 28 of Chicago Convention, an efficiency should be taken into consideration in this case. This Scenario doesn't take into account for example, the FANS service offerings on the high seas. Its non-availability might lead to a degradation of integral efficiency. Efficiency issue arises as well regarding satellite communications conducted between one State's ATC authority (or airline operator) and its nationality-registered aircraft flying over other States' air space. As indicated in the ICAO guideline¹⁸, enhancement of integral efficiency of FANS requires the communications with aircraft flying over other State's air space (even in the States' territory, if those States were not providing FANS or ATC services with similar technical performance as the FANS.) should be guaranteed. For that purpose of ensuring the efficiency in the FANS implementation, it should be taken into consideration a legal basis allowing such communications.

It is suggested that such legal basis would lie in a bilateral or multilateral coordination effort between States, which in turn might lead to creating an internationalized scheme of service offerings.

Second issue concerns the liability related to the FANS service performance to be contained in the contractual arrangements for space segment between national ATC authority and space segment operators. What air traffic control is to protect and guarantee is safety and efficiency of air navigation. For this kind of business, non-satisfactory technical performance below required level might result in a catastrophic incident. Such elements being considered, ATC authority would be considered, in general, as an organization whose main mission consists in providing and promoting public interest through guaranteeing safe and efficient air navigation.

The liability for those services is clearly the responsibility of the State ATS agency, which is also responsible for adherence to the Chicago Convention through real-time management of ATS transponder operation.¹⁹ However, contractual arrangement would need to cover the question of liability for failure. A problem arises

concerning whether it is practically possible for such ATS agency to impose the contractual requirements on space segment provider. It would be helpful here to note that some kind of exemption from product or service warranty has been acknowledged to date in space segment business as well as in space product industry.²⁰

In this respect, it would be necessary to establish a liability regime providing for a reasonable flow-down or sharing of liability through FANS participants.

Thirdly, in this Scenario, it is not clear how the management and contractual arrangements might emerge for AOC, or for non-safety services, if offered. In this Scenario, airlines could contract for AOC with the providing agency whether it would be the ATS agency or a post, telephone and telegraph (PTT). Contracts and liability for AOC or non-safety services being placed on the State could be unusual in many States, and would require negotiation and agreements among user airlines and providing States.²¹

Finally, this Scenario alone, as stated above, doesn't assure an accessibility to the FANS for all States without discrimination. Such accessibility is required and described in the air law and space law. There could exist various means for satisfying this requirement. One consists in assuring that the standards and procedures for FANS should be identical in every Flight Information Region ("FIR"), so that aircraft flying in the different FIRs need only meet one equipment standard and common operating procedures. In this case, even if all States in the world can't provide FANS for whatever its domestic or international purpose, the aircraft of all States would be provided enhanced services and potential benefit from the FANS when flying over FANS-provided region. Second one consists in establishing an international entity which would be created and maintained for assuring the FANS facilities and services network available to every States. That's the case with the INTELSAT. Other Scenarios deal with such an internationalized scheme of FANS service offerings.

B. Second Scenario : Sharing of GES Facilities

a. Overview

Second Scenario presupposes more shared usage of facilities, in particular, a sharing of GES facilities, with one State providing such facilities not only for themselves, but for others. In a region one, or possibly two, space segment provider(s) have been designated to provide a service through a limited number of GESs in some, but not all constituent Member States.

b. Legal Issues

In this Scenario, FANS service would be provided by ATC authority with the similar degree of single-State autonomy as in the first Scenario. So, communications issue discussed in the first Scenario is not resolved.

This Scenario implies some issues same with in the first one such as contractual arrangements would be needed between ATS agency and the space segment provider, those related to the liability for transponder operation and to the contractual liability for AOC or non-safety services being placed in the State, and accessibility without discrimination. In addition to those issues shared by first Scenario, shared usage of GES facilities and services would involve the problem of delimitation of liability and the choice of law problem.

C. Third Scenario : FANS by the IACSPs

a. Overview

Third scenario presupposes the International Aeronautical Communications Service Providers (IACSPs) acting as comprehensive providers of various forms of aviation communications services, contracting with space segment providers, with GES operators, and with State ATS providers. In short, the IACSPs would act as communications brokers. They would support global communications services for ATS, AOC, AAC, and APC traffic by each concluding agreements with sufficient GES operators (independent or PTT) and space segment providers. The IACSPs each also operate worldwide networks and provide connections to contracting aircraft operator's offices, etc. and to the gateways of all ATS provider agencies. The IACSPs take responsibility for delivering ATS messages between the gateways of ATS provider

agencies and aircraft. In order to ensure over-all interoperability, satellite and ground communications networks conform to applicable ICAO SARPs.

b. Legal Issues

As far as the IACSPs are supposed to operate on a multinational basis with appropriate authorizations given by each State, it may be expected that the problem raised in the first Scenario regarding the communications with aircraft flying over other States' territory would be resolved.

In this Scenario, a third Party, the IACSP is responsible for the provision of ATS communications to the ATS provider's gateway. This may represent a departure from the norm in many States. An issue lies in how to accommodate the rights and responsibilities of States regarding the control of operations of aircraft with the responsibility to be assumed by the IACSPs for delivering ATS messages. It would be needed also to impose contractual obligations on the IACSPs.

Other issue concerns the compliance with the requirement of the non-discriminatory accessibility to the FANS. This is relating to the nature and legal status of the IACSP as well as the number of the IACSP, whether the meaning of "non-discriminatory accessibility" consists in giving equal opportunity to every States for enjoying the FANS services, or in securing a reasonable price or rate in order to assist every States in receiving the FANS services. Also it is considered important that the IACSP might be subject to exploitation by a monopoly satellite provider.

D. Scenario 4 : FANS by the MSCPs

a. Overview

In this Scenario, communications for land and aircraft mobile stations would be provided through mobile satellite communications providers (MSCP) who might own GES(s). Aircraft operators would contract with the MSCPs of their choice. All satellite communications for land, marine and aeronautical

mobile stations would be provided through MSCPs. The MSCPs owns (or leases) and operates GES(s).

b. Legal Issues

This Scenario envisions total private-sector commercial operation of resources. As in the Scenario 3, a third party, the MSCP is responsible for the provision of ATS communications to the ATS provider's gateway. This may represent a departure from the norm in many States, and organizational arrangements to accommodate this mode of operation could have to be developed.

There would be considerable flexibility for the States, over timing and over choice of institutional arrangements. On the other hand, the Scenarios are not mutually incompatible. This would mean that the FANS may be implemented on the basis of institutional arrangements combining various constituent elements of each Scenario. Such trends may be already present in the efforts already pursued.

§ 2. Case 2 : Actual Effort of FANS Implementation

FANS implementation efforts have been undertaken firstly within the context of national and regional cooperation between States and secondly within the mandate of the existing international organization.

A. Inter-State Implementation Efforts

a. Efforts on Non-Global Scale

Many reasons admitted why the FANS concept is seen as advantageous, implementation efforts are already progressing on a wide scale. Those efforts are progressing in the form of regional inter-State cooperation as well as of airliners or satellite communications providers' effort endorsed by national ATC agency concerned.

To the extent that their scope is confined to national air space, or regional ATS area, legal issues would arise in the same way as discussed in the Scenario 1 and 2.

On the other hand, as the competence of the rule-making of each State participating in their efforts is limited to its territory or a certain region, the possible legal provisions implemented within these efforts with respect to such legal issues would not be universally binding in the sense of "uniform" mentioned in the Article 12 and 37 of the Chicago Convention.

b. GNSS Service-Offerings Propositions

Space technology has been identified as the most likely source of enhanced navigation systems for aviation. An accurate navigation system will be required in order to permit the pilot to execute his flight plan with the necessary precision. A key element in the introduction of these new techniques is the Global Navigation Satellite System ("GNSS"), defined as "... a world-wide position, velocity, and time determination system that includes one or more satellite constellations, receivers, and system integrity monitoring, augmented as necessary to support the required navigation performance for the actual phase of operation."²²

The U.S. Global Positioning System (GPS) and the Commonwealth of Independent States' Global navigation Satellite System (GLONASS) are currently the most prominent candidates for this purpose.

GPS and GLONASS both promise a precision of better than 100 m at the 95 per cent level of confidence of 2-D navigation. GPS additionally promise better than 300 m at the 99.99 per cent level of confidence. It is advanced also that GPS and GLONASS would be provided free of charge to help provide a basis for the transition to the GNSS.

The major issues to emerge with the adoption of GNSS for commercial navigation are the assurance of integrity and availability. Besides obtaining an assurance on the technical performance through increasing technology development, most states are interested in finding a legal instrument to enforce the providers to comply with technical performance requirement. Also, it was recognized that aviation use would require investments by user States and that there was a need to obtain a commitment from the

provider States of these systems as to unrestricted availability, in order to undertake planning of the transition to the future GNSS.²³

Another major issue is that both systems belong to and are controlled by the military. In the case of GPS, it is known that for reasons of national security, access to the highest accuracy level is reserved by the Department of Defense for the United States and its allied military organizations.

Regarding unrestricted availability and a commitment from the provider for the stable provision of the systems, the international organization may be preferred for the States.

B. International Organization Effort : INMARSAT Case

The purpose of the INMARSAT consists in making provision for the space segment necessary for improving maritime communications and, as practicable, aeronautical communications. INMARSAT has designed and implemented an aeronautical mobile-satellite systems, consisting of four primary satellites and seven back-up satellites located over the major oceans of the world. The ground segment currently comprises 13 GESSs owned and operated by 8 INMARSAT Signatories (organizations designated to provide mobile communications services via the INMARSAT space segment by the government of the member States). The airborne segment comprises the AESs installed in airline, corporate jet and other fixed and rotary wing aircraft. In excess of 170 AESs are currently in service.²⁴ The next generation of INMARSAT spacecraft will support communications in all 20 MHz of spectrum allocated to AMS(R)S and will incorporate earth disc coverage antennas for the purpose of the navigation services.

The roles of the international organization are those of space segment provider and system design authority. On the business side, it does not sell services to end users and recovers the cost of these activities from the ground segment operators who provide services to end users.

While it is undeniable that the efforts undertaken within the INMARSAT system have led to technical development of FANS, a legal

basis for allowing to the Organization to adopt and create a legally binding rules on the FANS is not found in its constituent chart. Therefore, the scope of the INMARSAT competence should be regarded as limited one as in the case of coordinated efforts between the States, or the GNSS service offerings propositions.

An examination on the illustrative Scenarios of AMSS implementation and on the forms of implementation effort actually pursued shows that firstly, there would be a multiplicity of participants in realizing the concept and secondly, these efforts are undertaken by the States and the organizations who assure the operation of the space segment, without, however, representing an effort for establishing an uniform rules in the sense of what the provisions of the Chicago Convention concern. This function should be assured by the ICAO.

IV. Scope of the ICAO Legal Competence

Legal issues discussed above contain the elements to be dealt within general context of the international civil aviation order. A legal competence of the ICAO on this subject stems from firstly the language in the Preamble to the Chicago Convention, as taking into account the preamble as an integral part of the treaty for purpose of interpretation in accordance with the jurisprudence of the international court and the rule enshrined in Article 31 of the Vienna Convention on the Law of Treaties. Secondly, it is based on its divers provision, if, as a constitution of an international organization, the Convention must be interpreted in the light of object and purpose of the Organization to adapt itself to the needs of a changing world caused by the development of technology.

In this context, the Chicago Convention in its definition of the objectives of the Organization (Article 44) and in the provisions on the adoption of international standards, recommended practices and procedures (Article 37, 54 and 90) provides full flexibility for the Organization to

address all problems of the FANS pertaining both the air law and the space law.

§ 1. Air Law Issues

Article 44 of the Chicago Convention defines the aims and objectives of the Organization which include, among other things, the development of principles and techniques of international air navigation and to foster the planning and development of international air transport so as to ensure the safe and orderly growth of international civil aviation throughout the world.

Consequently, the FANS concept would be fully within the mandate of ICAO not only as the only constitutional regulatory body competent to adopt Standards and Recommended Practices ("SARPs"),²⁵ but also as the most appropriate body with regard to the institutional and legal arrangements.

A. Establishment of the SARPs for the FANS

In the Scenarios, the necessity is described of assuring that standards and procedures for FANS are identical in every FIR, and are standardized, so that aircraft flying in the different FIRs need only met one equipment standard and common operating procedures. For that, ICAO is the only appropriate body to establish technical standards for international aeronautical communications and surveillance services. States are responsible for the authorization, certification, or the provision of these services in the air space for which they are accountable.

B. ATC Liability Issue

It should be noted that ATC services have been mostly organized on a national basis and that there is no reason inherent in the FANS concept why this needed to be changed.²⁶ This is in accordance with the rights and responsibilities of States within their sovereign air space as described above.

a. Present Rules of Air Law

The Chicago Convention, in its Annex 2 entitled "Rules of Air" specifies that an aircraft commander will follow the instructions of ATC authority. The liability of ATC is universally

accepted to constitute a delictual liability as opposed to contractual liability.²⁷ ATC services owe a duty of care to those airliners or aircraft operator making use of or relying upon their operations for safety of aircraft. A breach of this duty of care will be actionable in negligence, the defendant being the Governmental bodies where the accident occurred, because it assumed the responsibility of operation of the ATC services.

ATC liability may arise for fault as the part of its officers, employees and agents for the personal or property-damage sustained by aircraft accidents. ATC agency shall be exonerated if the damage occurred fortuitously, as a result of force majeure, through action of a third party, through fault of victim or inaccurate information from another agency which ATC agency only transmitted, and provided that ATC agency proves that it was impossible to take corrective measures. A breakdown of the equipment cannot relieve the agency from its liability, since it will have, in case of damage resulting from faulty equipment, a recourse action against the manufacturer under general products liability rules.

On the other hand, the State is obliged to have to the greatest possible extent its own regulations compatible with the international standards and procedures contained in the Annex 11 entitled "Air Traffic Services" which is established through appropriate procedure of the ICAO Council. The prime objective of the ATS being to prevent collisions between aircraft, the Annex deals with ways of expediting and maintaining an orderly flow of air traffic, advice and information for the safe and efficient conduct of flights, and alerting service for aircraft in distress. The standards and procedures specified in the Annex allow to the State the deviations from them, while, however, they are enforceable without exception to all States as to the flight over the high seas.

While the right of the State is recognized as to the establishment and the application of the laws and regulations of a State within its territory, a similar right is recognized to the ICAO as to the air navigation over the high seas in accordance with the Article 12 of the Chicago Convention. The Council of the ICAO has the right to promulgate an unilateral act to be incorporated in the Annexes to the Convention, which is legally

binding upon all member States when their aircraft flies over the high seas. The ICAO, thus, functions as an international authority on this matter.

As the rule-making authority on ATS over the high seas is conferred to the ICAO, the international obligation of a State to provide radio services and other navigation facilities to facilitate international air navigation is restricted to its own territory (Article 28 of the Chicago Convention) and is further limited to what State "may find practicable."

b. Legal Issues

The FANS concept, however, presupposes as analyzed in the Scenarios that satellite systems or components of such systems used for FANS purposes would represent multinational facilities and services, and a multiplicity of participants including an international entity other than State government. More specific issues, for example, are presented in the Scenario 3 and 4 regarding the IACSP and the MSCP, respectively.

Multinational facility/services by its very nature would extend beyond the individual airspace of a State, so as to serve international air navigation in airspace extending beyond the airspace serviced by a single State. In this context, this would call for the problem of the determination of jurisdiction. Activities of ICAO and International Law Association ("ILA") as to the legal problems on the liability of the ATC are relevant here, which might bring about the harmonization and unification among various States.

Secondly, for FANS participants other than the State, a legal issue lies in how to accommodate the rights and responsibilities of States with such entity. Legal arrangements between States and other participants should include the determination of the extent to which liability is to be assumed in connection with the provision of facility/service. Other aspects should also be dealt with including whether the entity providing the facility/service is concerned, whether an international organization agency or State(s), should alone assume such responsibility or whether this should be shared among all the participating States.

Finally, a question arises as to whether the international standards and procedures to be adopted by the ICAO may apply also to the operation of the space segment.

c. Scope of ICAO Competence

The determination of the jurisdiction and the extent to which liability is assumed by different entities participating in the provision, use management and regulations of the FANS would require an accommodation with the existing institutional framework and legal regulations. As far as such rights and responsibilities of states are defined in the Chicago Convention as well as its Annexes and upheld by regulatory role of the ICAO, any adjustment, if any, should be reviewed with regard to its consistency with other regulations and etc. The ICAO should play a central role in providing a guidance on this matter, so that institutional aspects of the FANS implementation would be more clarified and that States would be able to participate in this effort in more consistent way.

Furthermore, as the concept of the FANS presupposes facilities and services in the areas, extending beyond the individual airspace of a State, where such competence of the ICAO is effective, the resolution of the issues discussed above should be reviewed with respect to the rules laid down by the ICAO.

Regarding the question on the extension of the coverage of the international standards and procedures in the Annex to the operation of the space segment, an answer should be affirmative. It's because the space segment operates for the purpose of ensuring the safety, regularity, and efficiency of air regulation, the concerned area of which is listed in the Article 37 of the Chicago Convention. As the list in this Article which the international standards and procedures deal with is not exhaustive, and as, furthermore, this Article make it clear in the last sentence that the ICAO shall adopt those rules concerned "such other matters concerned with the safety, regularity, and efficiency of air navigation as may from time to time appear appropriate".

It is noted here that a part of the regulation of the air law is applicable to the space segment operation which, as space activities, is as well regulated by the space law.

As, on such basis, the ICAO is competent upon the adoption of the rules concerning the operation of the space segment, it remains to examine its competence on issues of space law which is also applicable to the space segment.

§ 2. Space Law Issues

Prominent issues of space law are regarding the international responsibility by the State and the non-discriminatory accessibility.

A. International Responsibility Issue

In accordance with space law requirement, the space activities should be under supervision and responsibilities of that State. The question arises as to, firstly, which causes call for State responsibility, and secondly, which scope of the activities should be assumed by the ICAO.

a. Constituent Elements of the International Responsibility

The issues related to ATC liability would be more complex when it is related to the space segment. In accordance with space law principle, the space activities should be under supervision by the State which should also assume the international responsibility related. It is implied in this principle that the operation of space segment would be considered as space activities being able to enjoy the freedom of navigation only when State government assures its supervision and international responsibilities. As discussed above, State responsibility may be claimed as well regarding the ATC liability under the present rules of air law.

State responsibility coming from space activities is by its nature distinct from the one due to such ATC liability. While calling for State responsibility is on such basis in case of the liability of the ATC agency, the international responsibility by State would be called for regarding its nationals' space activities. A question arises here on knowing which space activities would generate this responsibility.

According to the general theory on this subject, the international responsibility would be called for with regard to an illegal act in violation of international law which is attributable to the State as subject of international law and that constitutes

a direct cause of a damage occurred. In the case of other space activities such as satellite remote sensing and satellite direct broadcasting, the international responsibility has been set forth in its respective UN Resolutions. Each puts forward some principles based upon other space law principles or the norms of the international law, with which each State bears an obligation to comply. It should be noted that by doing so, each State acknowledges a certain space activity non-conforming with such principles might provoke a damage to other State, whether it is direct or consequential damage. On the other hand, a basis, upon which the responsibility is attributable to the State, is the principle codified through the Article VI of the Outer Space Treaty.

b. Scope of the ICAO Competence

As to the FANS, the rules of air law regulating aircraft navigation already exist as legally binding principles and also as a contractual obligation of the contracting States. While each State undertakes to adopt measures to insure that every aircraft flying over its territory and every aircraft carrying its nationality comply with the rules established in the Convention, the ICAO dispose only indirect means for enforcing the respect of its rules. In other words, a possible sanction is left to the discretion of the States. Thus, regarding the individual in violation of the rules, the Article 12 stipulates that the State undertakes to insure the prosecution of that individual. For the State in default under the provision of the Convention and its Annexes, the Council shall report to contracting states any infraction of the Convention. Otherwise, the international responsibility would be proceeded by the State against the State in default. A question posed here is whether the Article 12 would apply to the individual under default situation with respect to the rules pertaining to the operation of the space segment included in the Annexes. As those rules regarding the space segment operations are incorporated into the rules of air law established by the ICAO, the procedure set forth in this Article should be applied. Here arise a necessity, for the purpose of analysis, of distinguishing the case calling for this procedure from the one calling for the international responsibility in the sense defined in the space law.

The rules of space law pertinent to the FANS, as shown above, are regarding an universal accessibility to the FANS, the international responsibility of States for the compliance of its nationals' space activities with the international law.

While the competence of the ICAO regarding the violation of the rules of air law is confined and claiming the international responsibility in this area is left to the discretion of the State, the ICAO competence on the violation of the rules regarding space law is not clearly defined in the Convention. As the rules of air law codified in the Annexes to the Convention under the ICAO competence, however, is applicable to the space segment operation, the ICAO on this subject should assure an appropriate procedure, as stated above, in accordance with the Article 12 of the Chicago Convention for the infraction of the rules of air law. That's the ICAO competence regarding the infraction of the rules of air law.

As to the space activities to which the rules of space law are applicable, calling for the international responsibility is as well left to the discretion of the States. The ICAO may contribute to the determination and elaboration of the concept of the international responsibility. Such elaboration would lead to a more clarified concept and contents of the international responsibility of the State regarding the FANS-related space activities.

In this respect, some issues presented through the FANS Committee activities over the years would be developed as legally binding rules, the violation of which calls for the international responsibility. Prominent example might be the assurance from the space segment provider States on the stability and continuance of system providing. Actual concern of the States on the system integrity and availability non-interrupted of the GPS and the GLONASS may fall within this case.

Above all, such binding rules calling for the international responsibility would represent the concern of the States over the common interest promoted by this space activity, which should be accessible for all States.

B. Assuring a Non-discriminatory Accessibility

As discussed above, assuring a non-discriminatory accessibility would be a suitable way of complying with or realizing the principle of air law which is contained in the aims and objectives of international civil aviation order, as well as the principle of space law, that is the use of outer space in the interest of all States.

a. Present Competence of the ICAO

Detailed form of such accessibility may be various, as the FANS would be implemented in various ways as illustrated in the Scenarios. Firstly, if each State implements the FANS service network in its air space with its autonomy as discussed in the Scenario 1 and 2, this concept would be realized through ensuring an interoperability of the system provided by each State. For example, an aircraft equipped in accordance with the technical standardization would utilize the FANS service in other States' air space. Secondly, it would be realized through the function of an international organization or other kind of international entity established for assuring the FANS service to every State, as the function of the INTELSAT or INMARSAT in the satellite communications. The IACSP and MSCP discussed in the Scenario 3 and 4 would assure such function. It is possible also to suppose that some States ensure the operation of the space segment and service provision on a non-discriminatory basis to every State. That's the case of proposed GPS and GLONASS.

As to the first case, the competence of the ICAO is expressly defined in the Articles 37, 54 (l) and 90 of the Chicago Convention.

Regarding the second case, much concern was expressed over the possibility of the development of monopoly or oligopoly in system provision and operation. For this reason, and because of the need expressed for an international public body to ensure system quality, dependability, and availability, the States voiced strong support for the implementation option to use a mechanism within the ICAO. The scope of the ICAO competence on this subject has been actually discussed in the FANS Committee. It is on the guarantees of access to the GNSS system without restriction that this subject has been noted.

A problem is based upon a pessimistic view of this matter that full adoption of GPS or GLONASS as principal component of the FANS will give provider States the power to grant or deny, at their discretion, the instrumental navigation facility at any time and in any selected airspace in the world. Such dependence would be clearly unacceptable to many States, which would be forced to maintain an infrastructure of conventional radio aids, as a safeguard against this, perhaps unlikely, eventuality. It may not be enough to simply guarantee compliance with the technical requirements. Therefore, as long as there is no formal undertaking to that effect, the FANS concept could not be supported by States.

Taking into account these elements, an opinion is put forward that based on the interpretation that the achievement of objectives established in Article 44 of the Chicago Convention so requires, the ICAO should take steps to obtain the necessary guarantees of access to the GNSS system without restriction as to time or place, so that it may seriously propose, shortly after, a transition to the future CNS system.²⁸

To counter this point of view, an argument may be put forward, to the effect that the only institutional problem for GNSS would be to obtain and globally disseminate information on system integrity and health, in a timely fashion, with standardized, common and efficient formats and procedures. From this point of view, it would be inappropriate to ask GNSS provider States for guarantee of any kind regarding continuity of service. One reason is that demanding guarantees of any kind regarding the continuity of service seems an innovation that did not seem necessary in the past in the case of conventional aids system. And there would be no objective reason that would justify that the innovation in that if such guarantees were demanded regarding the conventional systems, the ICAO should have asked the providers of those systems for guarantees of continuity in the manufacture of equipment, the provision of spare parts, the training of personnel, etc. In the perspective of this opinion, it would be sufficient regarding the GNSS to conclude a bilateral agreement with the provider State, encompassing aspects such as guaranteed minimum performance at all times and throughout the airspace concerned, reception of information on the health of the system, etc. The function of the

ICAO under this régime would be limited to the development of Standards and Recommendations to be observed within the framework of such agreements.

A difference found between the point of view of such opinion is regarding the scope of the ICAO competence issue. The one claims that the ICAO is conferred the competence to request and obtain from the States a guarantee of access. The other insists on that the function of the ICAO should not exceed a traditional scope of work that is the rule-making on technical standards, and, thus to assure universal accessibility to the systems. As the concept of this principle is not clearly defined, and the form of the realization is various, it is premature to define the scope of the ICAO competence on this subject. While the enlarged scope may be acknowledged upon the basis of the interpretation in the light of the objectives and the purposes of the Organization, the mechanism available to the ICAO following its mission has been suitable for the traditional scope of the ICAO activities. The function of the ICAO consists in promoting the uniform rules regarding air navigation, preserving the rights of the States over the air space, and in establishing the international standards applicable to every State. This organization is not an operator of the space segment as the INTELSAT or the INMARSAT, and does not assure the provision of the facility and services. This is the existing status of the ICAO competence regarding this principle, established in accordance with the rules of air law based on the Chicago Convention.

Based upon the rule-making competence showed above, the Organization would perform its task through, for example, adopting the international standards and procedures. This is done by incorporating the requirements of the non-discriminatory accessibility into the rules contained in the Annexes. A question remains on whether the scope of the Annex is proper for setting such kind of legal requirement. Furthermore, its scope is limited because each member State has the right to notify its deviations from the such standards in necessary case.

For this reason, institutional arrangements would be inevitable.

b. Institutional Role of the ICAO

"Institutional arrangements" may be defined as arrangements necessary for the practical implementation of the global CNS/ATM systems by the mutual interaction of different entities who are the main participants in the provision, use, regulation and management of the systems such as providers of the satellite based CNS services, users of the services (aircraft operators, ATC), States, and international organizations (in particular ICAO as the focus of the international standardization and regulatory process.

Any function or obligation of a State to be included in the provision of the FANS beyond its territory and to insure its non-discriminatory accessibility can be based on a specific commitment of that State under an international agreement. Such commitment may be made under bilateral or multilateral agreement between the States. In that case, the role of the ICAO would be limited to providing a guidance.

An institutional role for ICAO, on the other hand, could be found when, apart from its global regulatory functions, ICAO will be institutionally involved in the approval of the Regional Air Navigation Plans. While the international obligation of a State to provide services and other air navigation facilities is restricted to its own territory, and that the State, thus, seems in a position not being legally obligated to ensure the system availability, a commitment of that State for the non-discriminatory accessibility can be assured through the Regional Air Navigation Plans. That's the case of ICAO EUR Navigation Facility/Service, which reflects relevant ICAO provisions and established policies on the Organization's regional planning for and implementation of facilities/services required for air navigation applicable in the European Region (Assembly Resolution a 26-8, Appendices K, L and M). The introduction of the new CNS facilities and services, in connection with such plan, will require adjustment of the existing Regional Air Navigation Plans by the appropriate RAN Conference and the resulting recommendations will be subject to approval by the ICAO Council.²⁹

On the other hand, a further substantial institutional role for ICAO could be found if States were to accept an implementation option involving a mechanism within ICAO along the lines of the successful financial management by ICAO for over forty years of agreements on the joint financing concerning the provision of North Atlantic air traffic control, communications, and meteorological facilities and services. Under such a scheme - regardless of who would be the actual provider or providers of the services - ICAO could act as an instrument of the international community to determine the policies and operating standards for the services, provide guidance on specific projects, equipment specifications, etc. ICAO could develop also under such scheme the system of user charges and their collection, as well as an international audit of the financing management.

FANS implementation through this institutional role of the ICAO would require its active involvement which would be beyond its traditional role. Through this active and extensive participation of the ICAO, the legal principle of the space law would be realized in this area of space technology utilization and, the safe and orderly growth of the international civil aviation throughout the world being fostered, the mission conferred to this Organization is in a satisfactory manner fulfilled.

Consequently, the legal issues originating from the rules of air law and the space law fall within the scope of the ICAO competence.

Concluding Remarks : "Space Activity of the ICAO"

Regardless of the eventual determination of particular scenarios and options for the FANS implementation, it is apparent that a key role will be played by the ICAO in the discharge of its constitutional functions under the Chicago Convention. Although the involvement of the satellite technology will be a new element transcending (at least in the case of geosynchronous satellites) the traditional concept of "air space", in fact, the ICAO is the only body which has the jurisdiction to regulate specific issues of aeronautical communications, air navigation aids and other matters concerned with

the safety, regularity and efficiency of air navigation. Apart from its regulatory and rule-making role for international standards and other technical uniformity, the ICAO should play a central role on the basis of its competence on institutional arrangements for ensuring that this utilization of space technology and its environment should be consistent with the rules of space law.

In consequence, as the function of this Organization consists in making as an international legislature the rules binding upon space activities as well as in participating, as an international authority in the international civil aviation, in the institutional arrangements of the FANS service providing, the ICAO undertakes in a certain sense a space activity. It is expected through this activity that this newly developed concept of space utilization would be implemented in a consistent manner with the rules of air law and space law.

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 2. Nicolas Mateesco Matte, "Droit Aérospatial", 1969, p.86
 3. Chicago Convention on International Civil Aviation, done December 7, 1944, 61 Stat. 1180, T.I.A.S. No. 1591, 3 Bevans 944, 15 U.N.T.S. 295 (Effective, April 4, 1947)
 4. Guideline a) in the Report of the 10th Air Navigation Conference (from 5 to 20 September 1991, Montréal), Report on Agenda Item 4, Appendix A. AN-CONF/10-WP/131
 5. Guiding Principles on Institutional and legal Aspects of the Future Air Navigation Systems, the Report of the 10th Air Navigation Conference (from 5 to 20 September 1991, Montréal), Appendix D
 6. Supra note 4, Guideline b)
 7. Supra note 3, Article 22.
 8. Supra note 3, Article 28
 9. Supra note 4
 10. "At the early stage of Astronautics, freedom to use outer space by non aeronautical objects would certainly have never been recognized on a customary law level if a solemn promise had not been given by the first space powers that exploration and use of outer space should

- be for the benefit of Science and social progress only, and in the interests of the whole mankind.", Marco G. Marcoff, "The International Legal Status of Large Space Structures and the 'General Interests' Principle"; Proc. 27th Colloquium on the Law of Outer Space, p.267 (1984)
11. See, "Principles Relating to Remote Sensing of the Earth From Outer Space", U.S. Doc. A/RES/41/65, 1985
 12. See "Principles Governing the Use by States of Artificial satellites for International Direct Television Broadcasting", G.A. Res. 37/92 (1982)
 13. Bin Cheng, "The Commercial Development of Space: The Need For New treaties", 19 Journal of Space Law 1, (1991), p.40
 14. Id.
 15. International Telecommunications Satellite Organization (INTELSAT) Agreement, With Annexes, done August 20, 1971, 23 U.S.T. 3813, T.I.A.S. No. 7532 (entered into force February 12, 1973)
 16. Convention on the International Maritime Satellite Organization (INMARSAT), With Annex, done September 3, 1976, 31 U.S.T. 1, T.I.A.S. No. 9605 (entered into force July 16, 1979)
 17. N.M. Matte, "Droit Aérospatial: les télécommunications par satellites", 1982, p. 283 (Ed. Pedone, Paris, 1982)
 18. Supra note 4, Guideline m): "Arrangements should make all four identified satellite services (ATS, AOC, AAC, and APC) available through any given satellites in any region of the world." in the Report of the 10th Air Navigation Conference (from 5 to 20 September 1991, Montréal), Report on Agenda Item 4, Appendix A. AN-CONF/10-WP/131
 19. Report on Agenda Item 4, Appendix C Representative Examples of Scenario Analyses for Scenario 1 to 4, 4C-4, for Special Committee for the Monitoring and Co-ordination of Development and Transition Planning for the Future Air Navigation System (FANS PHASE II) Second Meeting, Montreal, 29 Apr. to 17 May 1991
 20. See, Randol R. Craft Jr. "U.S. Product Liability Law and Commercial Space Activities", the Conference of the International Bar Association's Section on Business Law, Singapore, September 1985, also, Rudolph V. Pino, Jr. "Civil Liability in Commercial Space Ventures Under U.S. Law", 6th International Conference on Commercial and Industrial Activities in Space in the 90's: Insurance Implications, Rome, 16/17 September, 1991
 21. Supra note 193, 4C-4
 22. Global Navigation Satellite System Transition Implementation Plan. Final Report RTCA Inc. Doc. No. RTCA/TF-1 September 1992
 23. Supra note 19
 24. See, "Status of the INMARSAT Aeronautical System", presented by INMARSAT, ICAO Seminar on FANS (Singapore, 20 to 26 July 1991)
 25. Supra note 19
 26. Id.
 27. Doo Hwan Kim, "Some considerations on the liability of ATC agencies", Air Law, Vol.XIII, No.6 1988, p.268
 28. The 10th Air Navigation Conference, 5 to 20 September 1991, ICAO Doc. AN-CONF/10-WP/77, p.4
 29. The 10th Air Navigation Conference, 5 to 20 September 1991, ICAO Doc. AN-CONF/10-WP/23, p.4