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Legal Aspects of Aeronautical Mobile Satellite Services

-The ICAO FANS Concept-¹

by

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I. Historical Outline

The potential use of space-bound aeronautical installations has been envisaged since the benefits of satellite applications especially with regard to communications had been recognized². In the early 1960's, NASA and Pan American Airlines conducted experiments to demonstrate the feasibility of satellite communications for aircraft³. As early as in 1968, the International Civil Aviation Organization -ICAO- established a panel of experts to examine the "Application of Space Technology Relating to Aviation" called ASTRA⁴. Pursuing its recommendations NASA, ESRO and several states such as Canada, Australia and Japan formed an international consortium called AEROSAT⁵. Unfortunately ASTRA issued its recommendations at a time when airlines were suffering a decrease of business due to the first oil crisis and were unwilling to invest in an expensive satellite system. The AEROSAT experimental satellite was never launched and the project was officially abandoned in 1980.

However, the idea of AMSS remained alive and very soon serious thoughts had been undertaken especially with respect to shared services with maritime applications. For different reasons, INMARSAT and ICAO have been very cautious on this question and the discussions within these two international organisations ceased completely until the early 1980's when ICAO and INMARSAT concurrently reconsidered the use of satellite technology for civil aviation purposes.

In 1983, ICAO established the Special Committee on the Future Air Navigation Systems -FANS- which held his first session in 1984⁶. So far, the FANS-Committee held four meetings during the initial phase and three meetings during Phase II. Additionally, the 10th Air Navigation Conference in 1991⁷, the

28th Session of the Legal Committee⁸ and the 29th⁹ Assembly were almost entirely dedicated to the subject.

II. The Current and Future CNS/ATM Concepts

Since the birth of modern civil aviation, aircraft have relied upon ground based systems for communication, navigation and surveillance. Despite the use of advanced technology for the aircraft as such, CNS is still based upon technology developed before or during World War II. The present systems are characterised by four major shortcomings¹⁰:

- line-of-sight constraints
- implementation problems
- lack of air/ground data interchange systems
- lack of route flexibility and harmonised system development.

Today, communication between aircraft and air traffic control is usually carried out in the VHF-band which has a quasi optical range of about 450 km. Beyond this limit, communication has to be carried out on the HF-band with very poor quality. The navigational and surveillance tools have the same range. This means that none of the systems allows a coverage up to 70.000ft. altitude on a global basis due the curvature of the Earth surface¹¹. There is no coordination between the different national plans for CNS. Since today communication is limited to voice-only communication ambiguity and misunderstandings are common¹². Large parts of the World lack reliable coverage by CNS Systems¹³.

The future CNS/ATM concept will make satellite data and voice communication services available for at least the larger part of the World¹⁴. The so called *Aeronautical*

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Telecommunication Network -ATN- will provide for the interchange of digital data packets between end-users of dissimilar air-ground and ground-ground communication sub-networks. Interoperability will be maintained by the so called *Open System Interconnection Model*.

The benefits can be divided in two different categories:

- safety, technical and operational benefits
- economic benefits.

The new CNS/ATM concept will enhance aviation safety through improved reliability of the aeronautical mobile satellite communication system independent of line-of-sight constraints on an almost global basis. It will make aeronautical communication services via fax and telephone available to the passenger. Route deviations will become impossible thus incidents like the shot down of the Korean Airlines 747 over Sachalin will be avoided.

The economic benefits are enormous¹⁵. The annual cost is estimated about \$1.0 billion whereas the annual economic benefits range from \$5.2 billion to \$6.6 billion consisting of, *inter alia*, effective reduction of air miles and fuel consumption through access to optimum flight profiles. The airline industry has recently estimated that the cost of air traffic control system delays to airlines and commercial aviation users is probably \$10 billion per year. A reduction of congestion and ATC-related costs of delay of just 10 per cent would offset the cost of implementing the new concept world-wide¹⁶. The future passenger communication services, including telephone, telex and telefax, will be of special economic importance for airlines especially on long-distance flights. Cathay Pacific estimates the total annual costs per aircraft between \$58.000 for a 747-400 and \$132.600 for a L-1011 TriStar. Cathay assumes that a satcom-equipped 747-400 would generate a net return between \$42.500 and \$208.800¹⁷. Satcoms would therefore open a new source of substantial revenues for airlines.

III. The Existing AMSS

Today, the prime carrier for international satellite communications traffic for mobile users is the *International Maritime*

Satellite Organization -INMARSAT-¹⁸. It has progressively broadened its mandate from initially providing communication services between ships, shipowners and their customers, and services for personal communications of crew members and passengers. INMARSAT awarded itself, with the consent of its signatories, the right to provide commercial services on behalf of every kind of mobile user, including AMSS which eventually caused a serious conflict with ICAO.

Two navigation and surveillance systems are already operational although not yet fully installed, namely the US-American Global Positioning System -GPS-¹⁹ and the Russian Global Orbiting Satellite System -GLONASS-. Both systems are originally designed for military purposes but both, the US-Government and the government of the Russian Federation have offered to make these systems also accessible for civil uses free of charge for the first ten years of operations²⁰. Both systems have global coverage and are independent of weather conditions²¹. One of the major hurdles to implement the new CNS/ATM systems is to ensure that the different systems remain compatible²².

Since a couple of years, ESA, Spain, the United Kingdom and EUROCONTROL are investigating an European satellite system called PRODAT/PROSAT ATSS²³. Furthermore, a working group between, *inter alia*, Russia's air navigation body, Gosaeronavagatsia, the European Community and EUROCONTROL will test GLONASS for civilian use in Europe²⁴.

Recently, the Japanese government announced plans to launch a supplemental AMSS by the year 1999²⁵.

IV. AMSS and General Rules of the Law of Outer Space

As all activities in outer space, AMSS are subject to the provisions of the Law of Outer Space, especially the OuterSpace Treaty²⁶ being applicable to all activities in outer space whether carried out by state authorities or private entities and thus imposing limitations and conditions²⁷.

1. The Common Interest-Clause" in Art.I OST

This article provides that
 "[t]he exploration and use of outer

space,...., shall be carried out for the benefit and in the interest of all countries,irrespective of their degree of economic or scientific development, and shall be the province of all mankind;"

and

"[O]uter Space,...., shall be free for exploration and use by all states without discrimination of any kind, on a basis of equality and in accordance with international law..."

This is not the place to discuss the exact meaning of this principle, however, it is fair enough to say that it contains a basic call upon states carrying out space activities to be in some way responsive to the interests of developing countries, and to provide distribution of benefits derived from space activities. Thus, it can be regarded as "*a joint expression of intention, conferring no legal rights and imposing no real obligations*"²⁸. The ways and means by which to achieve such cooperation is a matter of agreement between the states concerned²⁹. This has to be done on a non-discriminatory basis.

The FANS-Committee regards the principle of non-discrimination as a corner stone of the new CNS/ATM-Concept incorporating it in its general guidelines for institutional arrangements concerning AMSS³⁰. However, one has to be aware of the loopholes in this non-binding provision. First, it does only apply to air navigation safety services, thus excluding the commercially interesting aspect of aeronautical passenger communication. Second, the accessibility to necessary AMSS ground and on-board equipment is not ensured. The 10th Air Navigation Conference of ICAO only recognized "*the convenience of equipment accessibility without discrimination*"³¹. The weak wording is obvious.

2. The Principle of State Responsibility and State Liability

Artt. VI and VII of the OST establish a rather unique régime of state responsibility and state liability which is further codified in the *Liability Convention of 1972*³². Many points are disputed in the context of responsibility and liability under the régime established by the OST and the LC. This is not

the place to open a discussion on different interpretation of some expressions. However some paramount points have to be highlighted.

Regarding AMSS it is important to underline that under space law only a small fraction of possible damages are covered. For instance, Art. I(a) of the LC defines "damage" as follows:

"[the term damage] means any loss of life, personal injury or other impairment of health; or loss of or damage to property of States or persons,..."

The wording of this article makes it clear that it refers exclusively to physical damage and excludes pecuniary damages³³. The liability régime of the outer space law will only be applied with regard to damages caused by the space segment itself, which is in the case of AMSS the satellite, for instance NAVSTAR/GPS. The typical damage arising from telecommunication activities, namely pecuniary loss due to transmission failure, incorrect, unclear, retarded or otherwise faulty transmission is not covered. Applied to AMSS, a major disaster caused by transmission failure would not fall under the scope of the LC.

A second complex problem could be which State shall be held liable. Since AMSS are offered also by private entities the question becomes very urgent who will actually be held liable if a space segment is operated by a private services provider³⁴. A safe starting point is to say that the state under whose name a satellite operating AMSS is registered in accordance with the Registration Convention³⁵ will be liable. The basic problem of the liability régime established is the question whether the term "state which...procures the launching" under article I(c)(i) LC shall be understood narrowly in the sense that the launch has to be carried out because of the given state's initiative or under its supervision. A broad interpretation of the term would impose liability in cases where a state does not intervene and thus does in fact tolerate launching activities by its own nationals. Although a broad interpretation seems to be appropriate, both because of the drafting history and the ratio behind the régime, it seems however be doubtful whether a state will be liable for space activities of its nationals in any case. Taking the example of the German company OTRAG³⁶, the German

government had no interest in and in fact discouraged the activities of OTRAG. Some authors are indeed of the opinion that a state is always liable for outer space activities of entities which have to be considered as its nationals³⁷. Two critical points have to be raised. First, the determination of a given nationality can already be very difficult concerning natural persons³⁸ and can be almost impossible concerning juridical persons such as multinational companies³⁹. Second, the state must be in the position to exercise effectively its duties to authorize and supervise space activities. This is merely the case when space activities are entirely carried out abroad and the only link is, e.g., the registration of a company under the law of a given state. One can therefore conclude that nationality as such might not be enough to make a state liable for outer space activities of individuals. Additional aspects such as, e.g., licensing and subsidies by the government, headquarters and main places of business, effectiveness of supervision and control may play a role to determine the state liable under the *LC*.

V. AMSS and the Régime of International Telecommunications

All forms of telecommunication, including AMSS, are subject to the regulatory régime established by the *International Telecommunication Convention*⁴⁰ and its body the *International Telecommunication Union -ITU-*. As it will be shown this régime and its major principles and mechanisms has a considerable impact on AMSS.

1. The Basic Principles of Telecommunication

Beside the above mentioned general principles of outer space law, the two major principles are, on a national level, the *Principle of States' Jurisdiction* and, on an international level, the *Principle of States' Responsibility*.

Under international law, governmental regulation and control of national telecommunication systems are considered to be an internal matter, the *domaine réservé*, of the respective state. Under the principle of sovereignty and territorial jurisdiction, general international law recognizes the jurisdiction of states to regulate and control their internal telecommunication systems⁴¹. This right

covers, for instance, licensing of radio stations and authorization to use certain radio frequencies. There is no freedom in the field of telecommunication which would automatically allow anybody to operate a wireless transmitter or any other means of telecommunication within sovereign territory of a state⁴². This principle is reflected in art. 30 of the *Chicago Convention*⁴³ para (a) of which reads as follows:

"...[T]he use of radio transmitting apparatus in the territory of the contracting State whose territory is flown over shall be in accordance with the regulations by that State".

The clear and absolute requirement that the use of the radio transmitting apparatus to be in accordance with the regulations prescribed by the state flown over is in recognition of the sovereign right of states and in compliance with the rules of international law. It presents a major obstacle to introduction of global public correspondence⁴⁴. Furthermore, art. 30(b) of the *Chicago Convention* provides that:

"[r]adio transmitting apparatus may be used only by members of the flight crew who are provided with a special licence for that purpose, issued by the appropriate authorities of the State in which the aircraft is registered".

Literally interpreted, both provisions actually forbid public correspondence from an aircraft in foreign airspace because it involves the "use" of a "Radio transmitting apparatus" by a person who is not "member of the flight crew provided with a special licence". However, such an interpretation is doubtful with regard to art.30(b)⁴⁵ taking into account article 44 of the *ITU Radio Regulations and Radio Regulations 3393 and 3394* which expressly permit the use of radio telephone equipment and aircraft Earth stations by anybody provided the station itself is controlled by a licensed operator⁴⁶. Even if article 30(b), correctly applied, does not hamper the introduction of AMSS, the basic legal obstacle to implement private correspondence services remains, namely the principle of absolute and complete sovereignty of states to regulate all telecommunication activities within their national territory and air space. Solutions discussed have been numerous from an amendment of the *Chicago*

Convention to a model clause to be inserted in the air services agreements allowing such correspondence⁴⁷.

Under the Principle of States' Responsibility states are internationally responsible if the frequencies assigned to a certain service cause harmful interference to foreign radio stations and thus violating the licensing state's international obligations under the rules established by *ITU*. Frequencies have been allocated to AMSS and to "classical" aeronautical radio navigation services. Regarding public correspondence, authorization within the allocated frequency bands can only take place provided that full priority will be given to messages concerning safety and regularity of flight. This responsibilities only applies vis-à-vis states.

Possible private litigations are subject to article 21 of the *ITU Convention* which reads as follows:

"[M]embers accept no responsibility towards users of the international telecommunication services, particularly as regards claims for damages."

This provision simply states that private claims arising out of the use of telecommunication services, such as AMSS, are not admissible under the *ITU Convention*⁴⁸. Similar provisions are included in the *INTELSAT Operating Agreement*⁴⁹. The *COSPAS/SARSAT Agreement* goes even further stating that the parties will co-operate in order to protect themselves against private claims⁵⁰.

Conclusions

As to summarize the above, the introduction of AMSS as envisaged by the FANS Committee of ICAO is in conformity with the basic principles of outer space law. AMSS are subject to the régime established by the *OST* and the *LC* and therefore the principle of state responsibility and liability applies. In a given case it might however be difficult to determine the state liable.

AMSS are also subject to the regulatory régime established by *ITU*. The current regulations allow the use of certain frequency bands for such services. Aeronautical Passenger Communication Services are allowed in so far as priority is given for safety messages. A major legal

obstacle with respect to such type of correspondence arises out of the principle of states' sovereignty to regulate telecommunication services within their sovereign territory including the airspace above.

¹See for an elaborated study of the subject: **W.Guldimann & S.Kaiser**, *Future Air Navigation Systems -Legal and Institutional Aspects-* (Dordrecht, Boston, London: Martinus Nijhoff Publishers, 1993); **W.Stoffel**, *Legal Aspects of Aeronautical Mobile Satellite Services* (Faculty of Law, McGill University, 1992) [unpublished LL.M. Thesis].

²See for instance: **M.S.Dougal, H.D.Lasswell & I.A.Vlasic**, *Law and Public Order in Space* (New Haven: Yale University Press, 1963) at 74.

³**W.D.von Noorden**, "Space Communication to Aircraft: A New Development in International Space Law (Part I)" [1987] 15 *J. Space L.* 25 at 30.

⁴See for details: ICAO Doc. 9004, AN-CONF/7 at 2-1ff.

⁵See for the history of AEROSAT: **W.-H. Park**, "Satellite Applications for Aviation Requirements" [1989] XIV *Air Law* 17 at 19.

⁶Whereas the committee concerned with the future systems continues to be known as the FANS-Committee, ICAO recently adopted the term "ICAO CNA/ATM Concept" in place of future air navigation systems or FANS.

⁷See: ICAO Doc. 9583, ANF-CONF/10.

⁸See: ICAO Doc. 9588-LC/188, item 3 and item 4.

⁹See: ICAO Doc. A29-WP/42.

¹⁰See for details: ICAO Doc. 9583, AN-CONF/10 at 2A-1.

¹¹See for details: **W.Guldimann & S.Kaiser**, *supra* note 1, at 151ff..

¹²70 to 80 per cent of all potentially hazardous incidents that were reported in the US aviation safety reporting system (ASRS) implicated ineffective verbal information transfer including, *inter alia*, acoustic confusion, pilot "readback" errors, controller "hearback" errors, misinterpretation caused by poor pronunciation and failure to use standard terminology. See: ICAO Doc. 9583, ANF-CONF/10, at 3-8.

¹³See for details: ICAO Doc. 9524, FANS/4, at 2A-1.

¹⁴See: ICAO Doc. 9583, AN-CONF/10, at 1-1.

¹⁵See for details: ICAO Doc. 9524, FANS/4, at 3.2A-1ff..

¹⁶**International Coordinating Council of Aerospace Industry Association**, "Aerospace Industry Ready to Help Implement Global Solution"

[No. 12, Dezember 1991] 46 *ICAO Journal* at 14f..

¹⁷See: C.Bulloch, "Aeronautical Satcoms Arrive" [1990] 6 *Space Markets* 275 at 280.

¹⁸There are many more providers of communication services fighting for the increasing market on aeronautical communication market especially with regard to passenger communications. See for instance: H.-W.Park, *supra*, note 5 at 25.; L.Burgess "Digital Technology Drives Airline Phone Fight" [No.34, Sept.20-26,1993] 1 *Commercial Aviation News* at 8.

¹⁹Sometimes referred to as GPS/NAVSTAR whereby NAVSTAR is the name of the type of satellite used for GPS.

²⁰There is a growing controversy in the USA whether to maintain this decision. See for instance: L. Burgess, "FAA Official: Satellite System is Free to Users Through 2003" [No.18, May 10-16, 1993] 1 *Commercial Aviation News* at 9.

²¹See for details: T.G.Anodina, J.E.Turner, "USSR-USA accord reached on satellite navigation" [No.5, May 1989] 44 *ICAO Bulletin* at 12; D.Fisher, "Satellite promise benefits for all" [No.1, 1992] *IATA Review* 13 at 13.

²²ICAO Doc.9583, AN-CONF/10, at 4F-1.

²³See for details: D.Diez & E.Esteban, "PRODAT/PROSAT data links successful in controlling jet flight" [No.2, February 1989] 44 *ICAO Bulletin* at 30ff..

²⁴B.Tigner, "Russia, EC to Cooperate on Glonass Use in Europe" [No.32, Aug.30-Sept.12, 1993] 1 *Commercial Aviation News* at 3ff..

²⁵L.Burgess, "Japan Makes Commitment to Satellite Navigation" [No.33, Sept.13-19, 1993] 1 *Commercial Aviation News* at 3ff..

²⁶*Treaty Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, of 27 January 1967*, K.H.Böckstiegel & M.Benkö (Eds.), *Space Law Basic Documents* (Dordrecht: Martinus Nijhoff Publishers, 1989) Vol.I. Part A.1 [hereinafter *OST*].

²⁷K.H.Böckstiegel, "Die Nutzung des Weltraums -Allgemeine Grundsätze-" in K.H.Böckstiegel (Ed.), *Handbuch des Weltraumrechts* (Köln: Carl Heymanns Verlag KG, 1991) 265 at 267.

²⁸B. Cheng, "Outer Space: The International Legal Framework" in *Institute of International Public Law and International Relations Thesaurus Acroasium Vol.X -Air and Space Law-* (Thessaloniki 1981) 51 at 81.

²⁹N.M.Matte, "Aerospace Law: Telecommunication Satellites" [1980, I.] 166 *Recueil des Cours* 123 at 147.

³⁰The so-called "Guidelines for Acceptable Institutional Arrangements Relative to the

Implementation of Aeronautical Satellite Services (AMSS) and Global Navigation Satellite Services (GNSS) for Civil Aviation". Guideline I-1 reads as follows: "[U]niversal accessibility to air navigation safety services must be available without discrimination"; ICAO Doc.FANS (II)/3 at 5A-1.

³¹ICAO Doc.9583, AN-CONF/10 at 4-10.

³²*Convention on International Liability for Damage Caused by Space Objects, 29 March 1972*, K.H.Böckstiegel & M.Benkö (Eds.), *supra*, note 25 Vol.I Part A.II [hereinafter *LC*].

³³N.M.Matte, *supra*, note 28 at 149. See also, *infra*, V.

³⁴For instance, Motorola is currently setting up a low Earth orbit satellite network called IRIDIUM allowing voice communication by small cellular phone type user terminals. Although it is not primarily dedicated to AMSS the parallels to aeronautical satcom services are obvious. See for details: P.J.Klass, "WARC-92 Approves Satellites for Small Cellular Telephones" [March 9, 1992, No.10] 136 *AW&ST* 31.

³⁵*Convention on Registration of Objects Launched into Outer Space of 1975*, K.H.Böckstiegel & M.Benkö (Eds.), *supra*, note 25 Vol.I Part A.IV..

³⁶Orbital Transport- und Raketen Aktiengesellschaft. See for details on this case: K.H.Böckstiegel, "Transport to Outer Space by Private Enterprises: Aspects of Air and Space Law", [1976] 25 *ZLW* 285ff..

³⁷H.Bittlinger, *Hoheitsgewalt und Kontrolle im Weltraum* (Köln: Carl Heymanns Verlag KG, 1988) at 39f.; N.M.Matte, *supra*, note 28 at 148.

³⁸See for instance: "Nottenbohm Case", *ICJ Reports* [1955], 4ff..

³⁹See for instance: "The Barcleona Traction, Light and Power Company" [1970] *ICJ Reports*, 3ff..

⁴⁰*International Telecommunication Convention with Annexes I and II of 1982*, K.H.Böckstiegel & M.Benkö (Eds.), *supra*, note 25 Vol.II Part C.IV.1 [hereinafter *ITU-Convention*].

⁴¹F.W.Hondius, "International Control of Broadcasting Programs in Western Europe" in E.McWhinney (Ed.) *The International Law of Communications* (Leyden: A.W. Sijthoff, 1971) 69 at 76f..

⁴²M.Milde, "Legal Aspects of Global Air-Ground Communication" in G.R. Baccelli (Ed.), *Liber Amicorum Honouring Nicolas Mateesco Matte -Beyond Boundaries-* (Paris: Éditions A.Pedone, 1989) 215 at 218.

⁴³*Convention on International Civil Aviation, signed at Chicago on 7 December 1944* ICAO Doc.7300/6 [hereinafter *Chicago Convention*].

⁴⁴See in the same sense: V.Poonosamy, "Report of the Rapporteur on the Legal Aspects of

the Global Air-Ground Communications", ICAO Doc. LC/28-WP/4-1..

⁴⁴See for details: **M.Milde**, *supra*, note 41 at 220.

⁴⁵This view is shared by the Legal Committee of ICAO; see ICAO Doc.9588-LC/188, at 4-5.

⁴⁶See for details: ICAO Doc.9588-LC/188, at 4-f.; **V.Poonoosamy**, *supra*, note 43 at 9.

⁴⁷See for details: **P.-M.Martin**, "Distress Location Via Satellite: Legal Aspects" [1990] 57 *Telecommunication Journal* 545 at 548.

⁴⁸Article 18(a) provides that: "[I]NTELSAT nor any signatory....shall be liable to, nor shall any claim be made against any of them by any signatory of INTELSAT, for loss or damage sustained by any reason of any unavailability, delay, or faultiness of telecommunications services provided or to be provided".

⁴⁹*Memorandum of Understanding among the Ministry of Merchant Marine of the USSR, the National Oceanic and Atmospheric Administration of the USA, the Department of National Defense of Canada and CNES of France Concerning Cooperation in the COSPAS-SARSAT Search and Rescue Satellite System of 1981* **K.H.Böckstiegel & m.Benkö** (Eds.), *supra*, note 25 Vol.II.1 Part D.II.3.2..