

## BROADCASTING - SATELLITE SERVICES IN AIRSPACE OF THE HIGH SEAS: SOME LEGAL AND REGULATORY CONSIDERATIONS

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### Abstract\*

The United Nations Resolution 37/92 of 1982 on Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, represents the culmination of a yet to be resolved debate, attempting to balance the free flow of information against the right of States to exercise Sovereignty over territorial spaces. Contemplating this debate in the open spaces of the high seas also raises a number of legal and regulatory issues. This paper highlights the legal and regulatory issues arising from the reception of broadcast-satellite services, on-board aircraft traversing the airspace of the high seas (including relevant polar regions). In this regard, the prevailing international legal and regulatory regimes will be considered in the context of a worldwide direct broadcast satellite service offered to airborne passengers primarily on long range wide-body aircraft. Attention shall be given to the international rules governing international flight; peaceful uses of the superjacent airspace of the high seas; and broadcasting-satellite services, respectively.

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### Introduction

To date, global mobile satellite systems have been successful in providing mobile satellite services to a number of niche markets including Maritime, Aeronautical and Land-based. When considering the next generation of aeronautical mobile satellite services\* (AMSS) it becomes necessary to examine some of the international legal and regulatory issues which may influence service offerings for more mainstream markets, intended to deliver significant growth in numbers of satellite users. Whilst the AMSS market has traditionally offered services to three main sectors, including: passengers<sup>†</sup>, aircraft operations and airline administration; air traffic control, navigation and position reporting, the main thrust of this paper lies in the area of non-safety passenger services. In this respect, AMSS is comprised of digital voice and data services provided over satellite systems traditionally operating in the mobile satellite radio frequency L bands<sup>‡</sup> at 1545 MHz - 1555 MHz and 1646.5 - 1656.5 MHz<sup>§</sup> respectively.

There are also satellite systems currently providing live television (TV) services to both corporate and commercial aircraft overflying continental Landmasses\*\*. These TV services are mainly provided over Direct Broadcast Satellites<sup>††</sup> (DBS) that traditionally offer Direct To Home

(DTH) digital TV to land based users. The state of the art<sup>++</sup> however is intended to deploy worldwide DBS services aimed at delivering live, multi-channel television video programming to airborne passengers primarily on long range wide-body aircraft.

One key observation concerning the geographic market or coverage area is the fact that a significant share of the addressable market is located at northern latitudes, especially within the long-haul intercontinental flight routes between European, North American and East Asian regions, overflying oceanic rather than continental landmasses. Assessing the legal and regulatory frameworks applicable to the provision of DBS services over the high seas would therefore require a re-examination of the rules applicable to the reception of TV signals in general<sup>§§</sup> albeit with an emphasis on the receipt of such signals by passengers over communications facilities for non-safety purposes, on-board aircraft relying upon satellites. These varied rules and, as will be revealed, non-complementary legal regimes are discussed hereinafter, thus providing a broad analysis of the international legal instruments that serve as the bedrock upon which non-safety aspects of aeronautical communications may be conducted in the airspace of the high seas.

### **Legal regime of the airspace over the high seas**

A significant part of the geographical area over which the planned DBS services are intended to be provided to aircraft, construed as the high seas, by definition mean...“all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or

in the internal waters of a State, or in the archipelagic waters of an archipelagic State”.<sup>\*\*\*</sup> This definition it has been contended, infers that the exclusive economic zone<sup>+++</sup> (EEZ) is optional except where a coastal State includes such a zone, and that a significant proportion of the freedoms of the high seas (discussed hereinafter) are according to the UN Convention of the Law of Sea 1982, (UNCLOS), applicable in the EEZ<sup>+++</sup>. On the extent to which the regime set forth in the UNCLOS addressing the high seas is applicable, the Arctic region merits special attention, not only because it is comprised of sea-ice without any underlying landmass, but also because it is a region over which the conduct of civil aviation continues to take place and to which varying<sup>§§§</sup> claims of territorial sovereignty have been made. At the risk of oversimplification, suffice it to state that the current legal status of the arctic sea, and the existence<sup>\*\*\*\*</sup> of polar routes thereto, would indicate that the use of polar airspace falls within the scope of arrangements involving individual States<sup>+++</sup>, thus precluding the notion that the legal regime of the airspace over the arctic sea is similar to the regime applicable to the airspace of the high seas.

The UNCLOS pursuant to its Article 87, in addressing the legal regime of the high seas, has established the freedom of the high seas and provides that:

1. The high seas are open to all States, whether coastal or land-locked. Freedom of the high seas is exercised under the conditions laid down by this Convention and by other rules of international law. It

comprises, *inter alia*, both for coastal and land-locked States:

- a. freedom of navigation;
- b. freedom of overflight;
- c. freedom to lay submarine cables and pipelines subject to Part VI;
- d. freedom to construct artificial islands and other installations permitted under international law, subject to Part VI;
- e. freedom of fishing, subject to the conditions laid down in Section 2;
- f. freedom of scientific research, subject to Parts VI and XIII.

- 2.) These freedoms shall be exercised by all States with due regard for the interests of other States in their exercise of the freedom of the high seas, and also with due regard for the rights under this Convention with respect to activities in the area.

From the foregoing, it is evident that within the scope of the high seas also exists the superjacent airspace, to which the UNCLOS makes reference when establishing the freedoms mentioned hereinbefore, where States may exercise a freedom to fly over, individually or collectively. An area to which, it has been stated,<sup>+++</sup> relatively little attention has been paid, despite the extent of that airspace and its commercial, strategic and environmental significance. This paper is not immediately concerned with the freedom to fly over the high seas, but rather considers the freedom to receive DBS signals on board aircraft exercising the right to fly over the high

seas. An activity, which from the foregoing cannot be rightly stated as being comprehensively regulated by one the principal international instruments expected to regulate the use of the high seas and the superjacent airspace thereto. It is for this reason that the provisions of the 1944 Chicago Convention on International Civil Aviation<sup>§§§§</sup>, as well as the Constitution, Convention<sup>\*\*\*\*\*</sup> and Radio Regulations<sup>++++</sup> of the International Telecommunications Union, become pertinent, to which this paper now turns.

**Civil aviation and non-safety aeronautical communications in the airspace of the high seas<sup>++++</sup>**

Whilst the freedom of flight over the high seas is proclaimed in the UNCLOS, the regulation of flight in this geographical area is specifically dealt with under the provisions of Article 12, to the Chicago Convention, which provides that:

Each contracting State undertakes to adopt measures to insure that every aircraft flying over or manoeuvring within its territory and that every aircraft carrying its nationality mark, wherever such aircraft may be, shall comply with the rules and regulations relating to flight and manoeuvre of aircraft there in force. Each Contracting State undertakes to keep its own regulations in these respects uniform, to the greatest possible extent, with those established from time to time under this Convention. Over the high seas, the rules in force shall be those established under this Convention. Each State undertakes to insure the

prosecution of all persons violating the regulations applicable.

The provisions of Annex 2 to the Convention implement the Rules of the Air referred to in Article 12 of the Chicago Convention. The foreword to this Annex provides *inter alia*...“the Annex constitutes the Rules relating to the flight and manoeuvre of aircraft within the meaning of Article 12. Therefore over the high seas these rules shall apply without exception”. The applicability of Annex 2 without exception<sup>§§§§</sup> is further re-iterated in the Annexes’ Chapter 2.1.1, whilst its relevance to the high seas is confirmed in Chapter 2.1.2. The effect of Article 12 therefore is that the ICAO Rules of the Air stated in Annex 2, are mandatory for flights over the high seas and any discretion given in Article 37 of the Chicago Convention would not apply. A close examination of Annex 2 reveals that the regulation of communications set forth in Chapter 3.6.5, applies to controlled flights and deals with maintenance of listening watch, establishment of two-way communication and procedures on communication failure under the general heading of Air Traffic Control services. No mention is made of passenger non-safety communications such as would be conducted by providing DBS services directly to aircraft.

One other Annex to the Chicago Convention, which ought to contain detailed regulations addressing the receipt of non-safety related DBS signals by aircraft over the high seas, is Annex 10 (aeronautical communications). Annex 10 which is comprised of four volumes in essence implements specific provisions of the Chicago Convention, namely: Article

28 (Air navigation facilities and standard systems), Article 30<sup>\*\*\*\*\*</sup> (Aircraft radio equipment), Article 69 (Improvement of air navigation facilities) and Article 83 *bis*, respectively. However, Annex 10 makes reference to the ITU Radio Regulations, which on a close examination, provide specific provisions relating to the conduct of aeronautical communications services for non-safety purposes. In this regard, and in order to ensure adequate protection for safety and regularity of flight messages, provisions are included in the Standards and Recommended Practices elaborated in the said Annex, thereby guaranteeing safety related messages, which have priority and pre-emption over other non-safety aeronautical users. Because these principles of priority and pre-emption guarantee the precedence of communications for safety purposes, non-safety communications must cease immediately if necessary, to permit transmissions of messages accorded a certain order of priority<sup>+++++</sup>. Considered within this framework, one can presume that non-safety communications, such as DBS services to passenger’s on-board aircraft over the high seas, is by deduction permitted albeit on a non-interference<sup>+++++</sup> basis.

At this juncture it is important to note that ...”the principle of the freedom of the high seas has been described as *multiforme et fugace*, and in truth it is a ‘general principle of international law, or a policy concept, from which particular rules must be deduced. Its application to specific problems often fails to give precise results’<sup>§§§§§§</sup>. This statement explains the difficulty one faces in attempting to deduce the legitimacy of providing DBS services to passenger’s on-board aircraft over the high seas. In this respect, the

provisions of Articles 30(a) and (b) to the Chicago Convention which are intended to address the use of Aeronautical earth Stations for non-safety purposes over national territories (without any specific reference to the airspace over the high seas) have been interpreted\*\*\*\*\* on a literal basis and the said interpretation set forth in Resolution 36/1 adopted by the International Civil Aviation Organisation Assembly at its 29<sup>th</sup> Session in 1992†††††††. That Resolution provides:

- 1.) that nothing in article 30(b) of the Chicago Convention shall be taken to preclude the use by unlicensed persons of the radio transmitting apparatus installed upon an aircraft where the use is for non-safety related air-ground radio transmissions;
- 2.) that all Member States should ensure that use of such apparatus shall not be prohibited in their airspace; and
- 3.) that use of such apparatus shall be subject to the conditions set out in the Annex hereto.

The Annex referred to, reads as follows:

Whenever a Member State is the State of Registry (or State of the operator under the terms of Article 83 bis of the Convention on International Civil Aviation... and is applied to a specific case) of an aircraft, the radio transmitting apparatus on board that aircraft may, while in or over the territory of another Member State, be used for non-safety air-ground radio transmissions subject to the following conditions;

- (i) compliance with the conditions of the licence for the installation and operation of that apparatus issued by the State of Registry (or State of the operator) of the aircraft;
- (ii) any person may use that apparatus for non-safety air-ground radio transmissions provided always that control of that apparatus shall be by an operator duly licensed by the State of Registry (or State of the operator) of the aircraft;
- (iii) compliance with the requirements of the International Telecommunication Convention and the Radio Regulations adopted thereunder as amended from time to time, including the applicable radio frequencies, the avoidance of harmful interference with other services and priority for aeronautical communications relating to distress, safety and regularity of flight; and compliance with any technical and operating conditions set forth in the applicable regulations of the Member State in or over whose territory the aircraft is operating.

An examination of this Resolution indicates that it's application is geared firstly, geared towards 'radio

transmitting apparatus', secondly pertains to what is referred to as "air-ground communications", and thirdly is of relevance to the use of radio transmitting apparatus for non-safety air-ground communications in the airspace of sovereign States. DBS services to aircraft on the other hand will involve, antennae located on aircraft capable or "receiving" rather than "transmitting" signals, and for the purposes of this paper such activity will be conducted, predominantly in the airspace of the high seas.

### Concluding Remarks

The analysis conducted hereinbefore, by deduction, leads one to believe that the provision of DBS services to aircraft overflying the high seas is permissible. The essence of the conclusion itself is premised *inter alia* upon the principle of the freedom of aviation, which underscores the fact that the airspace of the high seas "is an aerial highway open to all nations and not subject to the sovereignty of any State".<sup>†††††††</sup> This conclusion in turn gives rise to the question on whether the existing body of international laws and regulations are well suited to regulate such activity. It may be convenient to assume that in the absence of law and regulation, activity of this nature is legal if one believes that actions, which are not expressly forbidden, may be construed as permissible or even legitimate. Nonetheless, activity of this kind reinvent legal and regulatory issues within the on-going debate borne from the revolutionary development and simultaneously increasing involvement of private entities in space activities, within the framework of international law, principles and regulations, applicable to space as well as

aeronautical activity. A persistent state of affairs that should not be ignored and hence the debate that causes one to enquire whether the existing family of international instruments adequately balances the various interests stemming from activities in outer space<sup>§§§§§§§§</sup>, though in this instance terminating in the airspace of the high seas.

On the maintenance of public order in the airspace of the high seas, the comment of the International Law Commission (ILC) to the effect that "[a]ny freedom that is to be exercised in the interests of all entitled to enjoy it *must* [emphasis mine] be regulated",<sup>\*\*\*\*\*</sup> is pertinent. This author posits that the applicable and required regulations ought to be clear, consistent, predictable, enforceable and existent in the absence of conflicting positions either between Nation States and/or schools of thought, not because the transnational nature of DBS to aircraft over the high seas is capable of infringing upon territorial sovereignty, but specifically because..."introducing one technology into society may produce a seemingly predictable pattern of effects, at least on the surface. Another new technology will act entirely differently and raise unforeseen social and ethical issues. The nature of the technology, who has access to it, and the context into which it is introduced may greatly alter its impact upon society"<sup>††††††††</sup>. Therefore unless lawmakers, and governments keep pace with entrepreneurs and inventors, profits and commercialism will soon replace the international public order in the airspace of the high seas.

\* A service in which mobile earth stations ("MES") are located on board aircraft, without prejudice to "survival craft stations" and "emergency position-indicating radio-beacon stations". Article 1 paragraph 35 of the ITU Radio Regulations.

† Considered as being the most recent development in aeronautical communication, consists primarily of connections of onboard facilities with existing fixed networks e.g. domestic telephone networks, in addition to permitting the switching of connections to other aeronautical passenger facilities (via a ground station) thus enabling personal communications by/for passengers and crew.

‡ At present, Mobile-satellite spectrum at L-band (1.5-1.6 GHz) is fully assigned to operational geostationary MSS systems - in all, 10 mobile-satellite operators are assigned spectrum for 22 satellites within a 33 MHz block. The current mechanism utilised to assign spectrum to the mobile-satellite service on a global and regional basis is based on two Memoranda of Understanding between the administrations operating L-band GSO MSS systems. The MoU process, which is based on annual spectrum planning meetings between the L-band operators, is claimed to have been successful in that the spectrum congestion that was imminent a few years ago has been staved off, and the short-term spectrum requirements of the operators have so far been satisfied. However, there is little scope for networks to expand in the future, or for new networks to get access to L-band MSS spectrum. In contrast, the traffic in MSS systems continues to grow. New systems, some of which are planned for L-band, will therefore have to seek access to other bands, such as S-band (2.9-3.1 GHz). See: Radiocommunications Agency of the United Kingdom.: *Strategy for the future use of the Radio Spectrum*, 2002 at page 46

§ Frequency band allocations to the space services can be found in the ITU Radio Regulations.

\*\* LiveTV, a Joint venture between Harris Corp and Sextant-In Flight System. LiveTV is the only system currently providing live TV to commercial aviation (narrow body aircraft and commuters). The system enables access to the programs delivered by the US DirectTV DBS platforms and therefore is available only over continental United States. Live TV is based on an on-board distribution system provided by Sextant-IFS enabling 1248 channels of audio or Video programming. In seat billing and collection is included as well as a back channel communication link for surveys and passengers responses. An Antenna system provided by Harris Corp is of dual polarization and installed on the aircraft through one single hole.

†† A radiocommunication service in which signals transmitted or retransmitted by space stations are intended for direct reception by the general public. In the broadcasting satellite service, the term direct reception shall encompass both individual and community reception". Article 1 paragraph 38 of the ITU Radio Regulations.

†† AirTV intends to deploy a worldwide DBS service to deliver *inter alia* live, multi-channel

television video programming services to airborne passengers primarily on long range wide-body aircraft. The service will offer 40 TV channels customized to Airlines and route characteristics. The airborne equipment will include an S-band phased array receive antenna mounted on top of the fuselage and a Receiver/Decoder. Height - 12 cm, approximate length - 2.5 m. The Receiver/Decoder will interface with the In Flight Entertainment TV system. The system will operate within the S-band (about 2,6 GHz) and will include four geostationary satellites designed for and dedicated to this service. The AirTV satellite ground control station system consists of one primary satellite control center and three regional satellite control ground stations. The primary satellite control center will have all the necessary hardware and software to control the satellites in orbit via communications link to the regional satellite control ground stations. The design of the onboard aircraft antenna and receiver-decoder is optimized specifically for this application. It will utilize a phased-array approach for electronic steerability and includes the tracking system controller. It has the low profile required for mounting on aircraft, has relatively high gain and is customized to operate in the band segment transmitted by the AirTV satellites, while minimizing interference from other systems. Airbus has approved the antenna for installation aboard its A300, A310, A321, A330 and A340 aircraft models. A similar certification process is underway with Boeing. The major difference between AirTV and other announced systems for aeronautical communications is that it is the only satellite system dedicated exclusively to aeronautical services.

§§ Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting (resolution 37/92 of 10 December 1982); N.M. Matte, *Aerospace Law: Telecommunications Satellites*, Butterworths, 1982 pp. 17 - 198; Nandasiri Jasetuliyana and Roy S.K. Lee, *Manual on Space Law*, 1979, pp. 283 - 302; John H. Chapman and Gabriel I. Warren, *Direct Broadcast satellites: The ITU, UN and the real world*, AASL, vol. IV, 1979, pp. 413 - 432; Simone Courteix, *International legal aspects of Television Broadcasting by Satellite*, pp. 102-112 in K. Tatsuzawa (ed) *Legal aspects of space commercialisation*, 1992.

\*\*\* Article 86 United Nations Convention on the Law of the Sea, Montego Bay, 10 December 1982.

††† "The exclusive economic zone is an area beyond and adjacent to the territorial sea, subject to the specific legal regime established in this part, under which the rights and jurisdiction of the coastal State and the rights and freedoms of other States are governed by the relevant provisions of this Convention". *Id* at Art. 55.

††† Ian Brownlie, *Principles of public International Law*, (1998), p.229.

§§§ On the various schools of thought attempting to explain the legal status of the arctic sea, and the analysis of various writers on the "Sector Principle" see: Nicholas Grief, *Public International Law in the*

*Airspace of the High seas*, Utrecht studies in Air and Space Law, vol. 14, 199, pp. 24 - 28.

\*\*\*\* Although the new cross-polar routes take international flights over previously untraveled territory, commercial airlines have been flying in the polar region north of the Arctic Circle for more than 40 years. In 1954, Scandinavian Airlines System (SAS) inaugurated DC-6B service from Copenhagen to Los Angeles via Sondre Stromfjord. In 1957, SAS began polar service from Copenhagen to Tokyo via Anchorage. From that time through the mid-1980s, flights through the polar region increased as Anchorage became the primary stopping point for passenger traffic between Europe and East Asia. In 1983, Finnair inaugurated the first non-stop service from Europe to Japan by flying from Helsinki north through the polar region and down the Bering Strait to Tokyo. Today, hundreds of flights operate each week over the interior of Russia en route between Europe and Asia. Similarly, a large volume of traffic crosses the Atlantic north of Iceland and the Arctic Circle on flights between Europe and the West Coast of North America. Development of the new cross-polar routes began in 1994 when the Russian government initiated work with the airlines and the international community to establish a series of polar routes through its airspace. By mid-1998, the four cross-polar routes were defined and made available for demonstration flights. The first official polar route flight by a commercial airline was conducted in July 1998. U.S. and Asian airlines then conducted more than 650 demonstration flights under special arrangements with Russian authorities. Today, airlines operate non-stop 747 and 777 service to destinations in Asia via the polar routes.

\*\*\*\* In 2001 NAV CANADA and the Federal Aviation Authority of Russia (FAAR) released a detailed feasibility concluding that polar routes are feasible and desirable for air travel. The end of the Cold War enabled aircraft to use a set of four polar routes, known to the aviation community as Polar 1,2,3 and 4. NAV CANADA intends to invest approximately \$7 million (CDN), in this project, financed out of the normal budget for capital expenditures and subject to the FAAR securing the required financing for changes to its system. The Russian investment would be approximately \$33 million (USD). The main cross-polar route, known as Polar 1, generally offers efficient routing from West Coast cities such as Vancouver and Los Angeles to destinations on the Indian subcontinent. The other main cross-polar routes, Polar 2, 3, and 4, generally are for flights connecting cities in eastern and central North America with destinations in China and East Asia. Several interlinking airways among the four major routes provide additional flexibility. The governments of Russia, China, Canada, and the United States are continuing to develop the polar route system through the ongoing activities of the Russian-American Coordinating Group for Air Traffic.

\*\*\*\* P. Allot, *Mare Nostrum: A new international Law of the Sea*, AJIL, vol. 86 (1992), pp.764, 767;

M. Nash Leich, *Contemporary Practices of the United States relating to International Law*, AJIL, vol. 84 (1990), pp.237, 241; Nicholas Grief *op cit*, p. 1

§§§§ Convention on International Civil Aviation, Chicago, 7 December 1944.

\*\*\*\*\* *ITU Constitution and Convention of the ITU, Decisions, Resolutions and Recommendations*, Final Acts of the Plenipotentiary Conference of the International Telecommunication Union (Kyoto, 1994), Instruments amending the Constitution and Convention of the International Telecommunication Union (Geneva, 1992) ITU, Geneva, 1995, ISBN 92-61005521-4.

++++ ITU *Radio Regulations*, Edition of 2001, adopted by the WRC-1995 (Geneva), revised and adopted by WRC-1997 (Geneva) and WRC-2000 (Istanbul).

\*\*\*\* J.E. Carroz, *International Legislation on Air Navigation over the high Seas*, JALC, vol.26 (1959), pp. 158, 166-168.

§§§§§ On the right of States to deviate from the provisions of Annexes to the Chicago Convention, See: Bin Cheng, *Centrifugal Tendencies in Air Law*, (1957) *Current Legal Problems*, 200; *The law of International Air Transport* (1962); T. Buergethal, *Law-making in the International Civil Aviation Organization* (1969) 76 *et. seq.*; C.H. Alexandrowicz, *The Convention on Facilitation of International Maritime Traffic and International Technical Regulation* (1966) 15 ICLQ 621. All cited in B.D.K. Henaku, *The Law on global Air Navigation by Satellite – A legal Analysis of the ICAO CNS/ATM System*, 1998, p. 33.

\*\*\*\*\* "Aircraft of each contracting State may, in or over the territory of other contracting States, carry radio transmitting apparatus only if a license to install and operate such apparatus has been issued by the appropriate authorities of the State in which the Aircraft is registered. The use of radio transmitting apparatus in the territory of the Contracting State whose territory is flown over shall be in accordance with regulations prescribed by that State". Article 30(a) of the Chicago Convention, "Radio transmitting apparatus may be used only by members of the flight crew who are provided with a special license for the purpose, issued by the appropriate authorities of the State in which the aircraft is registered". Article 30(b) of the Chicago Convention. The interpretation of these Articles to the Chicago Convention as far as their applicability to the use of Aeronautical earth Stations for non-safety purposes over national territory (without any reference to the high seas) is concerned, is set forth on the basis of a literal interpretation in Resolution 36/1 adopted by the ICAO assembly at its 29<sup>th</sup> Session in 1992.

+++++ The order of priority of communications include: Distress calls, distress messages and distress traffic; communications preceded by the urgency signal; communications relating to radio-direction finding; flight safety messages; meteorological messages; and flight regularity



messages. See Article 51 of the ITU Radio Regulations.

\*\*\*\*\* Article 44 (2) of the ITU Constitution provides that: *In using frequency bands for radio services, Member States shall bear in mind that radio frequencies and any associated orbits, including the geostationary-satellite orbit, are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries.* Article 45 (1)(2)(3) provides that: *All stations whatever their purpose, must be established and operated in such a manner as not to cause harmful interference to the radio services or communications of other Member States or of recognized operating agencies, or of other duly authorized operating agencies which carry on a radio service, and which operate in accordance with the provisions of the Radio Regulations; Each member State undertakes to require the operating agencies which it recognizes and the operating agencies duly authorised for this purpose to observe the provisions in paragraph 1; Further, the Member States recognize the necessity of taking all practicable steps to prevent the operation of electrical apparatus and installations of all kinds from causing harmful interference to the radio services or communications mentioned in paragraph 1.*

§§§§§§§§ Brownlie *op cit* at page 231.

\*\*\*\*\* ICAO Doc. LC/28-WP/4-1 4/1 - Report of the Rapporteur on the Legal Aspects of the Global Air-Ground Communications; ICAO Doc 9588-IC/188 Legal Committee 28<sup>th</sup> Session Report, 1992, pp 4-1, 4-5. See also LC/28-WP/4-2 presented by the Delegate of Argentina; LC/28-WP/4-3 presented by the Observer of INMARSAT; LC/28-WP/4-4 presented by the Delegation of the United Kingdom. See also: Milde M.: *Legal Aspects of Future Air Navigation Systems*, AASL, Vol XII, 1987 at pp 87-98; Milde M.: *Legal Aspects of Global Air-Ground Communication* in G.R. Bacelli (Ed.), *Liber Amicorum Honouring Nicolas Mateesco Matte – Beyond Boundaries*, Paris 1989, pp 215 – 218; Guldemann & Kaiser, *loc cit*; Henaku, *loc cit*, pp 70-72; Stofel W.: *Legal Aspects of Aeronautical Mobile Satellite Services – The ICAO FANS Concept*, *Proceedings of the 36<sup>th</sup> Colloquium of the International Institute for Space Law*, 1993, pp 116-121.

\*\*\*\*\* ICAO Doc 9599, A29-LE Assembly, Legal Commission, 1992, Report and Minutes.

\*\*\*\*\* K. Hailbronner, *Freedom of the Air and the Convention on the Law of the Sea*, AJIL, vol.77 (1983), p.490.

§§§§§§§§ Frans G. Von der Dunk, *Public Space and Private Enterprise – The Fitness of International Space Law Instruments for Private Space Activities*,

1999 Proceedings of the Project 2001 – Workshop on Legal Issues of Privatising Space Activities 12.

\*\*\*\*\* YBILC, 1956, vol.2, p.253: para.5 of Commentary to Article 27 of the draft Articles concerning the law of the Sea (Doc.A/3159).

\*\*\*\*\* T. Cooper, *Speed-Up and New Technology Ethics: An acceleration of Effects*, PTR, vol. 21/no.3 (2000), p.12