

THE STATUS OF RADIO SPACECASTING UNDER SPACE LAW

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In 1990 a new space communications technology appeared before the world community. The technology was called Radio Spacecasting. It enabled, for the first time ever, portable and mobile radio receivers to receive digital audio programming directly from a satellite in high orbit. The key developers of this technology were a U.S. company called Satellite CD Radio ("CD Radio"), an international consortium called AFRISPACE, and a group of national broadcasters known as the European Broadcasting Union ("EBU").

Radio Spacecasting is similar to shortwave radio in that listeners in one country may tune in directly to programming from another country. Radio Spacecasting is similar to Direct Broadcast Satellite (DBS) television in that transmissions are picked up directly from satellites. But Radio Spacecasting is also different from any media yet developed. No specific legal framework currently exists for spacecasting. Hence, this article explores the current legal status of spacecasting, and recommends an appropriate regulatory structure.

Orbit/Spectrum Allocation Status

The upper portion of the 1429-1525 MHz frequency band was targeted for spacecasting by ITU Resolution No. 505, adopted in 1979. Both the CD Radio and AFRISPACE proposals express a strong preference for 1450-1525 MHz region, citing Resolution 505 as precedent. CD Radio is offering 100 channels of compact disc quality radio directly from satellites to car antennas. AFRISPACE is offering dozens of digital channels of satellite programming directly to portable radios in the Third World.

The U.S. Federal Communication Commission, in developing its own position on spacecasting, has recently adopted a finding in favor of the 1493-1525 MHz sub-band.¹ The European Broadcasting Union is also

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1. An Inquiry Relating to Preparation for the International Telecommunication Union World Administrative Radio Conference for Dealing With Frequency Allocation in Certain Parts of the Spectrum, 55 Fed. Reg. 40888, 40889 (1990) (to be codified at 17 C.F.R. pt. 2) (proposed Oct. 5, 1990).

focusing on this sub-band.² Although a final decision will be made at the 1992 World Administrative Radio Conference (WARC) in Geneva, it is useful to consider the background for this allocation decision.

The feasibility of broadcasting medium to high quality sound programs from a geostationary satellite directly to the general public using fixed, portable and vehicular receivers has been actively studied within the International Radio Consultative Committee (CCIR). Report 955-2³ considers both analog and digital encoding and modulation formats with a range of system parameter requirements and preferred operating frequency bands in anticipation of an allocation for the service being made at a World Administrative Radio Conference (WARC).

The ITU Plenipotentiary Conference (Nice, 1989) scheduled this WARC, to be held in early 1992. The Administrative Council meeting of June 1990 established the agenda for this conference in which Agenda item 2.2.3(a) includes consideration of the allocation of a frequency band for spacecasting in the range 500-3000 MHz including accommodation of complementary terrestrial sound broadcasting applications within this allocation and the associated feeder links.

CCIR Report 955-2 contains examples of satellite sound broadcasting systems, employing conventional analog modulation (FM), simple digital and advanced digital coding and modulation concepts. The use of digital systems for sound broadcasting provides the opportunity to employ the various processing and coding techniques both for the source and the channel to obtain high quality and at the same time result in efficient spectrum usage and relatively low satellite power requirements. Diversity techniques can significantly improve the system performance particularly for the most severe case corresponding to vehicular reception in heavily urban areas.⁴

There are three diversity techniques which can be applied to digital systems for the purpose of reducing satellite power requirements, namely:

- (a) Frequency Diversity where a number of carriers are spaced in frequency by an amount that equals or exceeds the correlation bandwidth of the channel;
- (b) Time Diversity whereby the transmitted digital symbols are scrambled or interleaved in an orderly fashion so that error bursts due to deep channel fading will be decoded as random errors at the output of the descrambler; and
- (c) Space Diversity where multiple antennas are used to surmount multi-path and other signal transmission problems.

2. *Provisional Views of the CEPT, Communications Meteorology, Operations Divisional Meeting*, I.C.A.O. Doc. COM/MET/OPS/90-IP/19 (1990).
3. *Satellite Sound Broadcasting with Portable Receivers and Receivers in Automobiles*, C.C.I.R. Rep. 955-2 (1990).
4. Reductions range from 36dB to 26dB, as compared to analog modulation.

Advanced digital sound broadcasting systems can employ one or more of the above diversity techniques to reduce link margins and hence satellite transmit power requirements and at the same time maintain or improve the service quality in the case of reception in automobiles.

The WARC-92 Agenda proposes a frequency range of 0.5-3.0 GHz for a frequency allocation to spacecasting, which is also formally known as Broadcasting Satellite Service (BSS)(Sound).⁵ Based on CCIR studies, the most suitable frequency band for a BSS (Sound) system would be in the vicinity of 1 GHz with the lower and upper frequency limits dictated by the following considerations:

- (1) Lower limit of approximately 500 MHz. This lower limit is based on man-made noise considerations which is inversely proportional to frequency and the limitation on the practical size for satellite antenna diameters which is also inversely proportional to the frequency.⁶
- (2) Upper limit of around 3 GHz. The effective area of the receive antenna which is necessary for such a system diminishes with increasing frequency, this entails an increase in transmit power in proportion to the square of the frequency.⁷

The total spectrum requirements for a BSS (Sound) service and a complementary terrestrial service as addressed in the WARC-92 Agenda is dependent on many factors, many of which are still to be determined. The key factors that will determine spectrum requirements are:

- (a) Target service to be provided (*i.e.*, for reception by receivers in automobiles and portable receivers plus fixed receivers), quality of service, monophonic or stereophonic programming, *etc.*⁸
- (b) The spectrum re-use factor achievable within a given geographical area.⁹

Very preliminary studies were made to estimate the amount of spectrum required. It has been estimated that between 50 and 100 MHz would be needed, based on the following considerations: use of the Advanced Digital System as specified in Report 955-2 and complementary

5. See Doc. 7042 (CA45-136), Administrative Council Meeting, Geneva, 20 June 1990.

6. For general discussions, see *supra* note 3.

7. *Id.*

8. See, generally, The Application of Satellite CD Radio Inc. before the Federal Communications Commission, File Nos. 49/50-DSS-P/LA-90; 58/59-DSS-Amend-90.

9. *Id.*

terrestrial/BSS service with the goal of eventual replacement of existing shortwave broadcasting services plus allowance for future growth.¹⁰

Further studies are being conducted to narrow down the option being considered as time approaches towards WARC-92.

Nexus With Free and Balanced Flow of Information

The BSS (Sound) technology has a great role to play in furthering the development of a free and balanced flow of information. The technology can be used to disseminate information directly to users, without censorship, on a worldwide basis and with reciprocity. For example, CD Radio channels may be purchased by Middle Eastern interests to deliver their views directly to the U.S. market. Alternatively, Nigerian interests could purchase AFRISPACE channels and spacecast directly to the masses in South Africa.

The oldest guarantee of freedom of international messaging is contained in the Universal Declaration of Human Rights, where it is stated in Article 19:

Everyone has the right to freedom of opinion and expression; the right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers.¹¹

It has also been unanimously declared by the member States of UNESCO that the "free flow of information" must be "wider and better balanced."¹² The "right to seek, receive and impart information of all kinds regardless of frontiers" clearly supports an international regime of free and open dissemination of information.¹³

10. *Id.*

11. Universal Declaration of Human Rights, art. 19, G.A. Res. 217/3 U.N. GAOR Supp. (No. 1) at 71, U.N. Doc. A/777 (1948).

12. Declaration on Fundamental Principles Governing the Contribution of the Mass Media to the Strengthening of Peace and International Understanding, to the Promotion of Human Rights and to Countering Racialism, Apartheid and Incitement to War, Nov. 22, 1978, art. 1, 19 I.L.M. 263 (1979). The Declaration was adopted at the 20th session of the General Conference of the United Nations Educational, Scientific and Cultural Organization, Paris, France, October 24-November 28, 1978.

13. International Covenant on Civil and Political Rights, *opened for signature* Dec. 19, 1966, 999 U.N.T.S. 171; European Convention for the Protection of Human Rights and Fundamental Freedoms, *signed* Nov. 4, 1950, 213 U.N.T.S. 221; American Convention on Human Rights, O.A.S. Off. Rec. OEA/Ser.K/XVI/1.1, Doc. 65, Rev. 1, Corr. 1 (1969).

Consistency with INTELSAT and INMARSAT

Because systems such as AFRISPACE are a "specialized satellite service" under the INTELSAT Agreement,¹⁴ it raises none of the difficult legal issues that needed to be solved prior to the authorization of separate systems such as PanAmSat and Orion. The INTELSAT Agreement only places technical coordination requirements on international specialized satellite systems.¹⁵ Since the frequency bands for BSS (Sound) are completely different from those of INTELSAT, there is no possibility of unsuccessful technical coordination.

Article 14 (e) of the INTELSAT Agreement provides:

To the extent that any Party or Signatory or person within the jurisdiction of a party intends to establish, acquire or utilize space segment facilities separate from the INTELSAT space segment facilities to meet its specialized telecommunications services requirements, domestic or international, such Party or Signatory, prior to the establishment, acquisition or utilization to the Assembly of Parties, through the Board of Governors. The Assembly of Parties, taking into account the advice of the Board of Governors, shall express, in the form of recommendations, its findings regarding the technical compatibility of such facilities and their operation with the use of the frequency spectrum and orbital space by the existing or planned INTELSAT space segment. (Emphasis supplied).

Under Article 1(1) of the INTELSAT Agreement:

"Specialized telecommunications services" means telecommunications services which can be provided by satellite, other than those defined in paragraph (k) [public telecommunications services] of this Article, including, but not limited to, radio navigation services, broadcasting satellite services for reception by the general public, space research services, meteorological services, and earth resources services. (Emphasis supplied).

Since the spacecasting is designed only to provide broadcasting satellite (sound) services direct reception by the general public, it is clear that it is a specialized telecommunications service under the INTELSAT Agreement. As such, there is no policy basis under the INTELSAT Agreement to in any way slow down prompt approval of spacecasting.

14. International Telecommunications Satellite Organization (INTELSAT) Agreement, With Annexes, art. I, para. 1, done Aug. 20, 1971, 23 U.S.T. 3813, T.I.A.S. No. 7532.

15. *Id.* art. III, para. f.

By the same reasoning, as applied to INTELSAT, there is no legal prohibition or policy issue inhibiting the authorization of spacecasting due to the INMARSAT Agreement.¹⁶

Article 8 of the INMARSAT Agreement provides that its members that intend to launch a satellite system addressing one of the "purposes" of INMARSAT will coordinate with INMARSAT's secretariat with a view to avoiding economic harm to the global maritime system.¹⁷ The purpose of INMARSAT is defined as making provision for the space segment necessary for improving maritime satellite communication, including radio-determination.¹⁸ Clearly, spacecasting does not impinge on the purpose of INMARSAT, and hence, no economic coordination is necessary.

Recently, aeronautical and land mobile satellite services have been added to the agenda of satellite services which INMARSAT is empowered to provide.¹⁹ However, these supplementary types of satellite services do not enjoy the same protection from economic harm as applies to maritime satellite communications services. In any event, spacecasting is neither an aeronautical nor a land mobile satellite service.

Consistency With the ITU Rules and Regulations

The ITU Rules and Regulations²⁰ contain no frequency allocation rules governing Radio Spacecasting. However, this is not an impediment to approval, for a longstanding principle of international legal practice is that whatever is not prohibited is therefore permissible. The ITU Rules and Regulations contain no prohibition of satellite sound broadcasting service. Therefore, such service is permitted.

ITU Radio Regulation 342 states as follows:

Administrations of the Members shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations given in this Chapter or the other provisions of these Regulations, except on the express condition that harmful interference shall not be caused to services carried on by stations operating in accordance with the provisions of the Convention and of these Regulations.

16. Convention on the International Maritime Satellite Organization (INMARSAT), With Annex, *done* Sept. 3, 1976, 31 U.S.T. 1, T.I.A.S. No. 9605.
17. *Id.* art. 8.
18. *Id.* art. 3, para. 1.
19. Amendments to the Convention on the International Maritime Satellite Organization (INMARSAT), art. 3, para. 1, INMARSAT Doc. Assembly 6/16, 4, 2, 7 & Annexes IV to XI (1989).
20. International Telecommunication Union Radio Regulations, With Appendices and Final Protocol, *done* Dec. 6, 1979 (T.I.A.S. No. unavailable as of Jan. 1, 1990).

Spacecasting satellites as to which authorization is sought are considered "stations" under the definitions of the ITU. Accordingly, they cannot be "in derogation" of the Table of Frequency Allocations except on the express condition of not causing harmful interference to services operating in accordance with the Table of Frequency Allocations. In any event, as discussed above, an appropriate allocation is expected at the WARC-92 Conference.

While it is true that ITU Regulation 728 does forbid satellite television broadcasting over other countries unnecessarily, this provision was adopted to ensure maximum orbit/spectrum efficiency. It was not intended to apply to audio direct spacecasting. Nor could it so apply, without flagrant violation of freedom of information and international sound broadcasting practice for over 50 years. Spacecasting is the shortwave radio service of the satellite age.

Analysis of Space Law Treaties

International spacecasting must also be considered under the relevant provisions of specific space law treaties: the Outer Space Treaty of 1967,²¹ the Liability Convention of 1972,²² the Registration Convention,²³ the Rescue and Return Agreement²⁴ and the Moon Treaty.²⁵ Of these expressions of global consensus on the use of outer space, including satellites in earth orbit, only the Outer Space, Liability and Registration Treaties have relevance to spacecasting.

The Registration Convention requires registration with the United Nations of a spacecasting satellite to a specific country.²⁶ Ordinarily, this country would exercise jurisdiction and control over the use of the direct audio broadcasting spacecraft. To determine which country should register a satellite, the Registration Convention asks which country launched or procured the launch of it. AFRISPACE, for example, is under the jurisdiction and control of the U.S. (Federal Communications

21. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *done* Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 [hereinafter "Outer Space Treaty"].

22. Convention on International Liability for Damage Caused by Space Objects, *done* Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762, 961 U.N.T.S. 187 [hereinafter "Liability Convention"].

23. Convention on the Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. No. 8480, 1023 U.N.T.S. 15 [hereinafter "Registration Convention"].

24. Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched Into Outer Space, *done* Apr. 22, 1968, 19 U.S.T. 7570, T.I.A.S. No. 6599, 672 U.N.T.S. 119.

25. Agreement Governing the Activities of States on the Moon and other Celestial Bodies, G.A. Res. 34/68, 34 U.N. GAOR Supp. (No. 46) at 77, U.N. Doc. A/34/46 (1979).

26. Registration Convention, *supra* note 23, at art. IV.

Commission) because a United States company procured the launch of the AFRISPACE satellite. It is not relevant under international law that the primary beneficiaries of AFRISPACE services are some 70 different African and Middle Eastern countries. In any event, it would not be practical to have so many countries exercising "jurisdiction and control."

The Liability Convention provides that the countries that launched, procured the launch, or from whose territory was launched, the spacecasting satellite would bear international absolute liability for any harm caused on earth by the launch.²⁷ It is conceivable that a country could file a legal claim for damage if it felt it was "harmed" in a measurable way by the spacecasts. In the United States, for example, it is possible to win large monetary awards for certain types of harm caused by broadcast. Far from such damages being issued under a theory of absolute liability, it may be necessary to prove both falsity, negligence and a reckless disregard for the truth. Since the Liability Convention only provides for damages under an absolute theory of liability for harm caused on the earth, it is unlikely that such liability can be extended to slander, where truth is always a defense and reckless negligence is usually a concomitant of guilt. Furthermore, the legislative history of the Liability Convention makes it clear that it was intended to provide a basis for compensation to innocent persons suffering unintended consequences from the unusually hazardous activity of rocket launches.²⁸ Spacecasting is not the type of dangerous activity intended to be covered by the Liability Convention.

The Outer Space Treaty of 1967 specifically approves of activities such as spacecasting. Article I of the Outer Space Treaty says that space is to be used for the benefit for all mankind. Consider the various means by which spacecasting systems such as AFRISPACE, described above, benefit humanity:

- They enhance regional socio-economic integration by fostering a common market for news, information and entertainment programming.
- They expand the dissemination of vital public health information to rural developing areas, with great cost effectiveness, on a continent-wide basis.
- They improve the quality of people's lives by providing all persons - even those out-of-reach from urban radio stations - with equitable level of access to radio program diversity.

Information disseminated by an AFRISPACE-type spacecasting system can help save millions of lives, and improve economic growth by

27. Liability Convention, *supra* note 22, at art. I, para. c & art. II.

28. See generally *Report of the Committee on the Peaceful Uses of Outer Space*, 34 U.N. GAOR Supp. (No. 20) at 1, U.N. Doc. A/8420 (1979).

billions of dollars. As such, it is obvious that spacecasting falls squarely within the Outer Space Treaty mandate to use space for the benefit for all mankind.

Free and Balanced Flow of Space-Based Information

In recent years, proponents of a New World Information Order (NWIO) have propounded the view that global communication, especially via satellite must be "balanced" to be truly "free." For example, if only large countries can afford the cost of launch satellites for broadcasting to smaller countries, then the small countries view may not get heard. This situation is contrary to the goals of freedom of communication, which favor "robust debate".

Spacecasting systems such as AFRISPACE are supportive of the New World Information Order because they reduce the cost of accessing a satellite broadcasting capability from around \$100 million -- the almost unaffordable cost of a satellite -- to as little as \$1 million per year, the price of a direct-to-portable radio audio spacecast channel.

Hence, with systems such as AFRISPACE, even small countries can spacecast directly to other countries, thereby enabling free and balanced global flow of information that is the hallmark of a global democratic society.²⁹

Conclusion

Spacecasting is a new 1990's technology enabling direct digital audio transmissions from satellites to portable radios.³⁰ Companies have formed to implement this technology, including a consortium called AFRISPACE which intends to offer spacecasting on an intercontinental basis.

Spacecasting raises several issues under international space law. These issues encompass orbit-frequency allocations, DBS prior consent, liability for satellite slander, and freedom of space information. An analysis of these space law aspects of international spacecasting indicates

29. The AFRISPACE Consortium intends to launch a satellite with three footprint beams covering Arabia, North-West Africa, and South-East Africa. AFRISPACE radios will be lightweight, solar powered, and capable of receiving up to 100 channels. The channels will be filled with radio programming delivered to the AFRISPACE satellite uplink center from international broadcasters (e.g., Radio Accra, Radio Nairobi) and specialized programmers (e.g., CNN Radio News, American Music). Programming will be delivered to the AFRISPACE uplink center via INTELSAT or regional, i.e., Rascom, satellite systems.

30. H. Donald Messer, *Studies for an Audio Direct Broadcast Satellite*, 40th Congress of the International Astronautical Federation, IAF-89-532, October 1989, Malaga, Spain.

clearly that there are no impediments to authorization of this revolutionary service. In fact, spacecasting is wholly consistent with space law.