

# Satellites: Unintentional and Intentional Interference

**A Presentation at**

**Panel Discussion on  
Radio Frequency Interference and Space Sustainability**

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# Introduction: the Problem

- Satellite radio frequency interference threatens space sustainability
- There is a direct relationship between the nature, the source and the order of magnitude of interference and the consequential damage to the quality of service provided by the interfered-with satellite
- Minor radio frequency interference ("permissible interference" or "accepted interference") is normal, expected, tolerated, and accepted
- The "harmful interference" is prohibited; i.e. interference which seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with the ITU Radio Regulations

- Two types of radio frequency interferences; i.e. unintentional and intentional
- Unintentional interference is primarily caused by:
  - human error,
  - bad installation,
  - lack of training,
  - poor equipment,
  - equipment failure,
  - system design, or
  - lack of adherence to regulatory requirements and industry standards, etc.
- This sort of interference counts for over 95% of the satellites interference cases;
- BUT it does not usually give rise to serious international controversies.

- Intentional interference (jamming) counts for less than 5% of interference cases
- Deliberate jamming of satellites is increasing dramatically
- Intentional jamming is highly dependent upon the satellite operator and their individual service regions
- In the Middle East, ‘Satellite channel jamming rose sharply after Arab Spring’
- Nabil Shanti, Arabsat vice president: "More than 80 per cent of satellite jamming incidents are for political differences among nations”.
- Information is power that is/can be/has been/used for political, strategic, military, economic, social, cultural and criminal purposes
- What information is being transmitted and received and by whom is a highly politically sensitive concern, particularly at international level; thus jamming of satellite communications is essentially a political issue.

# Solutions: implemented and sought

- Governments and the satellite industry are implementing a three-fold strategy to combat the satellite jamming problem
- 1. Political pressure: identification of the source (person or State); blame and shame (works sometimes, but to a limited extent)
- 2. Technical means: employment of anti-jamming devices, expensive but may prove useful in some cases (e.g. Eutelsat plan to deploy an interference mitigation system for its EUTELSAT 8 West B satellite scheduled for launch in 2015)
- 3. International regulatory mechanisms: Within ITU and Outside ITU
- I will focus on this aspect and will critically assess what has already been adopted
- These three ways are not mutually exclusive and appropriate actions are needed to resolve, or at least significantly mitigate, the problem of satellite jamming.

# International Regulatory Solutions: Within ITU

- All ITU members States are under obligation to respect ITU regulatory regime and NOT to cause harmful interference:
- **ITU Constitution Article 6.1:** “The Member States are bound to abide by the provisions of this Constitution, the Convention and the Administrative Regulations in all telecommunication offices and stations established or operated by them which engage in international services or which are capable of causing harmful interference to radio services of other countries.....”
- **ITU Constitution Article 45:** “All stations, ..... 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.”
- **ITU Constitution Article 48:** Though military radio installations are generally exempt from the ITU regime, yet “these installations must, so far as possible, observe statutory provisions relative ..... to the measures to be taken to prevent harmful interference.....”



- **All ITU members States are under obligation NOT to use unnecessary transmission power that might cause interference:**
- **ITU Radio Regulations Article 15.1 § 1 :** All stations are forbidden to carry out unnecessary transmissions, or the transmission of superfluous signals, or the transmission of false or misleading signals, or the transmission of signals without identification .....
- **ITU Radio Regulations Article 15.2 § 2 :**Transmitting stations shall radiate only as much power as is necessary to ensure a satisfactory service.

- **All ITU members States are under obligation to eliminate, and to cooperate with others in the elimination of, harmful interference:**
- **Radio Regulations Article 11.42** : Should harmful interference actually be caused by an assignment recorded under No. 11.41 to any recorded assignment which was the basis of the unfavourable finding, the administration responsible for the station using the frequency assignment recorded under No. 11.41 shall, upon receipt of a report providing the particulars relating to the harmful interference., immediately eliminate this harmful interference. (WRC-12)
- **Radio Regulations Article 11.42A** : In applying No. 11.42 with respect to satellite networks, administrations involved shall cooperate in the elimination of harmful interference and may request the assistance of the Bureau, and shall exchange relevant technical and operational information required to resolve the issue. (WRC-12)



- **ITU Radio Regulation Article 15.21 §13** (as modified by WRC-12): “If an administration has information of an infringement of the Constitution, the Convention or the Radio Regulations (in particular Article 45 of the Constitution and No. 15.1 of the Radio Regulations) *committed by a station* ~~over which it may exercise authority~~, *under its jurisdiction*, the administration shall ascertain the facts, ~~fix the responsibility~~ and take the necessary actions.”
- WRC-12 made the obligation of countries to more precise and firm.
- This is an important action but remained a timid one.
- This territorial jurisdiction should have been extended to include personal jurisdiction over a State’s national irrespective of the territory of their activities causing satellite jamming.
- WRC-12 should also have adopted a provision for imposing sanctions on the States that cause intentional interference.

- **Right to international protection against harmful interference is available ONLY to those satellites that are properly recorded with ITU and operate in accordance with ITU Radio Regulations.**
- **ITU Radio Regulations Article 8.1 :** “The international rights and obligations of administrations in respect of their own and other administrations’ frequency assignments shall be derived from the recording of those assignments in the Master International Frequency Register (the Master Register) or from their conformity, where appropriate, with a plan. Such rights shall be conditioned by the provisions of these Regulations and those of any relevant frequency allotment or assignment plan.”
- **ITU Radio Regulations Article 8.3:** Any frequency assignment recorded in the Master Register with a favourable finding under No. 11.31 shall have the right to international recognition.

- All ITU members States are under obligation NOT to assign radio frequencies in derogation of the provisions of the Radio Regulations:
- ITU Radio Regulations Article 4.4: “Administrations of the Member States shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations in this Chapter or the other provisions of these Regulations..”
- This prohibition is NOT always respected.
- Some States assign radio frequencies to their satellites in derogation of the Table of Frequency Allocations and other provisions of the Radio Regulations. Such satellites are NOT entitled to a right against harmful interference: both unintentional or intentional.

## *Press Release*

### **International Telecommunication Union**

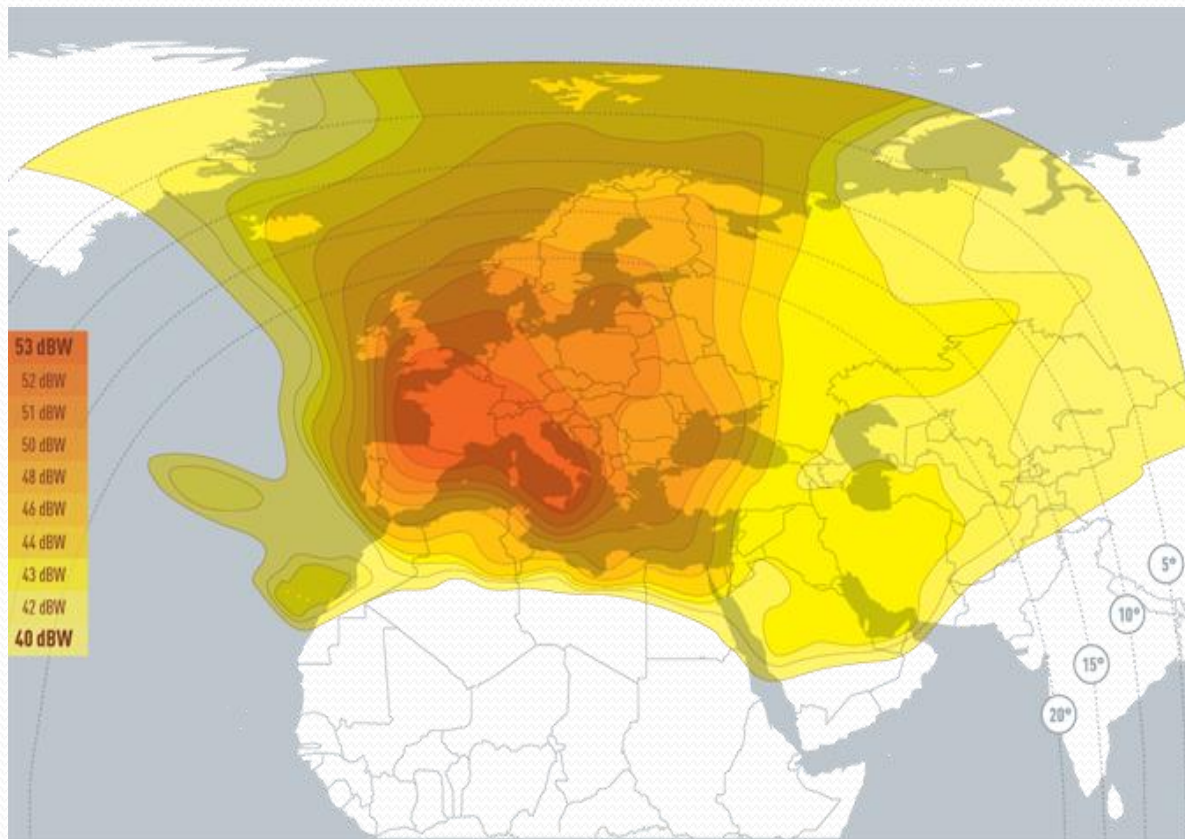
[http://www.itu.int/newsroom/press\\_releases/2010/14.html](http://www.itu.int/newsroom/press_releases/2010/14.html)

- **ITU Radio Regulations Board urges Iran to end interference hampering EUTELSAT satellite operations**
- **Geneva, 26 March 2010** — The ITU Radio Regulations Board concluded its week-long deliberations today. Among the issues discussed was that of interference with radio signals from satellite networks operated by the European Satellite Organization, EUTELSAT.
- The Administration of France, on behalf of the EUTELSAT satellite operator, notified the Radio Regulations Board (RRB) of the interference emanating from the territory of the Islamic Republic of Iran. While also considering correspondence from the Administration of Iran, the RRB determined that EUTELSAT satellite networks, operating in the orbital positions at 9E, 13E, 21.5E and 25.5E are receiving harmful interference. The Board noted that "the interfering signals appear to be of a nature that is prohibited under Radio Regulations No. 15.1".



# EUTELSAT Satellites at 13.E

## EUTELSAT HOTBIRD 13B at 13E degree downlink Ku Band wideband coverage



<http://www.eutelsat.com/en/satellites/the-fleet/EUTELSAT-HB13B-downlink-coverage.html>

- **Designed for television and radio broadcasting**, the EUTELSAT HOT BIRD 13B satellite has 64 Ku-band transponders .

With three high-power satellites, the HOT BIRD family **at 13° East** forms one of the largest **broadcasting systems** in Europe, delivering 1100 television channels to more than 120 million TV homes in Europe, North Africa and the Middle East.

- **Direct-To-Home reception** in beam centre is possible with antennae smaller than 70 cm, and with slightly larger antennas throughout Europe, North Africa and as far East as Moscow and Dubai.
- <http://www.eutelsat.com/en/satellites/the-fleet/EUTELSAT-HB13B.html>

# ITU Registration data

<http://www.itu.int/net/ITU->

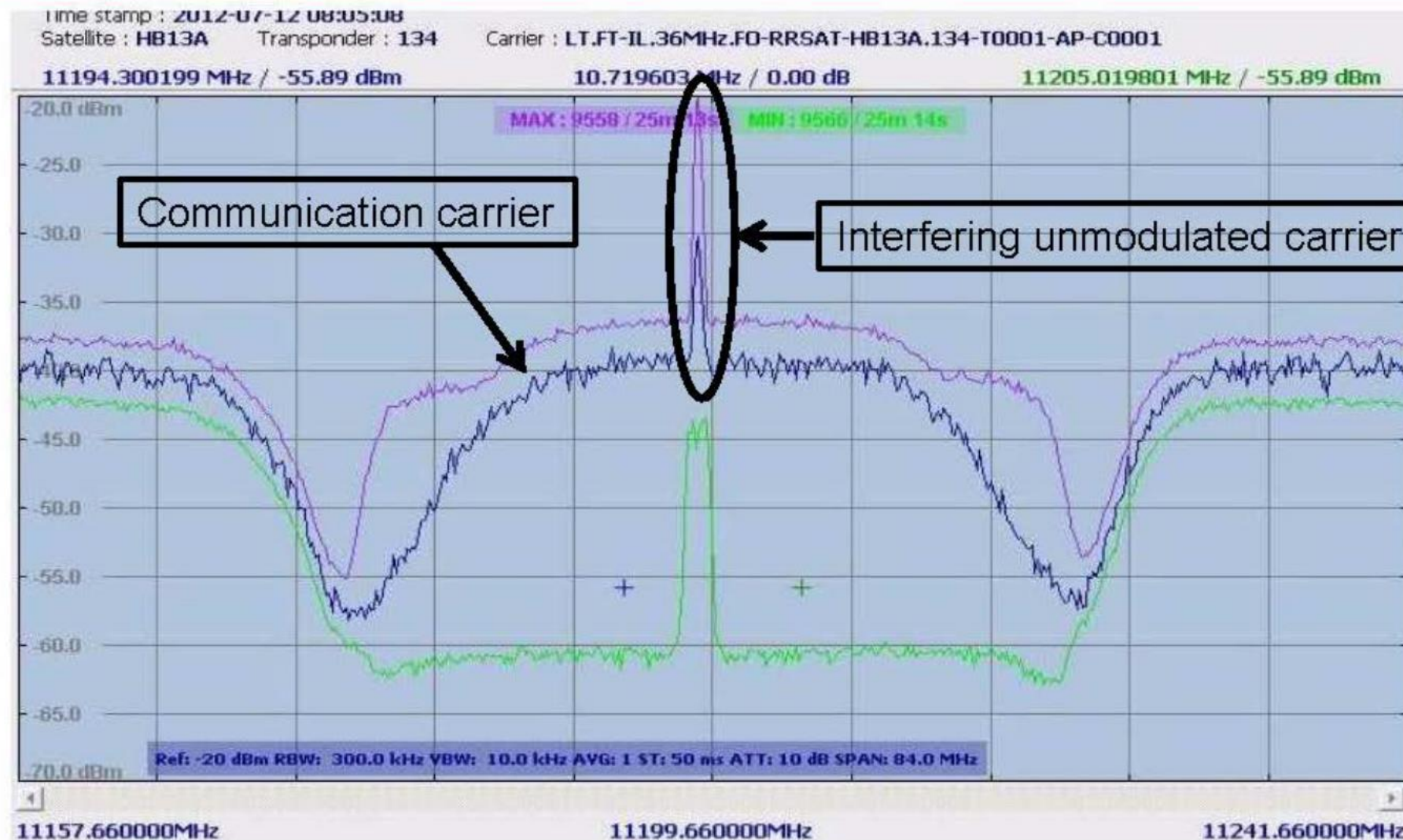
[R/space/snl/bresult/radvance.asp?sel\\_satname=&sel\\_esname=&sel\\_adm=&sel\\_org=&sel\\_ific=2733&sel\\_year=&sel\\_date\\_from=&sel\\_date\\_to=&sel\\_rcpt\\_from=&sel\\_rcpt\\_to=&sel\\_orbit\\_from=&sel\\_orbit\\_to=&sup=&q\\_reference=&q\\_ref\\_numero=&q\\_sns\\_id=&nmod=asc&norder=adm](http://www.itu.int/net/ITU-R/space/snl/bresult/radvance.asp?sel_satname=&sel_esname=&sel_adm=&sel_org=&sel_ific=2733&sel_year=&sel_date_from=&sel_date_to=&sel_rcpt_from=&sel_rcpt_to=&sel_orbit_from=&sel_orbit_to=&sup=&q_reference=&q_ref_numero=&q_sns_id=&nmod=asc&norder=adm)

- Diagram 1: 2.1\_TABLE7. TRANSMITTING GSO ES in **FIXED-SATELLITE SERVICE** W.R.T. RECEIVING TERRESTRIAL STATIONS. TS in FS or MS
- Notice ID: 112505435
- Administration/Geographical area: F/ F
- **Satellite orbital position: 13.00**
- **Satellite name: EUTELSAT B-13E**
- **Frequency band: 17828.80-17996.10 MHz**



Alexandre Vallet of Agence Nationale des Frequence: Harmful interference to satellite systems:  
ANFR views: International satellite communication workshop “The ITU - challenges in the 21st  
century: Preventing harmful interference to satellite systems” Geneva, 10 June 2013:

## Harmful interference sometimes happens Case 2: EUTELSAT HOT BIRD 13A (FSS satellite – Ku)



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# ITU Radio Regulations - Table of Frequency Allocations

- **Article 5 of the ITU Radio Regulations** allocates 17.8-18.1 GHz band to **Fixed Satellite Service** (space-to-Earth) in Region 2 (Africa, Europe, Russia)
- EUTELSAT B-13E is correctly registered with the ITU for **Fixed Satellite Service**
- However, EUTELSAT website shows that this satellite is actually being used for **Broadcasting Satellite Service**.
- One should note the difference between the information notified to the ITU and the actual service being provided.

## Broadcasting Satellite Service (BSS) = Direct Broadcasting by Satellite (DBS) = Direct-to-Home Service (DTH)

- **ITU Radio Regulations Article 1.39:** *broadcasting-satellite service: 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 reception and community reception.*
- Since EUTELSAT B-13E satellite in fact provides broadcasting satellite service, it must be subject to the following requirement of prior agreement with foreign States.
- **ITU Radio Regulations Article 23.13 § 4:** “In devising the characteristics of a space station in the **broadcasting-satellite service**, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries **unless an agreement** has been previously reached with such countries.”

# Final Remarks and Suggestions

- The ITU regulatory regime is based on three assumptions that all States:
  - will full-fill their obligations in good-faith, thus there are is no need to impose sanctions on the violators;
  - possess sufficient and appropriate human and technical resources to determine and control harmful interference originating from their territories, thus there is no need for international monitoring system; and
  - will cooperate with each other in good faith to resolve cases of harmful interference, thus there is no need for any formal system for settlement of interference disputes.
- These assumptions seemed to have worked well in the past, but they are currently being challenged particularly in cases of abuses of ITU regulatory system, including satellite jamming



- Therefore:
- ITU should adopt a procedure for due diligence for determining the actual purpose of the radio frequencies to be used by a satellite system before its registration in the Master Register;
- In the resolution of interference cases under Article 15 of the Radio Regulation, the Radiocommunication Bureau and Radio Regulations Board should be given more direct role and power to be actively involved (e.g. intervene on own, produce and call for evidence from different sources, issue decisions, etc.);
- ITU Member States should use arbitration procedure as specified in Article 41 of the Convention of the ITU.
- More ITU member States should be encouraged to become Parties to the Optional Protocol on the Compulsory Settlement of Disputes Relating to the ITU Constitution, the Convention and the Administrative (Radio) Regulations. (currently there are only about 60 States Parties to this Protocol)

- States and the satellite industry should include in their service – lease - contracts reference to the newly established *Permanent Court of Arbitration's Optional Rules for Arbitration of Disputes Relating to Outer Space Activities* for settling interference disputes.
- ITU should impose sanctions on those who are determined, through a proper dispute settlement mechanism, guilty of jamming. Such sanctions may include the denial of protection of harmful interference to the satellites and/or other radio stations of the offenders.
- An international and independent interference monitoring system should be set up, with its own facilities to process information, to provide accurate and unbiased information about geolocation of the interfering stations.





# SECOND PART

# International Regulatory Solutions: Outside ITU

- Article 19 of the 1948 Universal Declaration of Human Rights is often cited to support the right of nations and individuals to the freedom of satellite broadcasting internationally
- **Article 19:** “Everyone has the right to freedom of opinion and expression: this right includes freedom to hold opinions without interference and to **seek**, **receive** and **impart** information and ideas through any means and regardless of frontiers”.
- Legally speaking, this is a pretty weak argument.
- The Universal Declaration is a non-binding instrument.
- It creates a balance of interests; i.e. while the broadcasting entities and States are entitled to freedom of imparting (broadcasting), the receiving people and States are authorised to seek and receive information.

- Emphasis has often been placed on the right of the broadcasters and the information (propaganda) to be imparted.
- Who determines what can be received by the receiving people? : The Government of the receiving State or that of the broadcasting entities.
- If it is the receiving State, then it should have the right to control what information is being sent to its people (and possibly to take counter measures, as allowed under international law)
- If it is the broadcasting State, it ought to respect the right of the receiving people to seek and receive information.
- Right of foreigners to seek information is usually NOT respected in the States that possess the sought-out information.

- One wonders whether the right of the receiving people was considered when as “a result of increasing pressure from the international sanctions imposed on Iran, Eutelsat dropped 19 state-owned Iranian channels from its Hotbird satellite in October 2012. Intelsat has reportedly followed suit.”
- <http://www.pbs.org/wgbh/pages/frontline/tehranbureau/2012/11/briefing-satellite-wars-why-iran-keeps-jamming.html>
- Unfortunately, it appears that Article 19 of the Universal Declaration which contains a noble principle, is being used (even abused) by the broadcasting States and entities and often with implications detrimental to the receiving people and States.
- Perhaps for advocating freedom on satellite broadcasting one should rely on other international legal instruments. The essential elements of Article 19 of the Declaration have been adopted in Article 19 of the 1966 International Covenant on Civil and Political Rights and Article 10 of the 1954 European Convention on Human Rights and thus they provide more solid legal basis for the principle of freedom of satellite broadcasting.

- **The 1936 International Convention Concerning the Use of Broadcasting in the Cause of Peace, signed at Geneva.**
- Article 1: “The High Contracting Parties mutually undertake to prohibit and, if occasion arises, to stop without delay the broadcasting within their respective territories of any transmission which to the detriment of good international understanding is of such a character as to incite the population of any territory to acts incompatible with the internal order or the security of a territory of a High Contracting Party”.
- Article 2 prohibits broadcasting which constitutes, or is likely to lead to, an incitement to war against another Contracting State.
- This Treaty is applicable to satellite broadcasting by around 60 States. The U.S. never became party and the U.K. withdrew from it in 1985.
- Does the withdrawal by the U.K. indicate that it is entitled to broadcast or allow the broadcasting of programs that may incite the population of any receiving State to acts incompatible with its internal order or security?



- ***Outer Space Treaty Preamble: Taking account of United Nations General Assembly resolution 110 (II) of 3 November 1947, which condemned propaganda designed or likely to provoke or encourage any threat to the peace, breach of the peace or act of aggression, and considering that the aforementioned resolution is applicable to outer space.***

**110 (II). Measures to be taken against propaganda and the inciters of a new war**

*Whereas* in the Charter of the United Nations the peoples express their determination to save succeeding generations from the scourge of war, which twice in our lifetime has brought untold sorrow to mankind, and to practice tolerance and live together in peace with one another as good neighbours, and

*Whereas* the Charter also calls for the promotion of universal respect for, and observance of, fundamental freedoms which include freedom of expression, all Members having pledged themselves in Article 56 to take joint and separate action for such observance of fundamental freedoms.

*The General Assembly*

1. *Condemns* all forms of propaganda, in whatsoever country conducted, which is either designed or likely to provoke or encourage any threat to the peace, breach of the peace, or act of aggression;

2. *Requests* the Government of each Member to take appropriate steps within its constitutional limits:

(a) To promote, by all means of publicity and propaganda available to them, friendly relations among nations based upon the Purposes and Principles of the Charter;

(b) To encourage the dissemination of all information designed to give expression to the undoubted desire of all peoples for peace;

3. *Directs* that this resolution be communicated to the forthcoming Conference on Freedom of Information.

*Hundred and eighth plenary meeting,  
3 November 1947.*



- A number of States have been making declarations, in the UNCOPUOS and outside that Committee, regarding the limitations on freedom of broadcasting and the sovereign right of States to control foreign satellite broadcasts.
- Thus, from the beginning of the space age, there has NOT been any acquiescence or tacit agreement on the freedom of international satellite broadcasting.
- **The 1972 UNESCO Declaration of Guiding Principles on the Use of Satellite Broadcasting for the Free Flow of Information, the Spread of Education and Greater Cultural Exchange (Article IX) :**
- “In order to further the objectives set out in the preceding Articles, it is necessary that States, taking into account the principle of freedom of information, reach or promote prior agreements concerning DBS to the population of countries other than the country of origin of the transmission....., with respect to commercial advertising, its transmissions shall be subject to special agreement between the originating and the receiving States”.

- The ITU Radio Regulations Appendixes 30 and 30A have the effect that no international satellite broadcasting service could be started without the prior consent of the receiving State.
- For example, the 1977 and 1983 ITU Frequency Allotment Plans (international treaties) allow the use of 12 GHz band of radio frequencies for DBS for national coverage only. Such frequencies could be used for international services only on the bases of prior agreement between the transmitting and receiving States and only after following procedures for the modification of relevant Plans.

- **The 1982 United Nations General Assembly Resolution (A/RES/37/92) on Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting**, tends to support the requirement of prior consent. This resolution was a result of over two decades of discussions on the subject in the COPUOS. In its paragraphs 13 and 14 the Resolution provides that:
- “13. A State which intends to establish or authorize the establishment of an international direct television broadcasting satellite service shall without delay notify the proposed receiving State or States of such intention and shall promptly enter into consultation with any of those States which so requests.
- “14. An international direct television broadcasting satellite service shall only be established after the conditions set forth in paragraph 13 above have been met and on the basis of agreements and/or arrangements in conformity with the relevant instruments of the International Telecommunication Union and in accordance with these principles”.

## CONCLUSION RE SECOND PART

- A receiving State is *legally entitled*, if it chooses, to object to any unwanted satellite broadcasts from other States.
- In future, the broadcasting capabilities of various countries will determine the practice.
- It may be expected that freedom of satellite broadcasting will be broadly respected but will remain subject to applicable international agreements as well as a State's right to jam unwanted satellite signals. (as a counter measure)