General Principles of International Telecommunications Law (ITU Law)

ITU Constitution

Preamble

While fully recognizing **the sovereign right of each State to regulate its telecommunication** and having regard **to the growing importance of telecommunication for the preservation of peace and the economic and social development of all States,** the States Parties to this Constitution, as the basic instrument of the International Telecommunication Union, and to the Convention of the International Telecommunication Union (hereinafter referred to as "the Convention") which complements it, with the object of facilitating peaceful relations, international cooperation among peoples and economic and social development by means of efficient telecommunication services, have agreed as follows:

CHAPTER VI
General Provisions Relating to Telecommunications

ARTICLE 33
The Right of the Public to Use the International Telecommunication Service

Member States recognize the right of the public to correspond by means of the international service of public correspondence. The services, the charges and the safeguards shall be the same for all users in each category of correspondence without any priority or preference.

ARTICLE 34
Stoppage of Telecommunications

1 Member States reserve the right to stop, in accordance with their national law, the transmission of any private telegram which may appear dangerous to the security of the State or contrary to its laws, to public order or to decency, provided that they immediately notify the office of origin of the stoppage of any such telegram or any part thereof, except when such notification may appear dangerous to the security of the State.

2 Member States also reserve the right to cut off, in accordance with their national law, any other private telecommunications which may appear dangerous to the security of the State or contrary to its laws, to public order or to decency.

ARTICLE 35
Suspension of Services

Each Member State reserves the right to suspend the international telecommunication service, either generally or only for certain relations and/or for certain kinds of correspondence, outgoing, incoming or in transit, provided that it immediately notifies such action to each of the other Member States through the Secretary-General.

ARTICLE 36
Responsibility

Member States accept no responsibility towards users of the international telecommunication services, particularly as regards claims for damages.

ARTICLE 37
Secrecy of Telecommunications

1 Member States agree to take all possible measures, compatible with the system of telecommunication used, with a view to ensuring the secrecy of international correspondence.

2 Nevertheless, they reserve the right to communicate such correspondence to the competent authorities in order to ensure the application of their national laws or the execution of international conventions to which they are parties.

ARTICLE 38

Establishment, Operation and Protection of Telecommunication Channels and Installations

1 Member States shall take such steps as may be necessary to ensure the establishment, under the best technical conditions, of the channels and installations necessary to carry on the rapid and uninterrupted exchange of international telecommunications.

2 So far as possible, these channels and installations must be operated by the methods and procedures which practical operating experience has shown to be the best. They must be maintained in proper operating condition and kept abreast of scientific and technical progress.

3 Member States shall safeguard these channels and installations within their jurisdiction.

4 Unless other conditions are laid down by special arrangements, each Member State shall take such steps as may be necessary to ensure maintenance of those sections of international telecommunication circuits within its control.

5 Member States recognize the necessity of taking practical measures to prevent the operation of electrical apparatus and installations of all kinds from disrupting the operation of telecommunication installations within the jurisdiction of other Member States.

ARTICLE 40
Priority of Telecommunications Concerning Safety of Life

International telecommunication services must give absolute priority to all telecommunications concerning safety of life at sea, on land, in the air or in outer space, as well as to epidemiological telecommunications of exceptional urgency of the World Health Organization.

ARTICLE 41
Priority of Government Telecommunications

Subject to the provisions of Articles 40 and 46 of this Constitution, government telecommunications (see Annex to this Constitution, No. 1014) shall enjoy priority over other telecommunications to the extent practicable upon specific request by the originator.

ARTICLE 44
Use of the Radio-Frequency Spectrum and of the Geostationary-Satellite and Other Satellite Orbits

1 Member States shall endeavour to limit the number of frequencies and the spectrum used to the minimum essential to provide in a satisfactory manner the necessary services. To that end, they shall endeavour to apply the latest technical advances as soon as possible.

2 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

Harmful Interference

1 **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.**

2 Each Member State undertakes to require the operating agencies which it recognizes and the other operating agencies duly authorized for this purpose to observe the provisions of No. 197 above.

3 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 No. 197 above.

RADIO REGULATIONS
Preamble
0.4 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 Members 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 these Regulations (No. 197 of the Constitution).*

...

0.7 to ensure the availability and protection from harmful interference of the frequencies provided for distress and safety purposes;

0.8 to assist in the prevention and resolution of cases of harmful interference between the radio services of different administrations;

….

1.169 ***harmful interference:*** *Interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with Radio Regulations (CS).*

ARTICLE 4

Assignment and use of frequencies

4.1 Member States shall endeavour to limit the number of frequencies and the spectrum used to the minimum essential to provide in a satisfactory manner the necessary services. To that end they shall endeavour to apply the latest technical advances as soon as possible (CS 195).

4.2 Member States undertake that in assigning frequencies to stations which are capable of causing harmful interference to the services rendered by the stations of another country, such assignments are to be made in accordance with the Table of Frequency Allocations and other provisions of these Regulations.

4.3 Any new assignment or any change of frequency or other basic characteristic of an existing assignment (see Appendix 4) shall be made in such a way as to avoid causing harmful interference to services rendered by stations using frequencies assigned in accordance with the Table of Frequency Allocations in this Chapter and the other provisions of these Regulations, the characteristics of which

assignments are recorded in the Master International Frequency Register.

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, except on the express condition that such a station, when using such a frequency assignment, shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the provisions of the Constitution, the Convention and these Regulations.

4.5 The frequency assigned to a station of a given service shall be separated from the limits of the band allocated to this service in such a way that, taking account of the frequency band assigned to a station, no harmful interference is caused to services to which frequency bands immediately adjoining are allocated.

.....

4.9 No provision of these Regulations prevents the use by a station in distress, or by a station providing assistance to it, of any means of radiocommunication at its disposal to attract attention, make known the condition and location of the station in distress, and obtain or provide assistance.

4.10 Member States recognize that the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference; it is necessary therefore to take this factor into account in the assignment and use of frequencies.

....

4.22 Any emission capable of causing harmful interference to distress, alarm, urgency or safety communications on the international distress and emergency frequencies established for these purposes by these

Regulations is prohibited. Supplementary distress frequencies available on less than a worldwide basis should be afforded adequate protection.

ARTICLE 46
Distress Calls and Messages

Radio stations shall be obliged to accept, with absolute priority, distress calls and messages regardless of their origin, to reply in the same manner to such messages, and immediately to take such action in regard thereto as may be required.

ARTICLE 47
False or Deceptive Distress, Urgency, Safety or Identification Signals

Member States agree to take the steps required to prevent the transmission or circulation of false or deceptive distress, urgency, safety or identification signals, and to collaborate in locating and identifying stations under their jurisdiction transmitting such signals.

ARTICLE 48
Installations for National Defense Services

1 Member States retain their entire freedom with regard to military radio installations.

2 Nevertheless, these installations must, so far as possible, observe statutory provisions relative to giving assistance in case of distress and to the measures to be taken to prevent harmful interference, and the provisions of the Administrative Regulations concerning the types of emission and the frequencies to be used, according to the nature of the service performed by such installations.

3 Moreover, when these installations take part in the service of public correspondence or other services governed by the Administrative Regulations, they must, in general, comply with the regulatory provisions for the conduct of such services.

UNLAWFUL USE OF RADIO AND TELEVISION STATIONS
RADIO REGULATIONS, EDITION 2020

ARTICLE 23

Broadcasting services

Section I – Broadcasting service

23.1 A – General

23.2 § 1 1) The establishment and use of broadcasting stations (sound broadcasting and television broadcasting stations) on board ships, aircraft or any other floating or airborne objects outside national territories is prohibited.

European Agreement for the Prevention of Broadcasts transmitted from Stations outside National Territories

Strasbourg, 22.I.1965

Article 1

This Agreement is concerned with broadcasting stations which are installed or maintained on board ships, aircraft, or any other floating or airborne objects and which, outside national territories, transmit broadcasts intended for reception or capable of being received, wholly or in part, within the territory of any Contracting Party, or which cause harmful interference to any radio-communication service operating under the authority of a Contracting Party in accordance with the Radio Regulations.

Article 2

1 Each Contracting Party undertakes to take appropriate steps to make punishable as offences, in accordance with its domestic law, the establishment or operation of broadcasting stations referred to in Article 1, as well as acts of collaboration knowingly performed.

UNCLOS, articles 109-110

Article 109
Unauthorized broadcasting from the high seas

1. All States shall cooperate in the suppression of unauthorized broadcasting from the high seas.

2. For the purposes of this Convention, "unauthorized broadcasting" means the transmission of sound radio or television broadcasts from a ship or installation on the high seas intended for reception by the general public contrary to international regulations, but excluding the transmission of distress calls.

3. Any person engaged in unauthorized broadcasting may be prosecuted before the court of:

(a) the flag State of the ship;
(b) the State of registry of the installation;
(c) the State of which the person is a national;

(d) any State where the transmissions can be received; or
(e) any State where authorized radio communication is suffering interference.

4. On the high seas, a State having jurisdiction in accordance with paragraph 3 may, in conformity with article 110, arrest any person or ship engaged in unauthorized broadcasting and seize the broadcasting apparatus.

Article 110
Right of visit

1. Except where acts of interference derive from powers conferred by treaty, a warship which encounters on the high seas a foreign ship, other than a ship entitled to complete immunity in accordance with articles 95 and 96, is not justified in boarding it unless there is reasonable ground for suspecting that:

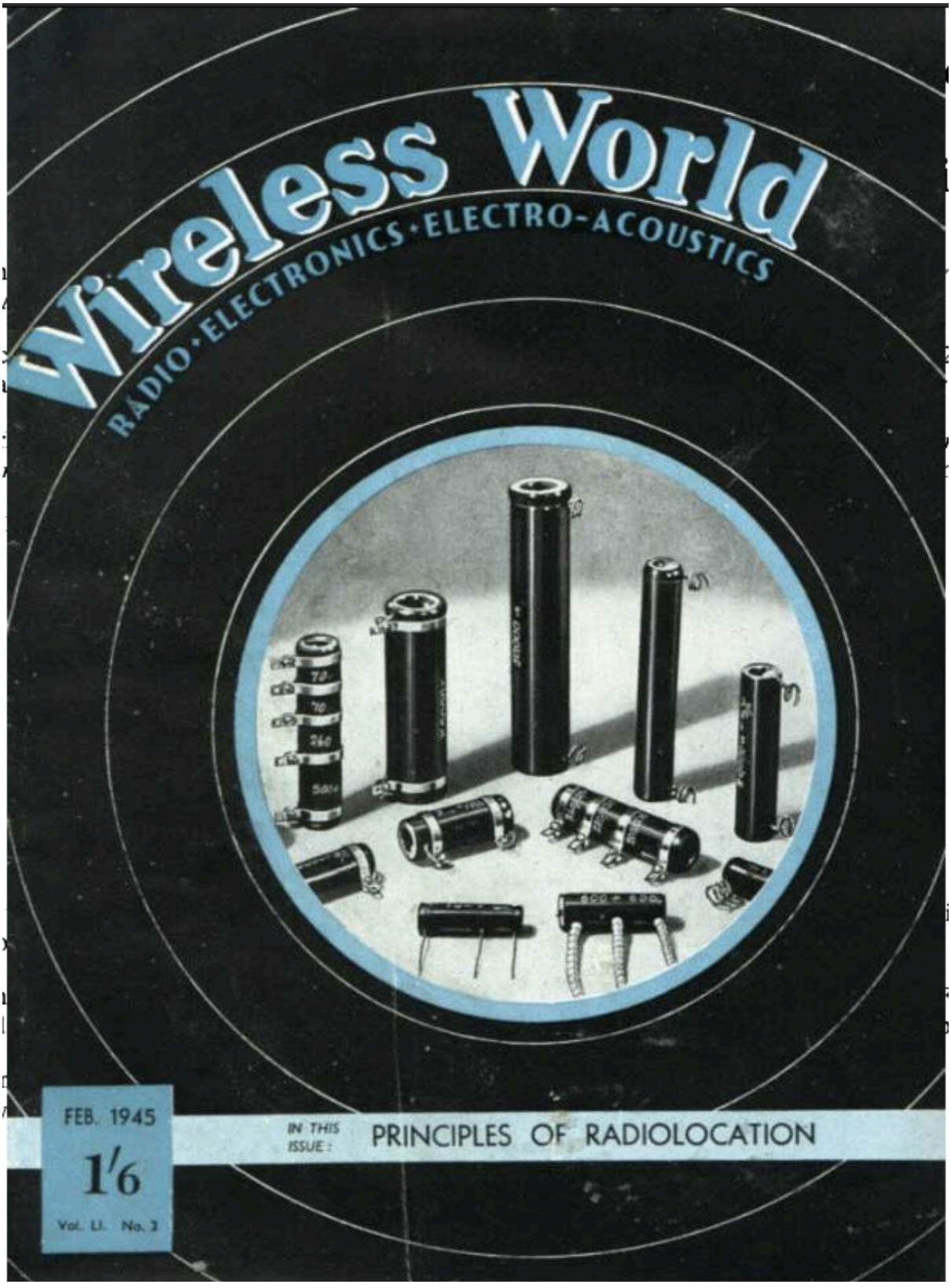
(a) the ship is engaged in piracy;
(b) the ship is engaged in the slave trade;
(c) the ship is engaged in unauthorized broadcasting and the flag State of the warship has jurisdiction under article 109;
(d) the ship is without nationality; or
(e) though flying a foreign flag or refusing to show its flag, the ship is, in reality, of the same nationality as the warship.

2. In the cases provided for in paragraph 1, the warship may proceed to verify the ship's right to fly its flag. To this end, it may send a boat under the command of an officer to the suspected ship. If suspicion remains after the documents have been checked, it may proceed to a further examination on board the ship, which must be carried out with all possible consideration.

3. If the suspicions prove to be unfounded, and provided that the ship boarded has not committed any act justifying them, it shall be compensated for any loss or damage that may have been sustained.

4. These provisions apply mutatis mutandis to military aircraft.

5. These provisions also apply to any other duly authorized ships or aircraft clearly marked and identifiable as being on government service.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PRINCIPLES OF RADIOLOCATION

Letters to the Editor

Peacetime Uses for V2 · FM Protection Against High-Amplitude Interference Pulses · Bad Books

V2 for Ionosphere Research?

ONE of the most important branches of radio physics is ionospheric research and until now all our knowledge of conditions in the ionosphere has been deduced from transmission and echo experiments. One of the more modest claims of the British Interplanetary Society was that rockets could be used for very high altitude investigations and it will not have escaped your readers' notice that the German long-range rocket projectile known as V2 passes through the E layer on its way from the Continent. If it were fired vertically without westward deviation it could reach the F_1 and probably the F_2 layer.

The implications of this are obvious: we can now send instruments of all kinds into the ionosphere and by transmitting their readings back to ground stations obtain information which could not possibly be learned in any other way. Since the weight of instruments would only be a few pounds—as compared with V2's payload of 2,000 pounds—the rocket required would be quite a small one. Its probable take-off weight would be one or two tons, most of this being relatively cheap alcohol and liquid oxygen. A parachute device (besides being appreciated by the public!) would enable the rocket to be re-used.

This is an immediate post-war research project, but an even more interesting one lies a little farther ahead. A rocket which can reach a speed of 8 km/sec parallel to the earth's surface would continue to circle it for ever in a closed orbit; it would become an "artificial satellite." V2 can only reach a third of this speed under the most favourable conditions, but if its payload consisted of a small one-ton rocket, this upper component could reach the required velocity with a payload of about 100 pounds. It would thus be possible to have a hundredweight of instruments circling the earth perpetually outside the limits of the atmosphere and broadcasting information as long as the batteries lasted. Since the rocket would be in brilliant sunlight for half the time, the operating period might be indefinitely prolonged by the use of thermo-couples and photo-electric elements.

Both of these developments demand nothing new in the way of technical resources; the first and probably the second should come within the next five or ten years. However, I would like to close by mentioning a possibility of the more remote future—perhaps half a century ahead.

An "artificial satellite" at the correct distance from the earth would make one revolution every 24 hours; i.e., it would remain stationary above the same spot and would be within optical range of nearly half the earth's surface. Three repeater stations, 120 degrees apart in the correct orbit, could give television and micro-wave coverage to the entire planet. I'm afraid this isn't going to be of the slightest use to our post-war planners, but I think it is the *ultimate* solution to the problem.

ARTHUR C. CLARKE,
British Interplanetary Society.

Frequency Modulation

WHILE post-war plans for television and UHF sound broadcasting are under discussion, it is important that the pros and cons of FM should be understood. Space will not permit a full discussion here; but I wish to correct a misconception, found even among responsible engineers, that FM can give no protection against ignition noise or other similar pulses which have an amplitude much greater than that of the signal carrier. The actual response of an FM receiver to very powerful impulsive interference can be summarised as follows:—

(1) In the absence of a signal, the FM receiver gives no output from impulsive interference.

(2) In the presence of an unmodulated carrier to which the FM receiver is accurately tuned, the impulsive interference causes no audible output. If the receiver is not accurately tuned, there will be an audible output, but the amplitude of the pulses in the audio-frequency circuits of the receiver will correspond to a modulation of the carrier of less than 100 per cent., in fact to a modulation depth equal to the ratio of the frequency error in tuning to the frequency swing corresponding to full modulation of a frequency-modulated signal.

(3) In the presence of a frequency-modulated signal to which the receiver is accurately tuned, the audio-frequency noise pulses are limited to the *instantaneous* level of signal modulation. If the receiver is not accurately tuned, the amplitude of the audio-frequency pulses will be increased by the amount defined in (2) above.

If it is true, as sometimes suggested, that ignition noise is the chief trouble in UHF broadcasting, this summary provides a basis for the comparison of FM with other systems, such as wide-band AM with audio-frequency limiting.

D. A. BELL.
London, N.21.

"New Thoughts on Contrast Expansion"

EXPEDIENCY be damned. My condemnation of contrast expansion was not based upon noise and neighbour tolerances. John B. Rudkin (your January issue) says "condemn the Philadelphia Orchestra because it is too large to play in the village hall." The truth is that anyone who asks it to do so should be condemned, and those who try to get the B.B.C. Orchestra into their bedroom are committing a crime. If the room is small, acoustically small, then only a limited contrast is proper, and all music

Table 8.2 Nine frequency bands as per the Radio Regulations, Art. 2(1)

Band number	Symbols	Frequency range (lower limit exclusive, upper limit inclusive)	Corresponding metric subdivision	Metric abbreviations for the bands
4	VLF	3 to 30 kHz	Myriametric waves	B.Mam
5	LF	30 to 300 kHz	Kilometric waves	B.km
6	MF	300 to 3 000 kHz	Hectometric waves	B.hm
7	HF	3 to 30 MHz	Decametric waves	B.dam
8	VHF	30 to 300 MHz	Metric waves	B.m
9	UHF	300 to 3 000 MHz	Decimetric waves	B.dm
10	SHF	3 to 30 GHz	Centimetric waves	B.cm
11	EHF	30 to 300 GHz	Millimetric waves	B.mm
12		300 to 3 000 GHz	Decimillimetric waves	

Table 8.3 Twelve frequency bands as per IEEE Standard 521-2002

Band name	Frequency range	Origin of name
HF band	3–30 MHz	**H**igh **F**requency
VHF band	30–300 MHz	**V**ery **H**igh **F**requency
L band	1–2 GHz	**L**ong wave
S band	2–4 GHz	**S**hort wave
C band	4–8 GHz	**C**ompromise between S and X
X band	8–12 GHz	Used in World War II for fire control – **X** for crosshair
Ku band	12–18 GHz	**K**urz-**u**nder
K band	18–27 GHz	**K**urz
Ka band	27–40 GHz	**K**urz-**a**bove
V band	40–75 GHz	
W band	75–110 GHz	**W** follows V
G band	110–330 GHz	

ITU CONSTITUTION

ARTICLE 1
Purposes of the Union

The purposes of the Union are:

a) to maintain and extend international cooperation among all its Member States for the improvement and rational use of telecommunications of all kinds;

...
c) to promote the development of technical facilities and their most efficient operation with a view to improving the efficiency of telecommunication services, increasing their usefulness and making them, so far as possible, generally available to the public; ...

...

2 To this end, the Union shall in particular:

a) effect allocation of bands of the radio-frequency spectrum, the allotment of radio frequencies and the registration of radio-frequency assignments and, for space services, of any associated orbital position in the geostationary-satellite orbit or of any associated characteristics of satellites in other orbits, in order to avoid harmful interference between radio stations of different countries;

b) coordinate efforts to eliminate harmful interference between radio stations of different countries and to improve the use made of the radio-frequency spectrum for radiocommunication services and of the geostationary-satellite and other satellite orbits; ...

...

ARTICLE 44
Use of the Radio-Frequency Spectrum and of the Geostationary-Satellite and Other Satellite Orbits

1 Member States shall endeavour to limit the number of frequencies and the spectrum used to the minimum essential to provide in a satisfactory manner the necessary services. To that end, they shall endeavour to apply the latest technical advances as soon as possible.

2 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 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.

ITU RADIO REGULATIONS

ARTICLE 1
Terms and definitions

…

Section II – Specific terms related to frequency management

1.16 allocation (of a frequency band): Entry in the Table of Frequency Allocations of a given frequency band for the purpose of its use by one or more terrestrial or space radiocommunication services or the radio astronomy service under specified conditions. This term shall also be applied to the frequency band concerned.

1.17 allotment (of a radio frequency or radio frequency channel): Entry of a designated frequency channel in an agreed plan, adopted by a competent conference, for use by one or more administrations for a terrestrial or space radiocommunication service in one or more identified countries or geographical areas and under specified conditions.

1.18 assignment (of a radio frequency or radio frequency channel): Authorization given by an administration for a radio station to use a radio frequency or radio frequency channel under specified conditions.

ITU CONSTITUTION

ARTICLE 13
Radiocommunication Conferences and Radiocommunication Assemblies

1 A world radiocommunication conference may partially or, in exceptional cases, completely, revise the Radio Regulations and may deal with any question of a worldwide character within its competence and related to its agenda; its other duties are specified in the Convention.

2 World radiocommunication conferences shall normally be convened every three to four years; however, following the application of the relevant provisions of the Convention, such a conference need not be convened or an additional one may be convened.

ITU CONVENTION

ARTICLE 7
World Radiocommunication Conference

...

2) The general scope of this agenda should be established four to six years in advance, and the final agenda shall be established by the Council preferably two years before the conference, with the concurrence of a majority of the Member States, ... These two versions of the agenda shall be established on the basis of the recommendations of the world radiocommunication conference, ...

ITU RADIO REGULATIONS

ARTICLE 5
Frequency allocations

...

5.28 3) Stations of a secondary service:

5.29 a) shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date;

5.30 b) cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date;

5.31 c) can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date.

...

5.32 4) Where a band is indicated in a footnote of the Table as allocated to a service “on a secondary basis” in an area smaller than a Region, or in a particular country, this is a secondary service (see Nos. 5.28 to 5.31).

5.33 5) Where a band is indicated in a footnote of the Table as allocated to a service “on a primary basis”, in an area smaller than a Region, or in a particular country, this is a primary service only in that area or country.

...

5.34 Additional allocations

5.35 1) Where a band is indicated in a footnote of the Table as “also allocated” to a service in an area smaller than a Region, or in a particular country, this is an “additional” allocation, i.e. an allocation which is added in this area or in this country to the service or services which are indicated in the Table (see No. 5.36).

5.36 2) If the footnote does not include any restriction on the service or services concerned apart from the restriction to operate only in a particular area or country, stations of this service or these services shall have equality of right to operate with stations of the other primary service or services indicated in the Table.

5.37 3) If restrictions are imposed on an additional allocation in addition to the restriction to operate only in a particular area or country, this is indicated in the footnote of the Table.

5.38 Alternative allocations

5.39 1) Where a band is indicated in a footnote of the Table as “allocated” to one or more services in an area smaller than a Region, or in a particular country, this is an “alternative” allocation, i.e. an allocation which replaces, in this area or in this country, the allocation indicated in the Table (see No. 5.40).

5.40 2) If the footnote does not include any restriction on stations of the service or services concerned, apart from the restriction to operate only in a particular area or country, these stations of such a service or services shall have an equality of right to operate with stations of the primary service or services, indicated in the Table, to which the band is allocated in other areas or countries.

5.41 3) If restrictions are imposed on stations of a service to which an alternative allocation is made, in addition to the restriction to operate only in a particular country or area, this is indicated in the footnote.

5.42 Miscellaneous provisions

5.43 1) Where it is indicated in these Regulations that a service or stations in a service may operate in a specific frequency band subject to not causing harmful interference to another service or to another station in the same service, this means also that the service which is subject to not causing harmful interference cannot claim protection from harmful interference caused by the other service or other station in the same service. (WRC-2000)

5.43A 1bis) Where it is indicated in these Regulations that a service or stations in a service may operate in a specific frequency band subject to not claiming protection from another service or from another station in the same service, this means also that the service which is subject to not claiming protection shall not cause harmful interference to the other service or other station in the same service.

...

Section I – General terms

1.2 *administration*: Any governmental department or service responsible for discharging the obligations undertaken in the Constitution of the International Telecommunication Union, in the Convention of the International Telecommunication Union and in the Administrative Regulations.

ITU CONSTITUTION

ARTICLE 14
Radio Regulations Board

1 The Radio Regulations Board shall consist of elected members thoroughly qualified in the field of radiocommunications and possessing practical experience in the assignment and utilization of frequencies. Each member shall be familiar with the geographic, economic and demographic conditions within a particular area of the world. They shall perform their duties for the Union independently and on a part-time basis.

...

3 1) In the exercise of their Board duties, the members of the Radio Regulations Board shall serve, not as representing their respective Member States nor a region, but as custodians of an international public trust. In particular, each member of the Board shall refrain from intervening in decisions directly concerning the member's own administration.

Table 8.1 Matrix of key terminology of the Radio Regulations, Art. 5(1)

Frequency distribution to	French	English	Spanish
Services	Attribution (attribuer)	Allocation (to allocate)	Atribución (atribuir)
Areas or countries	Allotissement (allotir)	Allotment (to allot)	Adjudicación (adjudicar)
Stations	Assignation (assigner)	Assignment (to assign)	Asignación (asignar)

Source: Art. 5 – Introduction, Radio Regulations

Table 8.2 Nine frequency bands as per the Radio Regulations, Art. 2(1)

Band number	Symbols	Frequency range (lower limit exclusive, upper limit inclusive)	Corresponding metric subdivision	Metric abbreviations for the bands
4	VLF	3 to 30 kHz	Myriametric waves	B.Mam
5	LF	30 to 300 kHz	Kilometric waves	B.km
6	MF	300 to 3 000 kHz	Hectometric waves	B.hm
7	HF	3 to 30 MHz	Decametric waves	B.dam
8	VHF	30 to 300 MHz	Metric waves	B.m
9	UHF	300 to 3 000 MHz	Decimetric waves	B.dm
10	SHF	3 to 30 GHz	Centimetric waves	B.cm
11	EHF	30 to 300 GHz	Millimetric waves	B.mm
12		300 to 3 000 GHz	Decimillimetric waves	

Notes:
1. 'Band N' (N + band number) extends from 0.3×10^N Hz to 3×10^N Hz
2. Prefix: k = kilo (10^3), M = mega (10^6), G = giga (10^9).

Table 8.3 Twelve frequency bands as per IEEE Standard 521-2002

Band name	Frequency range	Origin of name
HF band	3–30 MHz	**H**igh **F**requency
VHF band	30–300 MHz	**V**ery **H**igh **F**requency
L band	1–2 GHz	**L**ong wave
S band	2–4 GHz	**S**hort wave
C band	4–8 GHz	**C**ompromise between S and X
X band	8–12 GHz	Used in World War II for fire control – **X** for crosshair
Ku band	12–18 GHz	**K**urz-**u**nder
K band	18–27 GHz	**K**urz
Ka band	27–40 GHz	**K**urz-**a**bove
V band	40–75 GHz	
W band	75–110 GHz	**W** follows V
G band	110–330 GHz	

ARTICLE 10
Freedom of expression

1. Everyone has the right to freedom of expression. This right shall include freedom to hold opinions and to receive and impart information and ideas without interference by public authority and regardless of frontiers. This Article shall not prevent States from requiring the licensing of broadcasting, television or cinema enterprises.

2. The exercise of these freedoms, since it carries with it duties and responsibilities, may be subject to such formalities, conditions, restrictions or penalties as are prescribed by law and are necessary in a democratic society, in the interests of national security, territorial integrity or public safety, for the prevention of disorder or crime, for the protection of health or morals, for the protection of the reputation or rights of others, for preventing the disclosure of information received in confidence, or for maintaining the authority and impartiality of the judiciary.